Asia Pacific Spine Society
32nd Annual Scientific Meeting
& Philippine Spine Society
31st Annual Scientific Meeting

SPINE CARE REIMAGINED:

Advancing Through Innovation and Technology

2026

SHANGRI-LA MACTAN,
CEBU, PHILIPPINES
03 - 06 JUNE 2026

SOUVENIR PROGRAM

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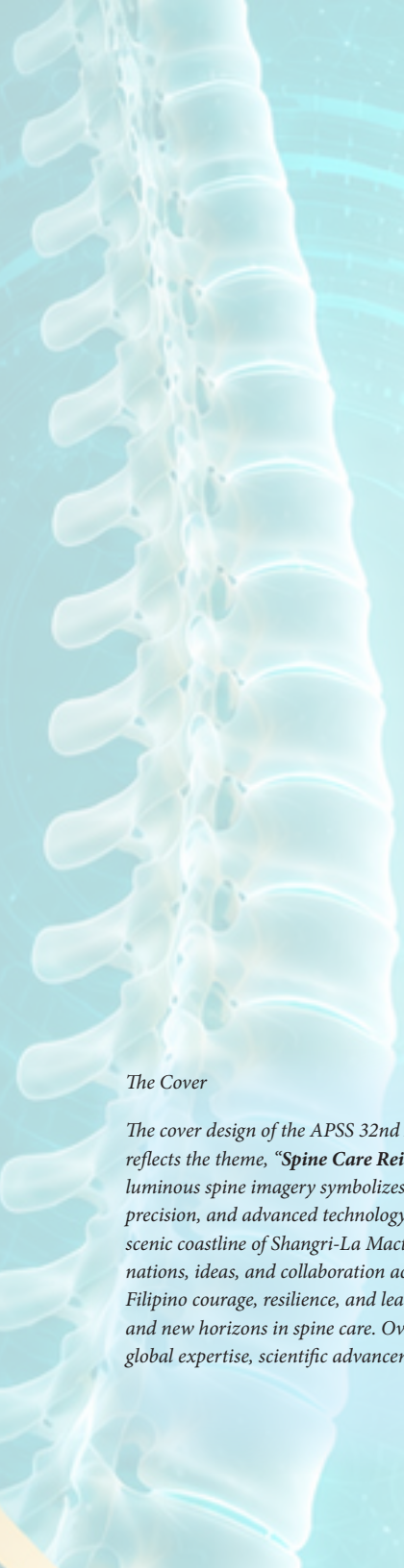

The Cover

*The cover design of the APSS 32nd Annual Scientific Meeting and PSS 31st Annual Scientific Meeting reflects the theme, "**Spine Care Reimagined: Advancing Through Innovation and Technology**." The luminous spine imagery symbolizes the rapid evolution of modern spine surgery driven by innovation, precision, and advanced technology. Set against the iconic backdrop of the CCLEX Bridge and the scenic coastline of Shangri-La Mactan, Cebu, the artwork highlights Cebu's role as a gateway connecting nations, ideas, and collaboration across the Asia-Pacific region. The inclusion of Lapu-Lapu represents Filipino courage, resilience, and leadership, while the ocean and sunrise imagery signify progress, unity, and new horizons in spine care. Overall, the cover embodies the meeting's vision of bringing together global expertise, scientific advancement, and regional culture in one transformative gathering.*

Contents

APSS President

Dear Colleagues and friends,

It is a great honour to welcome APSS members, guests, faculty, and industry partners to the APSS Annual Scientific Meeting 2026 in Cebu, Philippines. This year's meeting reflects the Asia Pacific Spine Society's enduring commitment to advancing spine care through scientific excellence, innovation, and meaningful regional collaboration.

The meeting stands as a clear expression of our shared purpose: to improve patient care by strengthening the science and practice of spine surgery. Through lectures, research presentations, discussions, and personal exchanges, this programme creates opportunities to expand knowledge, challenge established thinking, and inspire progress across our profession.

A major focus of this year's scientific programme is the transformative role of technology in contemporary spine surgery. Robotics, artificial intelligence, and advanced imaging are already reshaping clinical decision-making and procedural execution. These developments are helping surgeons reduce operative risk, minimise tissue trauma, support faster recovery, and improve outcomes for patients across a broad spectrum of spinal disorders.

At the same time, the true impact of innovation depends on the people who apply it. Progress in spine care is accelerated when surgeons, researchers, and allied professionals share expertise across borders and disciplines. The exchange of ideas within meetings such as this enables promising research to be translated into practical advances that directly benefit patients and healthcare systems throughout the region.

Continuous learning also strengthens the confidence and professional fulfilment of the surgeon. When clinicians are equipped with robust evidence, refined techniques, and modern tools, they are better positioned to deliver high-quality care with consistency and assurance. In this way, a culture of education and innovation serves both professional development and patient wellbeing.
The Society extends its sincere appreciation to the Local Organising Committee, the Scientific Committee, and all sponsors whose commitment and support have made this programme possible. Their contributions to education, research, and clinical excellence represent an important investment in the future of spine care in Asia-Pacific.

All participants are encouraged to take full advantage of the opportunities this meeting offers: to attend with curiosity, engage in thoughtful discussion, build lasting professional connections, and carry new insights back into clinical practice. Through collective commitment and collaboration, we continue to shape the future of spine care together.

Yours sincerely,

Wa

Prof. Yat Wa Wong
President, Asia Pacific Spine Society

Dear Colleagues,

It is with great honor and pride that we welcome all delegates, faculty, guests, industry partners, and colleagues to this year's scientific gathering of the Philippine Spine Society in collaboration with the Asia Pacific Spine Society.

This occasion represents more than a convergence of experts and professionals in spine care. It is a celebration of our shared commitment to advancing knowledge, strengthening professional collaboration, and embracing innovation that will shape the future of patient care in our region and beyond. Guided by the theme, "Spine Care Reimagined: Advancing Through Innovation and Technology," this meeting highlights the evolving landscape of spine surgery and the collective pursuit of excellence among spine specialists.

As we gather for meaningful scientific discussions, exchange of ideas, and fellowship, may this congress inspire all of us to continue pushing boundaries in research, education, and clinical practice. Through collaboration and continuous learning, we reaffirm our dedication to providing the highest standards of spine care for our patients and communities.

We extend our sincere gratitude to all organizing committees, faculty members, sponsors, and participants whose unwavering support and contributions have made this event possible. Your commitment and enthusiasm continue to strengthen our society and advance the field of spine surgery throughout the Asia-Pacific region.

May this scientific meeting be both productive and memorable, fostering new friendships, valuable collaborations, and lasting professional partnerships.

Welcome, and we wish everyone a successful and enriching congress.

RPT

RONALD P. TANGENTE, MD, MBA, FPOA, FPSS
President, Philippine Spine Society
Overall Organizing Chairman
APSS–PSS Scientific Meeting 2026

Scientific Committee Chair

Welcome to the Asia Pacific Spine Society Annual Scientific Meeting 2026.

It is with great pleasure that I welcome you to APSS 2026 here in Mactan, Cebu, Philippines. On behalf of the Scientific Committee, I extend my warmest greetings to all our delegates, faculty, guests, industry partners, and friends from across the Asia-Pacific region and beyond.

This year's meeting has been thoughtfully designed to reflect the many dimensions of modern spine care—grounded in sound principles, enriched by collaboration, and inspired by innovation. As our field continues to evolve, so too must the way we learn, teach, question, and work together. APSS 2026 aims to provide not only an update on where we are, but also a meaningful look at where we are headed.

Our scientific program brings together a rich and dynamic mix of topics across deformity, degenerative conditions, minimally invasive and endoscopic surgery, navigation and robotics, infection, tumor, trauma, osteoporotic and aging spine, research, education, and future-facing technologies. Just as importantly, we have sought to create a meeting that is clinically relevant, intellectually stimulating, and deeply practical for surgeons working in a wide range of settings across our region.

This year's program was organized with a clear track-based structure to help delegates navigate the meeting according to their interests while encouraging cross-learning between subspecialties. We have also placed strong emphasis on interactive formats—case-based discussions, operative video sessions, panel conversations, free paper presentations, and collaborative society sessions—to make the exchange of ideas more engaging and more useful to everyday practice.

APSS has always been more than a scientific meeting. It is a community of colleagues brought together by a shared commitment to better spine care, better education, and better outcomes for our patients. In that spirit, APSS 2026 also highlights the importance of mentorship, fellowship, research collaboration, inclusivity, and developing the next generation of leaders in spine surgery.

I would like to express my sincere gratitude to all our invited speakers, moderators, panelists, abstract presenters, partner societies, and organizing teams for their invaluable contributions. My deepest thanks also go to the Local Organizing Committee, the APSS leadership, and the members of the Scientific Committee for their hard work, dedication, and generosity in bringing this meeting to life.

May this meeting be a time of learning, reflection, reconnection, and renewed inspiration. May we leave not only with new knowledge, but also with new ideas, new collaborations, and a deeper sense of shared purpose.

Welcome to APSS 2026, and welcome to Cebu.

With warm regards,

ANNE KATHLEEN B. GANAL-ANTONIO, MD, FPOA, FPSS, FPCS
Scientific Committee Chair
APSS–PSS Scientific Meeting 2026

Dear Friends,

On behalf of the Asia Pacific Spine Society and the Philippine Spine Society, allow me to express to all of you our extreme gratitude for your participation in this conference.

We are proud to present one of the highlights of this meeting which is the research paper outputs that will be showcased in different categories namely : the best paper for basic research, best paper for clinical research, free paper presentation (Degenerative, Infection, Trauma, Tumor, Deformity, MIS, Navigation, and Robotics), rapid fire, and digital poster presentation.

About 300 papers were submitted to us from all over the world which reflects the eagerness and united resolve of our spine colleagues in advancing the science and art of spine care. We are delighted to provide this platform of inclusivity, specially in the Asia Pacific region, as an avenue to share months or even years of hard work in producing quality research papers. May I enjoin all of you to sit in the respective sessions and indulge in your different topics of interest, to visit the designated areas for e-poster and rapid fire presentations and interact with the authors of these informative papers. May this be an opportunity of learning, collaboration and strengthening of ties.

Last but not the least, I would like to personally thank and congratulate the research committee technical working groups of the PSS and Mr. Mike Villanueva who worked so hard to put up the research arm of this program.

May we all have a fruitful and memorable APSS 2026 in Cebu!

Sincerely,

ROMEL P. ESTILLORE, MD, FPOA, FPSS
Research *Chairman*
APSS–PSS Scientific Meeting 2026

Professor Keith Luk Dip Kei

Professor Keith Luk Dip Kei is an internationally renowned orthopaedic spine surgeon, academic leader, and pioneering researcher whose contributions have significantly advanced the field of spine surgery and scoliosis management worldwide. He currently serves as Honorary Consultant Orthopedic Surgeon at the Hong Kong Sanatorium and Hospital, Honorary Clinical Professor in the Department of Orthopaedics and Traumatology at The University of Hong Kong, and Emeritus Professor of The University of Hong Kong, where he previously held the distinguished Tam Sai Kit Chair Professorship in Spine Surgery from 2000 to 2018.

Professor Luk obtained his MBBS degree from Hong Kong in 1977 and subsequently earned numerous prestigious professional qualifications, including FRCS (Edinburgh and Glasgow), FRACS (Orthopaedics), MCh (Orth) from Liverpool, FHKCOS, and FHKAM (Orthopaedic Surgery). Throughout his distinguished career, he has received an exceptional number of international and regional awards in recognition of his groundbreaking work in orthopaedics, spine surgery, biomechanics, and scoliosis research.

A prolific scholar and innovator, Professor Luk has authored more than 435 refereed journal publications, contributed 34 book chapters, and filed 19 patents. His research has been widely published in leading international journals, including The Spine Journal, Spine, The Journal of Bone and Joint Surgery, Lancet, Nature Reviews Rheumatology, PNAS, and the Journal of Clinical Investigation. His pioneering work in adolescent idiopathic scoliosis, skeletal maturity assessment, spinal deformity correction, intervertebral disc regeneration, and congenital scoliosis genetics has profoundly influenced modern spine care and clinical practice globally.

As a principal investigator and collaborator, Professor Luk has also secured and contributed to major international research grants supporting innovations in orthopaedic and spinal research. Widely respected for his academic excellence, visionary leadership, and lifelong dedication to advancing orthopaedic surgery, Professor Keith D.K. Luk continues to inspire surgeons, researchers, and trainees across the world through his clinical expertise, scientific achievements, and commitment to excellence in spine care.

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Opening Ceremonies

Asia Pacific Spine Society 32nd Annual Scientific Meeting & 31st Philippine Spine Society Annual Scientific Meeting

1000 Hrs.
04 June 2026
Marquee Tent
Shangri-La Mactan, Cebu Philippines

Program

Processional
Parade of Dignitaries
Doxology
Entrance of Colors
Philippine National Anthem
Message from the PSS President & Congress Chairman
Ceremonial Opening
APSS Presidential Address
APSS Oration
Asian Spine Journal Introduction

Attire: Coat & Tie

DAY 0 | Wednesday | 03 June 2026

0800-1645 PRE-CONGRESS WORKSHOP: A HANDS-ON WORKSHOP
Fundamentals of Uniportal and Biportal Endoscopic Lumbar Surgery
Chong Hua Hospital, Mandaue Cebu
12th Floor Auditorium

DAY 1 | Thursday | 04 June 2026

Shangri-La Mactan, Cebu

Time	Marquee Tent	Mactan 1 & 2	Mactan 3	Mactan 4	Jasmine Room
0800–0900		Free Paper Session I (Degenerative)	Rapid Fire Free Paper Session I	Free Paper Session II (Infections + Trauma)	Rapid Fire Free Paper Session II
0900–1000		Craniocervical Junction	Why MISS Still Matters in 2026	Spine Infections in 2026	
1000–1230	Opening Ceremony				
1230–1330		Industry Sponsored Lecture (Medtronic)			
1330-1400		Lunch Symposium (Baxter)			
1400-1430		KSSS Plenary Lecture			
1430-1500		IOSSA Plenary Lecture			
1500-1530		Coffee Break			
1530-1600		JSSR Plenary Lecture			
1600-1700		APSS General Assembly			
1800-2100	Gala Night				

DAY 2 | Friday | 05 June 2026

Shangri-La Mactan, Cebu

Time	Mactan 1 & 2	Mactan 3	Mactan 4	Jasmine Room
0800–0900	APSS Fellowships	Navigation & Robotics 2.0	Modern Spine Oncology	Rapid Fire Free Paper Session III
0900–1000	Cervical Degenerative Case Controversies	Best Paper Session I: Clinical	Free Paper Session III (Tumour)	
1000–1030	Coffee Break/Snack Symposium (Brainlab | Taisho)			
1030-1130	APSS-IOSSA Collaborative Session	Quality, Safety and Professionalism in the Digital Era	Stem Cells and Regeneration in Spine	
1130-1230	Industry Sponsored Lecture (Globus Medical)			
1230–1300	Lunch Symposium [Raynham | Dragon Crown Medical | Variance]			
1330-1430	Lumbar Degenerative Disease	Spine Endoscopy in 2026	The Aging Spine: Managing Complications Beyond Osteoporosis	Rapid Fire Free Paper Session IV
1430–1530	Free Paper Session IV (Deformity)	Best Paper Session II: Basic Science		
1530-1600	Coffee Break/Snack Symposium [ASpine]			
1600-1641	APSS-SFG: New Evidence in AIS:	APSS-KSSS Collaborative Session	Spine Trauma in the Real World	
1700-1720	KSSS Plenary Lecture			
1800–2300	Fellowship Night [The Mactan Newtown Beach Rotunda]			

DAY 3 | Saturday | 06 June 2026

Shangri-La Mactan, Cebu

Time	Mactan 1 & 2	Mactan 3	Mactan 4
0800–0900	Pediatric Spinal Deformities	Free Paper Session V (MIS/ Navigation/Robotics)	How I Do It: Live-Commented Operative Videos
0900–1000	Adult Spinal Deformity – Meet the Masters:	Rapid Fire Free Paper Session V	Women in Spine
1030–1030	Snack Symposium/Coffee Break (Sanyou Medical | Regenesys)		
1030-1130	JSS-APSS Session: Treatment of Adult Spinal Deformity (ASD)	APSS–AO Spine Translational Research	Innovations in Osteoporotic Spine
1130-1200	Lunch		
1200-1240	Lunch Plenary Panel: Future of Spine Care		
1240–1350	Closing Ceremony & Awards		

DAY 0 | Wednesday

12th Floor Auditorium
Chong Hua Hospital, Mandaue City, Cebu

Time	Title/Faculty
07:30 – 08:00	Registration and Welcome Coffee
08:00 – 08:08	Opening Remarks (Dr. Richard V. Condor | PSS Vice President & Vice Chairman, APSS-PSS Congress 2026)
08:09 – 08:15	Course Overview/House Rules (Dr. Jose Joefrey F. Arbatin, Jr. | Course Director)
08:16 – 08:30	Lecture 1: Unilateral Biportal Endoscopic discectomy for Lumbar disc herniation (Adj Prof. Gabriel Liu)
08:31 – 08:46	Lecture 2: UBE for decompression in spinal stenosis (Dr. Jacob Oh)
08:46 – 09:01	Lecture 3: Emphasizing the dual challenge of Uniportal Endoscopy: Mastering the skill and patient selection (Dr. Christopher C. Balaba)
09:01 – 09:15	Lecture 4: Uniportal endoscopic surgery for extended indications and clinical outcomes (Dr. Jiang Lei)
09:16 – 09:20	Moderator: Dr. Jose Joefrey F. Arbatin Jr. Panel Discussion and Q&A Group Photo
09:20 – 09:40	Coffee Break [AVP: Inova | Brainlab | Taisho]
Hands-on Workshop (Realist Lumbar Model Session) 3 stations : Uniportal; 5 stations : Biportal; 2 participants/ 1 faculty / station / 1 hour per participant	
9:40 – 10:00	Workshop Orientation *Demonstration of Instruments and Realist Models*
10:00 – 12:00	Hands-on Session 1: Basic UBE and Uniportal Technique Practice on Dummy Models *Portal placement, laminotomy, flavectomy, discectomy , and instrument familiarization (burr/RF)*
12:00 – 13:00	Lunch Symposium [AMGEN | Endocare | Riwo | Vantage | Variance]
Hands-on Workshop (Swine Session) 3 stations : Uniportal; 5 stations : Biportal; 1 hr 30 min /participant	
13:15 – 16:15	Hands-on Session 2: Live Tissue Practice on Swine Models *Laminotomy Discectomy , Technique Refinement, and Basic Procedure Completion*
16:16 – 16:30	Debriefing and Workshop Wrap-up
16:31 – 16: 45	Closing Remarks & Certificate Distribution to sponsors

Uniportal Table Instructors: *Dr. Gian Karlo P. Dadufalza; Dr. Buenaventura Alfredo B. Canto IV; Dr. Jiang Lei; Dr. Chew Zhihong*
Biportal Table Instructors: *Dr. Oliver Y. Ong; Dr. Jose Miguel T. Lumawig; Dr. David Mak; Dr. Heng Hwee Yee Christian; Dr. Mary Ruth A. Padua; Dr. Roy Michael G. Domacena*

Gala Night

Asia Pacific Spine Society 32nd Annual Scientific Meeting
& 31st Philippine Spine Society Annual Scientific Meeting

1700 Hrs.
04 June 2026
Marquee Tent
Shangri-La Mactan, Cebu Philippines

Program

Processional
Messages
Ceremonial Toast
Dinner
Re-enactment of the Arrival of Christianity in the Philippines
Entertainment
PSS AVP
Awards
Entertainment
Closing

Attire: National Costume

DAY 1 | Thursday

Time	Title/Faculty
0800-0900	Free Paper Session I (Degenerative) Moderators: Rommel L. Tan (Philippines) & Abdul Kadir Hadar (Indonesia)
Craniocervical Junction: Anatomy, Instability and Decision-Making (From congenital and rheumatoid pathology to real-world fixation options) Session Chair: Gilbert J. Rañoa Moderators: Gilbert J. Rañoa (Philippines) and Seok Woo Kim (South Korea)	
0900-0908	Evolving Concepts in Craniovertebral Junctional Instability: Anatomy to Alignment [Dong Ho Lee/South Korea]
0909-0916	Management of Basilar Invagination [Dipak Shrestha/Nepal]
0917-0924	Complications in Cranio-cervical Junction Surgery: Prevention, Recognition and Salvage [Gilbert J. Rañoa/Philippines]
0925-0934	Open Forum
0935-0942	Cervical Fusion for the Chiari I Malformation [Eric Dennis C. Legaspi/Philippines]
0943-0950	Video: C1C2 Fusion using Navigation [Michael Louis A. Gimenez/Philippines]
0951-1000	Open Forum
1000-1230	Opening Ceremony [Marquee Tent]
1230-1330	Industry Sponsored Lecture (Medtronic) [Mactan Ballroom]
1330-1400	Lunch Symposium (Baxter) [Mactan Ballroom]
AFTERNOON SESSIONS (Mactan Ballroom) Plenary Lectures Moderators: Ronald P. Tangente (Philippines) and Gabriel Liu (Singapore)	
1400-1430	KSSS Plenary Lecture (Prof. Yong Chan Kim): Decision of Surgical Strategies for Severe Dynamic Sagittal Imbalance
1430-1500	IOSSA Plenary Lecture (Prof. Luthfi Gatam)- Lumbar Disc Replacement, Overview and Outcome
1500-1530	Coffee Break
1530-1600	JSSR Plenary Lecture (Prof. Masaya Nakamura): Regenerative medicine for spinal cord injury using iPS cells
1600-1700	APSS General Assembly
1800-2100	Gala Night [Marquee Tent]

DAY 1 | Thursday

Time	Title/Faculty
0800-0900	Rapid Fire Free Paper Session I Moderators: Erika Paulina Stefani H. See (Philippines) & Samuel Arsenio M. Grozman
Why MISS Still Matters in 2026 (Less invasive, not less demanding—indications, limits and outcomes) Session Chair: Orland Joshua M. Alimbuyuguen (Philippines) Moderators: Orland Joshua M. Alimbuyuguen and Brian Hsu (Australia)	
0900-0908	Modern ALIF: Safe Access, Fusion Strategies, and Long-Term Outcomes [John Choi/Australia]
0909-0916	Mastering the Oblique Corridor: Advanced Techniques in X-ALIF and ATP Fusion [John Choi/Australia]
0917-0924	Tips and Pitfalls in Cervical Endoscopic Surgery [Jae Hung Shin/South Korea]
0925-0934	MIS Deformity Correction: Alignment, Balance & Safety [Niraj B. Vasavada/India]
0935-0942	Navigation in Posterior Lumbar Instrumentation [Alvin Pun/Australia]
0943-0950	Panel: The Future of MISS in APAC (Collaboration, Innovation, and Training)
0950-1000	Open Forum
1000-1230	Opening Ceremony [Marquee Tent]
1230-1330	Industry Sponsored Lecture (Medtronic) [Mactan Ballroom]
1330-1400	Lunch Symposium (Baxter) [Mactan Ballroom]
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1500-1530	Coffee Break
1530-1600	JSSR Plenary Lecture (Prof. Masaya Nakamura): Regenerative medicine for spinal cord injury using iPS cells
1600-1700	APSS General Assembly
1800-2100	Gala Night [Marquee Tent]

DAY 1 | Thursday

Time	Title/Faculty
0800-0900	Free Paper Session II (Infections + Trauma) Moderators: Dr. Paul Albert C. Manuel (Philippines) & Syed Shahidul Islam (Bangladesh)
Spine Infections in 2026: Principles, Pitfalls and Practical Algorithms (When to biopsy, when to brace, when to instrument, land when to stop antibiotics) Session Chair: Harjoland L. Obenieta (Philippines) Moderators: Harjoland L. Obenieta and Prof. M. Arif Khan (Pakistan)	
Panelists: Jean Pierre F. Leung (Philippines); Gaurav Raj Dhakal (Nepal); Shu-Hua Yang (Taiwan)	
0900-0915	Case 1: Spine Infection with Instability: MIS vs Open [Ingrid Frances D. Ignacio/ Philippines]
0916-0930	Case 2: Peri-Implant Infection — Retain or Remove? [Ingrid Frances D. Ignacio/ Philippines]
0931-0945	Case 3: Infection in the Immunocompromised: Implant Choice & Antibiotic Strategy [Borriwat Santipas/Thailand]
0946-0952	Tuberculosis of the Spine: Bangladesh Experience [Shah Alam/Bangladesh]
0953-1000	Open Forum
1000-1230	Opening Ceremony [Marquee Tent]
1230-1330	Industry Sponsored Lecture (Medtronic) [Mactan Ballroom]
1330-1400	Lunch Symposium (Baxter) [Mactan Ballroom]
AFTERNOON SESSIONS (Mactan Ballroom) Plenary Lectures Moderators: Ronald P. Tangente (Philippines) and Gabriel Liu (Singapore)	
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1430-1500	IOSSA Plenary Lecture (Luthfi Gatam)- Lumbar Disc Replacement, Overview and Outcome
1500-1530	Coffee Break
1530-1600	JSSR Plenary Lecture (Masaya Nakamura): Regenerative medicine for spinal cord injury using iPS cells
1600-1700	APSS General Assembly
1800-2100	Gala Night [Marquee Tent]

DAY 1 | Thursday

Time	Title/Faculty
0800-1000	Rapid Fire Free Paper Session II [Jasmine Room] Moderator: Shah Alam (Bangladesh) and Nicole Teresa C. Lukban-Venida (Philippines)

DAY 2 | Friday

Time	Title/Faculty
APSS Fellowships: Building Your Regional Career Path (How to choose a fellowship, get published and stay engaged with APSS)	
0800-0805	Opening; Program Spotlights – Host Centres [Alvin Pun/Australia]
0805-0811	National University Hospital [Gabriel Liu/Singapore]
0811-0817	Keio University [Kota Watanabe/Japan]
Alumni Stories – Life as an APSS Fellow	
0817–0820	UMMC/ Chi-Wei Chen
0820–0823	UMMC/ Abdullah Al Mamun Choudhury
0823–0826	UMMC/ Guna Pratheep Kalanchiam
0826–0829	UMMC/ Ana Rosario Merceditas Sta. Ana-Famador
0829–0832	Ganga/ Kyaw Linn Linn
0832–0835	Ganga/ Jun-Hao Tan
0835–0838	Ganga/ Md Monowar Tarik
8038–0841	APSS Medtronic Fellowship/ Bhaskar Sarkar
0841–0844	APSS Medtronic Fellowship/ Chia Yu Lin
0844–0847	APSS Medtronic Fellowship/ Wongthawat Liawrungrueang
0847–0855	Panel: Designing the Ideal Fellowship & Giving Back/ Panel
0855–0900	Wrap-up & Take-Home Messages
Cervical Degenerative Case Controversies (Failed surgery, border-line indications, and "what I would do differently next time") Session Chair: Rommel F. Fernando Moderators: Rommel F. Fernando (Philippines) & Samuel Arsenio M. Grozman (Philippines)	
0900-0902	Opening
0903-0925	Case 1 Discussion: Degenerative Cervical Spine Complex Cases and Morbidities (Anterior or Posterior or Both) [Kuniyoshi Abumi/Japan; Wong Chung Chek/ Malaysia]
0926-0950	Case 2 Discussion: Degenerative Cervical Spine Complex Cases and Morbidities (Anterior or Posterior or Both) [Brian Hsu/Australia; Sub-ri Park/South Korea]
0950-1000	3D printing and templating technology: Current applications in Degenerative Cervical Spine Surgery [Rafael C. Bundoc/Philippines]
1000-1030	Coffee Break/Snack Symposium (Brainlab/Taisho) [Mactan Ballroom]
APSS-IOSSA Collaborative Session: Cervical & Lumbar Degeneration - Global Principles and Treatment Pathways (What international guidelines and registries tell us about when and how to operate) Session Chairs: Yudha Mathan Sakti (Indonesia) and Jose Miguel T. Lumawig/Philippines	
Session 1: Moderator Primadenny Airlangga (Indonesia)	
1030-1038	The Benefit of Multilevel CDR will be [Dennis Hey/Singapore]
1039-1046	The Role of Endoscopic Decompression in Degenerative Cervical Spine [Abdul Kadir Hadar/Indonesia]

1047-1054	Open Forum
Session 2: Moderator Asrafi Rizki Gatam (Indonesia)	
1055-1104	Current review and comparison of fusion and motion preservation in Lumbar degenerative stenosis [Wongthawat Liawrungrueang/Thailand]
1105-1113	Multilevel posterior fusion is not obsolete [Rommel L. Tan/Philippines]
1114-1122	En Bloc Discectomy via Anterior Lumbar Approach for Lumbar Disc Replacement: A Technical Note [Harmantya Mahadipta/Indonesia]
1122-1130	Open Forum
1130-1230	Industry Sponsored Lecture (Globus Medical) [Mactan Ballroom]
1230–1330	Lunch Symposium (Raynham/Dragon Crown Medical/Variance) [Mactan Ballroom]
Lumbar Degenerative Disease: Choosing the Right Operation (Disc arthroplasty, fusion and MISS—matching procedure to patient and pathology) Session Chair: Eric Astelo O. Belarmino (Philippines) Moderators: Jose Joefrey F. Arbatin, Jr. (Philippines) & Prof. Tsai-Sheng Fu (Taiwan)	
1330-1338	Lumbar Lordosis Alignment: Where are We Now and How Did We Get There? [Jonathan N. Sembrano/USA]
1339-1346	Use of Patient Specific Rods in Spinal Deformity Surgery [Jonathan N. Sembrano/USA]
1347-1354	Combined OLIF/ Posterior Fusion in ASD [Dong-Gune Chang/South Korea]
1355-1404	Open Forum
1405-1413	SI Joint Dysfunction (Diagnosis and Treatment) [Alvin Pun/Australia]
1414-1422	Advancing Minimally Invasive Fusion: The Role of Biportal Endoscopy in Lumbar Fusion [Tran Vu Hoang Duong/Vietnam]
1423-1430	Open Forum
1430–1530	Free Paper Session IV (Deformity) Moderators: Ryan Conrad A. Carnero (Philippines)
1530-1600	Coffee Break (ASpine) [Mactan Ballroom]
APSS-SFG: New Evidence in AIS: Growth Prediction, Brace Weaning, and Alignment Strategies from the APSS-SFG Multicenter Studies Session Chair: Hideki Shigematsu Moderators: Hideki Shigematsu (Japan) & Kenny Yat Hong Kwan (Hong Kong)	
1600-1607	International Multicenter Validation of the DRU Classification [Hideyuki Arima/Japan]
1608-1615	Skeletal Maturity Assessment and Prediction of Curve Progression after Brace Weaning [Chih-Wei Chen/Taiwan]
1616-1624	Determinants of Shoulder Balance in Lenke 1 and 2 Curves [Chris Chan/Malaysia]
1625-1632	Integrated Decision-Making in AIS: From Growth Assessment to Surgical Planning [Ajoy Prassad Shetty/India]
1633-1640	Benefits and Hurdles in Robotic AIS Surgery [Daisuke Sakai/Japan]
1640-1650	Open Forum
1700-1720	KSSS Plenary Lecture: Severe but Silent Cervical Stenosis- How to diagnose and manage? [KSSS Past President Jong-Beom Park]
1800–2300	Fellowship Night [The Mactan Newtown Beach Rotunda]

Fellowship Night

Asia Pacific Spine Society 32nd Annual Scientific Meeting
& 31st Philippine Spine Society Annual Scientific Meeting

1800 Hrs.
05 June 2026
Mactan Newtown Beach Rotunda

Program

Dinner
Presentation: Battle of Mactan
Entertainment
Fireworks
Fire Dance
Band Performance
LED Light Dance
Cultural Presentation
Band Performance
Closing

Attire: Beach Wear

DAY 2 | Friday

Time	Title/Faculty
Navigation & Robotics 2.0: From Hardware to AI-Driven Decisions (Integrating AR/VR, machine learning and intra-op imaging into daily practice) Session Chair: Oliver Y. Ong (Philippines) Moderator: Oliver Y. Ong and Michael Louis A. Gimenez (Philippines)	
0800-0808	Evolution & Current State of Navigation & Robotic Systems in Spine Surgery [Yoshiharu Kawaguchi/Japan]
0809-0816	Advanced Navigation Modalities (AR/VR) in Cervical Deformity Surgery [Wen-Tien Wu/Taiwan]
0817-0824	Terminator Tendencies: Hidden Threat of AI in Clinical Medicine [Ou Yang Youheng/Singapore]
0825-0834	Robotic & Navigation-Assisted Surgery in Complex Spine Procedures [Jacob Oh/Singapore]
0835-0842	The Future of Lumbar Spine Care: AI, Predictive Analytics, and Personalized Surgery [Kenny Yat Hong Kwan/Hong Kong]
0842-0900	Open Forum
0900-1000	Best Paper Session I: Clinical Moderators: Adrian B. Catbagan (Philippines) & Yat Wa Wong (Hong Kong)
1000-1030	Coffee Break/Snack Symposium (Brainlab/Taisho) [Mactan Ballroom]
Quality, Safety and Professionalism in the Digital Era (OR checklists, complication reporting, and how to behave on social media) Session Chair: Miguel Rafael D. Ramos (Philippines) Moderators: Miguel Rafael D. Ramos and Jiong Hao Jonathan Tan (Singapore)	
Quality & Safety in Spine Surgery	
1030-1038	ERA(S)S: Enhanced Recovery After (Spine) Surgery [Katrina Jean G. Gabriel-Ramos/Philippines]
1039-1046	Maximizing Operative Checklists [John Nathaniel M. Ruiz/Singapore]
1047-1054	How O-Arm Navigation has Transformed My Approach to Complex Spinal Deformity Surgery [Din Ngoc Son/Vietnam]
Spine Socials: Social Media in Spine Surgery	
1055-1104	Ethics & Legalities of Posting on social media [Dato' KS Sivananthan/Malaysia]
1105-1113	The Value of social media in Spine Surgery [Guna Pratheep Kalanchiam/India]
1114-1122	Establishing Your Social Media Presence [Muhamad Aulia Rahman/Indonesia]
1123-1130	Open Forum
1130-1230	Industry Sponsored Lecture (Globus Medical) [Mactan Ballroom]
1230–1330	Lunch Symposium (Raynham/Dragon Crown Medical/Variance) [Mactan Ballroom]

Spine Endoscopy in 2026: Beyond Simple Decompression (Fusion, thoracic and infection cases—where endoscopy adds real value) Session Chair: Gian Karlo P. Dadufalza (Philippines) Moderators: Gian Karlo P. Dadufalza and Shu Hua Yang (Taiwan)	
1330-1338	Complications in Endoscopic Posterior Cervical Spine Surgery: Preventive and Effective Management Strategies [Yong Hai/China]
1338-1346	The tips for avoiding and managing complications in lumbar degenerative conditions, in endoscopic (or full endoscopic) spine surgery [Jae Hung Shin/South Korea]
1346-1354	Endoscopic Spine surgery expanding indications: Endoscopic Debridement for Pyogenic Spondylodiscitis/ TB spondylitis/ Tumors [Yong Hai/China]
1354-1402	Local Anesthesia and Erector Spinae Plane Block in Endoscopic Spine Surgery: Our Local Experience [Gian Karlo P. Dadufalza/Philippines]
1402-1410	Updates in Endoscopic Fusion – Expanding Indications [Wongthawat Liawrungrueng/Thailand]
1411-1419	Tips and Tricks to Improve Efficiency of Biportal Endoscopic [Dennis Hey/Singapore]
1419-1430	Open Forum
1430–1530	Best Paper Session (Basic Science) Moderators: Clint P. Guitarte (Philippines) and Zhaomin Zheng (China)
1530-1600	Coffee Break (ASpine) [Mactan Ballroom]
APSS-KSSS Collaborative Session: Complex Cervical Spine and Proximal Junction Kyphosis Session Session Chair: Ki Tack Kim (South Korea)	
Session 1: Complex Cervical Spine Moderators: Ronald P. Tangente (Philippines) and Kyu Jung Cho (South Korea)	
1601-1608	How well do we know about posterior cervical foraminotomy? [Dong Ho Lee/South Korea]
1609-1616	Total en bloc resection of the uncinate for cervical spondylotic radiculopathy [Kyung Soo Suk/South Korea]
1617-1624	Treatment Strategies in Adjacent Segment Disease After Cervical Spinal Fusion [Jae Jun Yang/South Korea]
1625-1630	Open Forum
Session 2: Proximal Junctional Kyphosis Moderators: Ronald P. Tangente (Philippines) and Ki Tack Kim (South Korea)	
1631-1638	Treatment strategies for cervical kyphotic deformity [Seok Woo Kim/South Korea]
1639-1646	Preventive and Treatment Strategies for Proximal Junctional Problem in the Thoracolumbar Spine [Yong Chan Kim/South Korea]
1647-1654	Recent trials for prevention of PJK [Ho-Joong Kim/South Korea]
1655-1700	Open Forum
1700-1720	KSSS Plenary Lecture: Severe but Silent Cervical Stenosis- How to diagnose and manage? [KSSS Past President Jong-Beom Park]
1800–2300	Fellowship Night [The Mactan Newtown Beach Rotunda]

DAY 2 | Friday

Time	Title/Faculty
Modern Spine Oncology: Separation Surgery, TES and Adjuvant Therapies (Decision-making with radiotherapy, systemic therapy and complex reconstructions) Session Chair: Mamer S. Rosario (Philippines) Moderator: Mamer S. Rosario and Yusutsugu Yukawa (Japan)	
0800-0808	Resection of Intradural Tumours — Techniques & Outcomes [Wencito A. Daya/Philippines]
0809-0816	Understanding Evolution of Spine Tumour Surgery — TES to MIS [Mamer S. Rosario/Philippines]
0817-0824	TES for MSD — Updates & Controversies [Satoshi Kato/Japan]
0825-0834	Outcomes of Separation Surgery for MSD — Is Less More? [Hideki Shigematsu/Japan]
0835-0840	Open Forum
0841-0900	Case Discussion (1–2 cases) [Daya, Rosario & Kato]
0900-1000	Free Paper Session III (Tumour) Moderators: Mamer S. Rosario (Philippines) & Hideki Shigematsu (Japan)
1000-1030	Coffee Break/Snack Symposium (Brainlab/Taisho) [Mactan Ballroom]
Stem Cells and Regeneration in Spine: Hype, Hope and Current Evidence (Biologics, disc regeneration and what is (and isn't) ready for clinical use) Session Chair: Nicole Teresa C. Lukban-Venida (Philippines) Moderators: Jose Manuel F. Ignacio (Philippines) and Jacob Oh (Singapore)	
1030-1038	From Lab Testing to Clinical Application: How We Got There [Takashi Yurube/Japan]
1039-1047	The Role of Regenerative Therapeutics in the Degenerative Spine [Daisuke Sakai/Japan]
1048-1058	Open Forum
1059-1107	Spine Trauma [Inbo Han/South Korea]
1108-1116	Intra-operative Supplementation / Potential Applications [Daisuke Sakai/Japan]
1117-1130	Open Forum
1130-1230	Industry Sponsored Lecture (Globus Medical) [Mactan Ballroom]
1230–1330	Lunch Symposium (Raynham/Dragon Crown Medical/Variance) [Mactan Ballroom]
The Aging Spine: Managing Complications Beyond Osteoporosis (Frailty, peri-operative risk, delirium, rehab and long-term function) Session Chair: Daniel William T. Yu (Philippines) Moderators: Daniel William T. Yu and Abhay Nene (India)	
1330-1338	Preventing Problems Before They Start: Preoperative Risk Assessment in the Elderly Spine Patient [Kin Cheung Mak/Hong Kong]

1339-1346	In the OR: Managing Intraoperative Complications in Aging Spines [Orso L. Osti/Australia]
1347-1354	Revision Surgery for Nonunion after Anterior Cervical Discectomy and Fusion [Jong-Beom Park/South Korea]
1355-1402	Optimizing Recovery: Rehabilitation and Long-Term Complication Prevention in Elderly Spine Patients [Anne Kathleen B. Ganal-Antonio/Philippines]
1403-1410	When Fusion Isn't Necessary: The Role of Decompression Alone in Elderly Lumbar Pathology [Richard V. Condor/Philippines]
1411-1425	Salvage surgeries for previously fused deformities: from the craniocervical junction to the lumbosacral spine [Prof. Kuniyoshi Abumi/Japan]
1426-1430	Open Forum
Complex Spine Deformities in Challenging Conditions: Pediatric CVJ and Post-Tubercular Reconstruction Session Chair: Francisco P. Altarejos Moderators: Gilbert E. Cauilan (Philippines) and Gaurav Raj Dhakal (Nepal)	
1430-1440	Management Strategies in Craniovertebral Junction Anomalies in Pediatric Spine [SK Srivastava/India]
1440-1450	Algorithmic approach to management of post tubercular spinal deformity correction [SK Srivastava/India]
1450-1500	Open Forum
1530-1600	Coffee Break (ASpine) [Mactan Ballroom]
Spine Trauma in the Real World: Safe Fixation in Difficult Situations (Polytrauma, poor bone quality and limited-resource settings) Session Chair: Bienvenido Leo Antonio M. Caro (Philippines) Moderators: Bienvenido Leo Antonio M. Caro and Rommel L. Tan (Philippines)	
1600-1603	Case: Cervical Facet Dislocation (Pre-op ± post-op) [Bienvenido Leo Antonio M. Caro/Philippines]
1604-1624	Panel Discussion — Acute vs Delayed, Doing More with Less Abhay Nene/ India; Paul Julius A. Medina/ Philippines; Zamzuri Zakaria/ Malaysia; Shah Alam/Bangladesh; Sharif Ahmed Jonayed/Bangladesh
1625-1630	Delayed Management of Cervical Bilateral Facet Dislocation [Shah Alam/Bangladesh]
1631-1633	Case: Thoracolumbar Fracture-Dislocation [Bienvenido Leo Antonio M. Caro/Philippines]
1634-1654	Panel Discussion — Avoiding Complications Abhay Nene/ India; Sharif Ahmed Jonayed/Bangladesh; Ryan Conrad A. Carnero/ Philippines; Torphong Bunmapresert/Thailand
1655-1700	Delayed Management of Thoracolumbar Fractures [Shah Alam/Bangladesh]
1700-1720	KSSS Plenary Lecture: Severe but Silent Cervical Stenosis- How to diagnose and manage? [KSSS Past President Jong-Beom Park]
1800–2300	Fellowship Night [The Mactan Newtown Beach Rotunda]

DAY 2 | Friday

Time	Title/Faculty
0800-1000	Rapid Fire Free Paper Session III [Jasmine Room] Moderators: Rodolfo III B. Garcia (Philippines) and Yehlen Francis R. Saligumba (Philippines)
1330-1500	Rapid Fire Free Paper Session IV [Jasmine Room] Moderator: Billy Francis Y. Hung (Philippines) and Viennah Condor-Magcalas (Philippines)

DAY 3 | Saturday

Time	Title/Faculty
Pediatric Spinal Deformities: Timing, Techniques and Long-Term Follow-up (Congenital, early-onset and post-infectious deformities in growing spines) Session Chair: Frederick Patrick I. Nicomedez (Philippines) Moderators: Frederick Patrick I. Nicomedez and Dr. Md Sarwar Jahan (Bangladesh)	
0800-0808	Rapid Recovery Protocols for in Deformity Correction in Pediatric Patients [Dato' Mun-Keong Kwan/Malaysia]
0809-0816	Early Onset Scoliosis: Is there still a role for bracing? What if GR are not available, other options out there? [Paul Koljonen/Hong Kong]
0817-0824	Passive Correction and Fusion for Congenital Scoliosis - When and Why? [Chee Kidd Chiu/Malaysia]
0825-0830	Open Forum
0831-0838	Post-infection Deformity in children [Frederick Patrick Nicomedez/Philippines]
0839-0847	Hemivertebra Resection in Small Children [Ahmet Alanay/Turkey]
0848-0856	Congenital Scoliosis: When they do it and what to do, anything new? [Ahmet Alanay/Turkey]
0857-0900	Open Forum
Adult Spinal Deformity – Meet the Masters: Strategy, Correction and Complication Rescue (Master case discussions on ASD, flatback and revision deformity) Session Chair: Ken Jeffrey O. Magcalas Moderators: Ken Jeffrey O. Magcalas (Philippines), Prof. Tomohiko Hasegawa (Japan) & Ryan Conrad A. Carnero (Philippines)	
0900-0908	Choosing the right approach in lumbar spine deformities: anterior, posterior, combined [Yat Wa Wong/Hong Kong]
0909-0916	Surgery for ASD in the elderly: Risky or Life-Changing [Shanmuganathan Rajasekaran/India]

0917-0924	Most challenging case [Yukihiro Matsuyama/Japan]
0925-0934	Open Forum
0935-0940	High Grade Spondylolisthesis [Aju Bosco/India]
0940-1000	Panel Discussion Yukihiro Matsuyama/Japan; Yat Wa Wong/ Hong Kong; Shanmuganathan Rajasekaran/ India; Kota Watanabe/Japan
1000-1030	Coffee Break (Sanyou Medical/Regenesys) [Mactan Ballroom]
JSS-APSS Session: Treatment of Adult Spinal Deformity (ASD) Session Chair: Hideki Shigematsu (Japan) Moderators: Mario R. Ver (Philippines) and Hideyuki Arima (Japan)	
1030-1034	Overview
1035–1042	Role of Exercise Therapy in Adult Spinal Deformity: Limitations and Potential [Shinji Takahashi/Japan]
1043–1050	Surgical Indications and Strategies in Adult Spinal Deformity [Jose Manuel F. Ignacio/Philippines]
1051–1058	Preventing Neurological Complications in Osteotomy-Based ASD Surgery [Masashi Miyazaki/Japan]
1059–1106	Management of Mid- to Long-Term Mechanical Complications [Tetsuro Ohba/ Japan]
1107-1114	Postoperative ADL Disability and Management [Mikhail Lew P. Ver/Philippines]
1115-1130	Open Forum
1130–1200	Lunch [Mactan Ballroom]
1200–1240	Lunch Plenary Panel: Future of Spine Care Moderators: Ronald Tangente (Philippines) and David Cabatan (Philippines) Panelists: • Shanmuganathan Rajasekaran/India • Keith DK Luk/Hong Kong • Gabriel Liu/Singapore • Yukihiro Matsuyama/Japan • M. Arif Khan/Pakistan • Antonio B. Sison/Philippines
1240-1350	Closing Ceremony & Awards [Mactan Ballroom]

DAY 3 | Saturday

Time	Title/Faculty
0800-0900	Free Paper Session VI – What's coming next (MIS/ Navigation/Robotics) Moderators: Paul Julius A. Medina (Philippines)& Yoshiharu Kawaguchi (Japan)
0900-1000	Rapid Fire Free Paper Session V Moderators: Viennah Condor-Magcalas (Philippines) & Yoshiharu Kawaguchi (Japan)
1000-1030	Coffee Break (Sanyou Medical/Regenesys) [Mactan Ballroom]
APSS–AO Spine Translational Research: From Evidence to Everyday Practice (Building data that changes guidelines, not just presentations) Session Chair: Dave Anthony G. Dizon Moderators: Dave Anthony G. Dizon (Philippines) and Reuben Soh (Singapore)	
1030-1034	Overview
1035–1042	Measuring What Matters: Patient-Reported Outcomes and Value-Based Spine Care [Romel P. Estillore/Philippines]
1043–1050	Can Asia Pacific region lead the world in spine research - The role of APSS? [Rajasekaran Shanmuganathan/India]
1051–1058	From Knowledge Forum to Regional Research Study Groups [Kenny Yat Hong Kwan/Hong Kong]
1059–1106	Some Hurdles Spine Surgery Research Faces and Some Things We Can Do to Improve Them [Kin Cheung Mak/Hong Kong]
1107-1117	Adult Spinal Deformity in an Aging Society: What AO Spine Data Should Change in Our Practice? [Kota Watanabe/Japan]
1118-1125	The AO Spine and Praxis Spinal Cord Institute Guidelines for the Management of Acute Spinal Cord Injury [Paul Koljonen/Hong Kong]
1126-1130	Open Forum
1130–1200	Lunch [Mactan Ballroom]

DAY 3 | Saturday

Time	Title/Faculty
How I Do It: Live-Commented Operative Videos (Deformity, MISS, tumor and trauma cases with step-by-step tips and tricks) Session Chairs: Paul Julius A. Medina (Philippines) & Yehlen Francis R. Saligumba (Philippines) Moderators: Neilson G. Palabrica (Philippines) and Pierre M. Mella (Philippines)	
0800–0810	OLIF: Single-Position Technique [Reuben Soh/Singapore]
0810-0820	Robotics [Jacob Oh/Singapore]
0820-0830	How I do it - Endoscopic Approach to the Thoracic and Thoraco-lumbar Spine in AIS [Wong Hee Kit/Singapore]
0830-0840	Complex Kyphotic Deformity [Huiren Tao/China]
0840-0850	Dural Sleeve Medialization and Bleeding Control for Lumbar Discectomy: Tips and Challenges [Yudha Mathan Sakti/Indonesia]
0850-0900	Open Forum
Women in Spine: Most Challenging Cases and How Teams Can Do Better (Complex cases from female surgeons across Asia and concrete actions for allies) Session Chairs and Moderators: Rina Therese R. Madelar (Philippines) and Yehlen Francis R. Saligumba (Philippines)	
0900-0910	Thoracolumbar/Lumbar [Priyambada Kumar/India]
0910-0920	Upper Cervical/Cervical Spine TB [Ma. Ramona B. Reyes-Diyco/Philippines]
0920-0930	Thoracolumbar/Lumbar [Nur Aida Faruk Senan/Malaysia]
0930-0940	When Spine Surgery Reveals Cancer [Mary Ruth A. Padua/Philippines]
0940-0950	Thoracolumbar/Lumbar [Jiwon Park/South Korea]
1000-1030	Coffee Break (Sanyou Medical/Regenesys) [Mactan Ballroom]
Innovations in Osteoporotic Spine Session Chair: Mary Ruth A. Padua (Philippines) Moderator: Anne Kathleen B. Ganal-Antonio (Philippines) and Masahiko Watanabe (Japan)	
1030-1031	Overview
1032–1039	Pathophysiology, Diagnosis & Risk Stratification of OVF [Pamela Louise G. Gervasio/Philippines]
1040–1047	Vertebral Augmentation/Stenting & MIS [Yoshiharu Kawaguchi/Japan]
1048–1055	Complex Surgery in Osteoporotic Patients [Ho-Joong Kim/Korea]
1056–1103	Treatment strategies for osteoporotic adult spinal deformity [Yukihiro Matsuyama/Japan]
1104-1111	Tips and Tricks in Osteoporotic Fracture Fixation [Jose Miguel T. Lumawig/Philippines]
1112-1119	AI & Predictive Analytics for Diagnosis/Decision-Making in the Osteoporotic Spine [Wongthawat Liawrungrueng/Thailand]
1120-1130	Open Forum
1130–1200	Lunch [Mactan Ballroom]

Closing Ceremony

Asia Pacific Spine Society 32nd Annual Scientific Meeting
& Philippine Spine Society 31st Annual Scientific Meeting

1240 Hrs.
06 June 2026
Mactan Ballroom
Shangri-La Mactan, Cebu Philippines

Program

Event Recap

Awards

Acknowledgment of Sponsors

Annual 2027 - Kyoto, Japan

Announcements

Closing Remarks

Oral Research Presentations

BEST PAPER: CLINICAL | DAY 2 | Friday | 05 June 2026 | Mactan 3

Moderators: Adrian B. Catbagan (Philippines) & Yat Wa Wong (Hong Kong)

Time	Paper Title	Presenter
0901-0908	[BPC041] False-Positive Transcranial Motor Evoked Potential Alerts in Spinal Surgery: Insights from A 13,743-PatientMulticenter Study by the JSSR Spinal Monitoring Committee	Ushirozako, Hiroki
0909-0916	[BPC228] Effect of Psoas Muscle Quantity and Density on Post-operative Outcomes in Patients with Metastatic Spine Tumors	Heng, Woon Theng
0917-0924	[BPC175] Segmental Lumbar Lordosis and Spinopelvic Alignment Across Different Pelvic Incidence (PI) Groups in Adolescent Idiopathic Scoliosis (AIS): Implications for Surgical Sagittal Correction	Chandirasegaran, Saturveithan
0925-0932	[BPC179] Prediction of Revision Surgery After Balloon Kyphoplasty Based on a Novel Computed Tomography-Based Endplate Injury Classification for Osteoporotic Vertebral Fractures	Iwamae, Masayoshi
0933-0940	[BPC161] Deep-Learning-Based Automated Kinematic Analysis of the Lumbar Spine: A Multicenter Study on Precision Measurement and Clinical Alignment	Jiahui, He
0941-0948	[BPC032] Changes in Spinal Alignment Following a Nutritional and Exercise Intervention in a Community Health Screening Program: A Prospective Randomized Controlled Trial	Oe, Shin
0949-0956	[BPC042] Impact of Smoking Status and Cumulative Smoking Exposure on Surgical Outcomes in Degenerative Cervical Myelopathy: A Multicenter Prospective Cohort Study	Okubo, Toshiki

BEST PAPER: BASIC SCIENCE | DAY 2 | Friday | 05 June 2026 | Mactan 3

Moderators: Clint P. Guitarte (Philippines) and Zhaomin Zheng (China)

Time	Paper Title	Presenter
1431-1438	[BPBS131] When ageing becomes degeneration: Evidence from Metabolomics of Healthy Age-stratified organ-donor and degenerated lumbar discs	Shanmuganathan, Rajasekaran
1439-1446	[BPBS004] Low-Temperature Spine-Specific PMMA Enhances Osteogenesis Through Localized Thermal Necrosis in Osteoporotic Vertebrae: Evidence from an Ovariectomized Rat Model	Park, Jong-Beom
1447-1454	[BPBS121] Plasma proteomic signatures of skeletal muscle mass linked to diet and digital phenotypes: UK Biobank discovery and YMoC (Japan) validation	Goto, Go
1455-1502	[BPBS109] Subclinical Infection Drives Progressive Intervertebral Disc Degeneration: Experimental Insights from a Rabbit Model	Ramachandran, Karthik
1503-1510	[BPBS178] Do Combustible Cigarette– and Heated Tobacco Product–Derived Extracts Exacerbate Cervical Myelopathy? In Vivo and In Vitro Evidence	Kobayashi, Yuto
1511-1518	[BPBS146] Age- and sex-related differences in physiological rotation patterns of the cervical spine: A detailed upright CT analysis	Mizukoshi, Ryo

1519-1526	[BPBS003] Bone Regeneration Efficacy and Applicability of Defect-Fitting 4D Scaffolds Based on Shape Conformity in Three-dimensional Curved Bone Defects for possibility spinal cage	Kim, Young-Yul

FREE PAPER: DEGENERATIVE | DAY 1 | Thursday | 04 June 2026 | Mactan 1 & 2

Moderators: Rommel L. Tan (Philippines) & Abdul Kadir Hadar (Indonesia)

Time	Paper Title	Presenter
0801-0806	[FPD203] Utilizing a novel combinatorial Physical Performance Test-based clinical assessment tool to screen for radiologically severe Degenerative Cervical Myelopathy	Koljonen, Paul A
0807-0812	[FPD224] Characterizing Proprioceptive Dysfunction as an Early Sensory Indicator of Mild Degenerative Cervical Myelopathy	Koljonen, Paul
0813-0818	[FPD182] Comparative Efficacy of Arthroscopy-assisted Unilateral Single-portal Lumbar Fusion (AUSS-TLIF) versus Uniportal Full-endoscopic Transforaminal Lumbar Interbody Fusion (Endo-TLIF) for Lumbar Spinal Stenosis with Segmental Instability: A Prospective Cohort Study	Zhang, Jie
0819-0824	[FPD054] Mid-term surgical outcomes of posterior lumbar interbody fusion for lumbar spondylolisthesis with diffuse idiopathic skeletal hyperostosis	Ozaki, Masahiro
0825-0830	[RF90#257] Aspirin Attenuates Neurological Decline in the Preclinical Cervical Spondylotic Myelopathy Model via Improving Cord Perfusion and Modulating Microglial Phenotype	Shea, Graham Ka Hon
0831-0836	[FPD048] The Over-Widening Phenomenon due to suboptimal Lordosis Distribution Index: As a Risk factor for Rod fracture after Anterior Column Realignment in Patients with Degenerative Sagittal Imbalance	Kim, Sung-Min
0837-0842	[FPD129] Feasibility of Intra-cage vs Extra-cage Application of Recombinant Human Bone Morphogenetic Protein-2 in Posterior Lumbar Interbody Fusion	Yang, Jae Jun
0843-0848	[FPD106] Preoperative Metabolite Ratio Predicts Postoperative Recovery in Cervical Myelopathy: A Prospective MRS-Based Study	Ramachandran, Karthik
0849-0854	[FPD086] Semi-Dynamic Implant Stabilization Versus Posterior Interspinous Silicone Implant for Single-Level Degenerative Lumbar Disease: A Retrospective Comparative Cohort from Vietnam	Nguyen, Ngoc
0855-9000	[FPD268] Cervical Sagittal Alignment Changes Following Long-segment Lumbar Instrumenta-tion: a Longitudinal Follow-up Study	Yeh, Kuang-Ting

FREE PAPER: INFECTIONS + TRAUMA | DAY 1 | Thursday | 04 June 2026 | Mactan 4
Moderators: Dr. Paul Albert C. Manuel (Philippines) & Syed Shahidul Islam (Bangladesh)

Time	Paper Title	Presenter
0801-0806	[FPIT176] Artificial Intelligence-Driven Predictive Modelling for Tuberculous versus Non-Tuberculous Spondylodiscitis Using Magnetic Resonance Imaging: A Pilot Study	Santiago, Ryan Jacob D
0807-0812	[FPIT132] Instability matters more - A Paradigm Shift in Understanding Neurological Deficit in Spinal Tuberculosis	Shanmuganthan, Rajasekaran
0813-0818	[FPIT082] Surgical Outcomes of Posterior-Only Surgery for Thoracolumbar Spinal Tuberculosis: A Five-Year Case Series of 83 Patients from A High-Burden Region	Diep, Phuc Ngiah
0819-0824	[FPIT060] Trends in Surgical Site Infections and Causative Pathogens After Spinal Surgery: A 15-Year Analysis of 10,432 Cases (2010–2024)	Iga, Takahito
0825-0830	[FPIT144] To elucidate the role of serum Nogo-A as a predictor of neurological recovery in Spinal Cord Injury (SCI): A Prospective Case-Control Study	Waliullah, Shah
0831-0836	[FPIT046] Predicting Surgical Indications and Outcomes in Ankylosing Spondylitis Patients with Thoracolumbar Fractures: A Classification-Based Approach	Lee, Young-Jik
0837-0842	[FPIT252] Investigation of bone union rate and associated factors after posterior fixation combined with vertebroplasty for osteoporotic thoracolumbar vertebral fractures	Sasaki, Ryo
0843-0848	[FPIT059] Long-Term Cervical MRI Changes After Whiplash-Associated Disorders: Twenty-Year Findings and Expectations at Thirty Years	Watanabe, Kota
0849-0854	[FPIT231] Preoperative Vertebral Hounsfield Unit Values Predict Correction Loss After Posterior Corrective Fixation for Thoracolumbar Burst Fractures	Yuki, Takeuchi
0855-9000	[FPIT126] Non cervical diffuse idiopathic skeletal hyperostosis is a risk factor for severity of cervical spinal cord injury	Teraguchi, Masatoshi

FREE PAPER: TUMOR | DAY 2 | Friday | 05 June 2026 | Mactan 4
Moderators: Mamer S. Rosario (Philippines) & Hideki Shigematsu (Japan)

Time	Paper Title	Presenter
0901-0906	[FPT050] Risk factors for local recurrence after total en bloc spondylectomy for spinal tumors: A retrospective study	Nunotani, Shin
0907-0912	[FPT216] Development and Validation a deep learning-based algorithm for differentiating malignant vertebral metastasis from benign vertebral fracture on plain spine radiographs	Chou, Po-Hsin
0913-0918	[FPT066] Intratumoral Flow Void Diameter on Standard Magnetic Resonance Imaging: A Practical Marker of Vascularity in Metastatic Spinal Tumors	Ishino, Yuji

0919-0924	[FPT124] Is Shape Factor a Useful Prognostic Factor for Functional Outcome in Cervical Intradural Extramedullary Tumors?	Kuga, Tomomasa
0925-0930	[FPT049] Clinical Characteristics and Surgical Outcomes of Intradural Spinal Metastases: A Comparative Analysis Between Intramedullary and Extramedullary Lesions	Okubo, Toshiki
0931-0936	[FPT064] Long-term outcomes of total spondylectomy for giant cell tumor of the mobile spine	Kawai, Megumu
0937-0942	[FPT105] Validation of Risk Factors for Tumor Regrowth After Spinal Dumbbell-Shaped Schwannoma Surgery	Tarukado, Kiyoshi
0943-0948	[FPT229] Sudden negative chronotropic change during TES for large undifferentiated pleomorphic sarcoma arising from T12 vertebra - a rare case report	Rosario, Mamer S
0949-0954	[FPT166] GLP-1 Receptor Agonists as a Potential Alternative Strategy to Reduce Spine-related Morbidities in Obese Population	Wu, Meng-Huang
0955-1000	[FPT165] Microscope-Assisted Open-Door Plasty for Early Recovery Approach (Opera) via A 3-cm Incision: Technical Note and Clinical Outcomes of 300 Consecutive Cases	Narita, Wataru

FREE PAPER: DEFORMITY | DAY 2 | Friday | 05 June 2026 | Mactan 1 & 2
Moderator: Ryan Conrad A. Carnero (Philippines)

Time	Paper Title	Presenter
1431-1436	[FPDY093] Lateral interbody release technique improves the bone union at L5/S1 in posterior lumbar interbody fusion for adult spinal deformity surgery	Kozaki, Takahiro
1437-1442	[FPDY189] Automated Alpha Angle Calculation for Adolescent Idiopathic Scoliosis Surgery Planning Using Deep Learning Pose Model	Tan, Shun Herng
1443-1448	[FPDY199] Automated Upper Instrumented Vertebra Tilt Angle Measurement for Adolescent Idiopathic Scoliosis Using Deep Learning Pose Estimation	Tan, Shun Herng
1449-1454	[FPDY078] Correlation between nutritional status, assessed by MNA-SF, and clinical outcomes in patients undergo spinal deformity surgery	Oda, Kotaro
1455-1500	[FPDY174] Perioperative Outcome and Complications in Adolescent Idiopathic Scoliosis (AIS): Propensity Score Matching (PSM) Study Based on World Health Organization (WHO) Body Mass Index (BMI)	Chandren, Josephine Rebecca
1501-1506	[FPDY044] A Novel Surgical Strategy–Oriented Classification for Severe Dynamic Sagittal Imbalance	Li, Xiongjie
1507-1512	[FPDY133] Postoperative Coronal Imbalance Predicts Late Mechanical Failure and Revision Surgery After Adult Spinal Deformity Correction with Pelvic Fixation: A 5-Year Follow-Up Study in Elderly Patients	Yamada, Tomohiro

1513-1518	[FPDY130] Domino assisted Dual Rod Cantilever Correction in Complex Rigid Triplanar Kyphoscoliosis Deformities – A Retrospective Study	Shanmuganathan, Rajasekaran
1519-1524	[FPDY160] The Effect of Exoscopic Minimally Invasive Cervical Open-door Laminoplasty on Reducing Postoperative Axial Pain and Cervical Kyphotic Deformity	Yamane, Kentaro
1525-1530	[FPDY088] Effectiveness of Dual Rod Translation in Thoracic Kyphosis Restoration for AIS: A Comparison with the Conventional Technique	Hori, Yusuke

FREE PAPER: MIS/ NAVIGATION/ROBOTICS | DAY 3 | Saturday | 06 June 2026 | Mactan 3

Moderators: Paul Julius A. Medina (Philippines)& Yoshiharu Kawaguchi (Japan)

Time	Paper Title	Presenter
0801-0806	[FPMNR170] Outcomes of Conventional Open Versus Minimally Invasive Posterior Interbody Fusion Surgery: A Meta-Analysis	Siy, Hantz Filbert C
0807-0812	[FPMNR173] Microendoscopic Decompression for Thoracic Ligamentum Flavum Hematoma: A Rare Case Successfully Treated Using a Minimally Invasive Technique	Ishibashi, Katsuhiko
0813-0818	[FPMNR085] The Effect of 3D-printed Titanium Cage Used in Atlantoaxial Lateral Mass Joints on Cervical Realignment	Cao, Kai
0819-0824	[FPMNR057] Delayed Massive Spinal Subarachnoid Hemorrhage Following T12 Balloon Kyphoplasty: A Case Report and Literature	Sakai, Daisuke
0825-0830	[FPMNR163] Percutaneous Endoscopic Decompression for Lumbar Radiculopathy with Radiographic Instability: A Non-Fusion Strategy Balancing Clinical Efficacy and Spinal Stability	He, Jiahui
0831-0836	[FPMNR223] Robotic-Assisted vs Navigation-Guided vs Freehand Pedicle Screw Placement: A Systematic Review and Meta-Analysis of Accuracy, Complications, and Cost-Effectiveness	Tantyo, Rafell
0837-0842	[FPMNR152] Robot-assisted Percutaneous Kyphoplasty for Severely Collapsed Osteoporotic Burst Fracture: Operative Technique and Feasibility	Song, Joshua Tam
0843-0848	[FPMNR147] Trans Thoracic Direct Lateral Retropleural Rib Sparing Approach for Thoracic Disc Herniation. A 10-year experience	Pal, Debashish
0849-0854	[FPMNR244] Novel Technique of Assisted Uniportal Interlaminar Percutaneous Endoscopic Lumbar Discectomy to Increase Versatility for Discectomy: Technical Notes	Sakti, Yudha Mathan
0855-9000	[FPMNR227] Modified Minimally Invasive Transforaminal Lumbar Interbody Fusion for Isthmic Lumbar Spondylolisthesis: A Technical Note and Two Years Clinical Results	Zhang, Feng

RAPID FIRE SESSION I | DAY 1 | Thursday | 04 June 2026 | Mactan 3

Moderators: Erika Paulina Stefani H. See (Philippines) & Samuel Arsenio M. Grozman

Time	Paper Title	Presenter
0801-0804	[RF30#201] Extension of Proximal Thoracic Curve (pfc) into Cervical Spine in Lenke 1 and 2 Adolescent Idiopathic Scoliosis (AIS)	Chandirasegaran, Saturveithan
0805-0808	[RF30#242] Diagnostic Performance of Plain Radiographic Pedicle Grading in Adolescent Idiopathic Scoliosis: Validation Against Computed Tomography	Chook, Pei Yi
0809-0812	[RF30#015] Utility of Preoperative Fulcrum-side Bending Flexibility Assessment for Predicting Shoulder Imbalance after Posterior Corrective Fusion in Lenke Type 5 Adolescent Idiopathic Scoliosis	Abe, Tetsutaro
0813-0816	[RF30#016] Predictive Value of Preoperative Fulcrum-side Bending Radiographs for Distal Adding-on in Lenke Type 1 and 2 Adolescent Idiopathic Scoliosis	Miyazaki, Masashi
0817-0820	[RF30#019] Impact of Enhanced Recovery after Surgery (ERAS) Protocol on Postoperative Pain and Clinical Recovery in Adult Spinal Deformity Surgery	Yao, Yu-Cheng
0821-0824	[RF30#023] The Characteristics of Pedicle Screw for Upper Instrumented Vertebra Fracture Following Adult Spinal Deformity Surgery	Lo, Yuan-Shun
0825-0828	[RF30#239] Comparison of Oswestry Disability Index Between Motorcycle and Car User with Body Mass Index as Risk Factor in Banjarmasin	Ramadhana, Ahya
0829-0832	[RF30#095] Lumbar-dominant Adult Spinal Deformity Is Associated with Sagittal	Nagata, Keiji
0833-0836	[RF30#115] Impact of Polypharmacy on Postoperative Outcomes in Adult Spinal Deformity Surgery	Gellangarin, John Alvin
0837-0840	[RF30#180] A Regression-based Equation for Postoperative Spontaneous Correction of the Unfused Proximal Thoracic Curve in Lenke Type 1 and Type 2 Adolescent Idiopathic Scoliosis	Iwamae, Masayoshi
0841-0844	[RF30#188] Clinical Meaning of Neutral (score 3) Satisfaction after Lumbar Spine Surgery	Suzuki, Maya
0845-0848	[RF30#191] Prediction of Postoperative Cobb Angle and Synthetic Radiograph Generation in Adolescent Idiopathic Scoliosis Using Generative Adversarial Networks	Halim, Nur Farah Anis Abd
0849-0852	[RF30#195] Classification and Subclassification of Adolescent Idiopathic Scoliosis (AIS) Based on Lenke Classification: a 9-year Analysis from a Single Tertiary Institution	Guan, Wei Tan
0853-0856	[RF30#289] Delayed (>48 Hours) Posterior Wide Decompression in Complete Cauda Equina Syndrome: A 30-Patient Retrospective Cohort With 24-Month Outcomes	Islam, Shaikh Sadiul
0857-0900	[RF30#243] Subcrestal Iliac Screw Is a Safe and Reliable Spinopelvic Fixation Technique in Spinal Deformity Correction. a Prospective Study of 100 Patients with 206 Screws with Minimum Two Year Follow Up	Poon, Glenys

RAPID FIRE SESSION II | DAY 1 | Thursday | 04 June 2026 | Jasmine Room

Moderators: Shah Alam (Bangladesh) and Nicole Teresa C. Lukban-Venida (Philippines)

Time	Paper Title	Presenter
0801-0804	[RF90#255] Timely Decompression in Spontaneous Spinal Epidural Hematoma Presenting as Quadriparesis: A Case Report	Ambulo, Ma. Gicelle Christine U
0805-0808	[RF90#237] Comparison of Prone versus Prone Traction Radiographs in Fusion Level Determination in Adolescent Idiopathic Scoliosis	Ang, Alexander
0809-0812	[RF90#087] Type-specific Determinants and Clinical Impact of Waistline Asymmetry in Adolescent Idiopathic Scoliosis	Banno, Tomohiro
0813-0816	[RF90#281] Dry-run-surgical-simulation on 3d-printed Patient-specific Spine Deformity Models with Haptic Feedback: an Innovative Low-cost Alternative Solution to Improve the Accuracy of Pedicle Screw Placement in Paediatric Kyphoscoliosis	Bosco, Aju
0817-0820	[RF90#282] Do Existing Cervicothoracic (C2-T1) Fe Models Reflect the Actual Postoperative Adjacent Segment Biomechanics at the Cervicothoracic Junction after Cervical Laminectomy and Posterior Instrumented Fusion (CLPIF)? Comparative Finite Element Analysis of C2–T1 and C2–T2 CLPIF Fe Models	Bosco, Aju
0821-0824	[RF90#288] Does Midline Preserving Unilateral Decompression and Anterior Reconstruction with Morselized Autograft Prevent the Loss of Sagittal Alignment and Cage Related Complications Compared to the Traditional Midline Decompression and Anterior Reconstruction with Mesh Cage and Bone Grafting in Thoracolumbar Spinal Tuberculosis?	Bosco, Aju
0825-0828	[RF90#211] Cervical Myelopathy Caused by Motor Tics in a Patient with Tourette's Syndrome: a Case Report	Caluscusin, Ian Ray C
	[RF90#211] Cervical Myelopathy Caused by Motor Tics in a Patient with Tourette's Syndrome: a Case Report	Caluscusin, Ian Ray C
0829-0832	[RF90#186] Surgical Outcomes in Delayed-presentation Traumatic Central Cord Syndrome: an Analysis of 37 Cases Undergoing Intervention at 7-14 Days Post-injury	Choudhury, Abdullah Al Mamun
0833-0836	[RF90#240] Persistent Coronal Imbalance Following Posterior Spinal Fusion in Lenke Type 5 and 6 Idiopathic Scoliosis: a Propensity Score-matched Comparison of Adolescent and Adult Patients	Chow, Khai Teeng
0837-0840	[RF90#103] A Comprehensive Framework for the Radiographic Assessment of Lumbar Pedicle Screw Instrumentation: Review of Literature and a New Proposed Criteria Assessment	DeCarlo, Rebecca
0841-0844	[RF90#183] Demographic Profile, Clinical Characteristics, and Short-term Outcomes of Tuberculosis Spondylitis in a Tertiary Medical Center in Southern Philippines: a 10-year Retrospective Review	Delgado, Ralph Daniel V
0845-0848	[RF90#083] Fusion Analysis of Short-segment Pedicle Screw Fixation with Transpedicular Bone Grafting for Thoracolumbar Burst Fracture: a Three-year Case Series of 187 Patients	Diep, Phuc

0849-0852	[RF90#169] Temporary Internal Distraction, a Softer Alternative to Severe Rigid Scoliosis: Early Onset Scoliosis with Delayed Treatment	Estillore, Rommel P
0853-0856	[RF90#220] Association of Dyslipidemia with the Development of Symptomatic Ossification of the Posterior Longitudinal Ligament	Fukada, Shotaro
0857-0900	[RF90#034] Selective Cement-augmented Fenestrated Pedicle Screws Combined with Transpedicular Bone Grafting in Posterior Fusion for Severe Osteoporotic Vertebral Fractures	Ha, Tuan
0901-0904	[RF90#164] Plastrum Testudinis Extract Ameliorates Intervertebral Disc Degeneration by Suppressing NF-κB Mediated Senescence and Inflammation	Jiahui , He
0905-0908	[RF90#135] Rescue and Restore: Strategic Management of Myelopathy as a Complication after Cervical Laminectomy	Johri, Taarini
0909-0912	[RF90#119] Preoperative Radiographic and CT Evaluation Imprinted on Plain Paper: a Cost-effective, Accurate Alternative to Navigation and Robot-assisted Correction of Severe, Rigid, and Neglected Spinal Deformity	Jonayed, Sharif Ahmed
0913-0916	[RF90#111] Impact of Pre-operative Staged Skull-femoral Traction Followed by Surgery in Severe Rigid Spinal Deformity	Jonayed, Sharif Ahmed
0917-0920	[RF90#118] A Comparative Analysis of General versus Spinal Anesthesia in Lumbar Spine Surgery: Efficacy, Safety, and Clinical Outcomes.	Jonayed, Sharif Ahmed
0921-0924	[RF90#007] Ventral Dynamic Correction of Idiopathic Scoliosis. Use of Additive Technologies and Customized Implants.	Kazmin, Arkadii
0925-0928	[RF90#008] Dynamic Stabilization of the Lumbar Spine. 10 Years Follow-up.	Kazmin, Arkadii
0929-0932	[RF90#071] Can Endoscopic Decompression Treat Grade I Degenerative Spondylolisthesis Like Simple Stenosis? A Symptom-Based Descriptive Comparison with Degenerative Disc Disease	Luthfi, Omar
0933-0936	[RF90#094] Incidence of Cervical Kyphosis and Factors Associated with Improvement in Postoperative Cervical Spinal Alignment in Idiopathic Scoliosis with Major Thoracolumbar/Lumbar and Thoracic Curves	Mizukami, Kai
0937-0940	[RF90#009] Application of ALIF and OLIF As Salvage Strategies for Revision after Failed Lumbar Interbody Fusion	Shih, Cheng-Min
0941-0944	[RF90#271] Does Prone Positioning Alter Retroperitoneal Structures Relevant to the LLIF Corridor? a Positional MRI Study of Prone vs. Lateral Decubitus Positions	Kanto, Tomoya
0949-0952	[RF90#122] Traditional Dual Growing Rods: Do They Remain the Cornerstone of Early-onset Scoliosis (EOS) Management?	Chandirasegaran, Saturveithan
0953-0956	[RF90#200] Fate of the L3/L4 Disc in Lenke 5 and 6 Patients Undergoing Posterior Spinal Fusion (PSF) with the Lowest Instrumented Vertebra (LIV) at L3, with a Minimum Follow-up of 5 Years	Chandirasegaran, Saturveithan

RAPID FIRE SESSION III | DAY 2 | Friday | 05 June 2026 | Mactan 3

Moderators: Rodolfo III B. Garcia (Philippines) and Yehlen Francis R. Saligumba (Philippines)

Time	Paper Title	Presenter
0801-0804	[RF90#205] Demographics, Bacteriological Profile, and Antibiotic Susceptibility Patterns of Pediatric Pott's Disease in a Tertiary Hospital in the Philippines	Ablong, John Steven D
0805-0808	[RF90#200] Fate of the L3/L4 Disc in Lenke 5 and 6 Patients Undergoing Posterior Spinal Fusion (PSF) with the Lowest Instrumented Vertebra (LIV) at L3, with a Minimum Follow-up of 5 Years	Chandirasegaran, Saturveithan
0809-0812	[RF90#040] How Tall Does Sitting Height or Length Increase after Surgery for Flaccid Type of Neuromuscular Scoliosis?	Horiuchi, Yuki
0813-0816	[RF90#108] Expanding the Indications of Minimally Invasive Scoliosis Surgery via Posterior Approach in Adolescent Idiopathic Scoliosis: Feasibility in Very Severe Curves Exceeding 80°	Kim, Hong Jin
0817-0820	[RF90#002] Increased Autophagic Flux and Apoptosis in Human Nucleus Pulposus Cells Under Serum Deprivation; Implications for Intervetebral Disc Degeneration and Therapeutic Strategy	Kim, Young Yul
0821-0824	[RF90#156] Hirayama Disease in a Young Indonesian Male: a Case Report	Koh, Hun Yi
0825-0828	[RF90#198] Use of a Support Platform for Unsupervised Supine Side-Bending Radiographs in the Assessment of Curve Flexibility in Adolescent Idiopathic Scoliosis (AIS)	Lee, Sin Ying
0829-0832	[RF90#047] Osteoarthritic Knee Can Change Surgical Result for Lumbar Degenerative Disease: Radiographic and Clinical Evidence	Lee, Young-Jik
0833-0836	[RF90#045] Dynamic Interspinous Radiology As a Predictor for Early-onset Adjacent Segment Degeneration after Multilevel Lumbar Interbody Fusion (l2–ilium)	Li, Xiongjie
0837-0840	[RF90#020] Thresholds for Reciprocal Changes and Proximal Junctional Complications after Adult Spinal Deformity Correction	Lin, Erh-Ti
0841-0844	[RF90#018] A Short Distance between Pedicle Screw Tip and Upperendplate As a Risk Factor for Upper Instrumented Vertebra Fracture Following Adult Spinal Deformity Surgery	Lo, Yuan-Shun
0845-0848	[RF90#022] Comparative Different Surgical Strategy in the Treatment of Dystrophic Neurofibromatosis Type 1 Kyphoscoliosis: a Retrospective Comparative Cohort Study.	Lo, Yuan-Shun
0849-0852	[RF90#184] Outpatient Intermittent Percutaneous CSF Drainage As Treatment of CSF Leak in Spine Surgery	Manuel, Paul Albert C.
0853-0856	[RF90#112] Efficacy of Suspension Bending Cast for Early Onset Scoliosis	Masuda, Keisuke
0857-0900	[RF90#273] Management and Long-term Outcomes of Mild Cervical Spondylotic Myelopathy: a Systematic Review and Meta Analysis	Mata, John David B

0901-0904	[RF90#096] Lateral Interbody Release with Rim Cage Placement Enables Effective L5/S Lordosis Restoration in Adult Spinal Deformity Surgery	Nagata, Keiji
0905-0908	[RF90#075] Impact of Diabetes Mellitus on Surgical Outcomes in Degenerative Cervical Myelopathy: a Prospective Multicenter Study	Nagoshi, Narihito
0909-0912	[RF90#148] Acute Calcium Pyrophosphate Crystal Arthritis of the Lumbar Facet Joint with Sequential Progression from Unilateral to Bilateral Involvement: a Rare Case Report	Nakai, Keiichi
0913-0916	[RF90#031] The Factors Affecting and Characteristics of Residual Neuropathic Pain after Cervical Laminoplasty for Myelopathy	Nokariya, Nokariya
0917-0920	[RF90#238] Quality of Life in Patients with Lumbar Failed Back Surgery Syndrome after Removal of Implant a -single-center Retrospective Study	Noor, Zairin
0921-0924	[RF90#253] Mechanical Stress Induces Degenerative and Chondrogenic Changes in the Ligamentum Flavum in a Rat Model	Okamura, Yuki
0925-0928	[RF90#099] Efficacy of the Erector Spinae Plane Block in Idiopathic Adolescent Scoliosis Surgery: a Retrospective Cohort Study	Ong, Tze Qi Josiah
0929-0932	[RF90#092] High Reproducibility of Sagittal Realignment Using Ai-assisted Preoperative Planning and Patient-specific Rods in Adult Spinal Deformity Surgery with Pelvic Fixation: a Case Series Study	Osato, Tomoyuki
0933-0936	[RF90#025] Romosozumab versus Teriparatide in Osteoporotic Vertebral Fractures: a Comparative Radiologic Analysis	Park, Hyung-Youl
0937-0940	[RF90#010] Associations between Postoperative Complications and Preoperative Glycemic Status after Spine Surgery	Park, Sangjun
0941-0944	[RF90#033] Effects of Sarcopenia and Malnutrition on Postoperative Outcomes in Spine Surgery	Park, Sangjun
0945-0948	[RF90#254] A Mid-to Long-term Prospective Study on the Effects of Disease Activity in Rheumatoid Arthritis on Cervical and Global Spine Alignment	Sachiko, Kawasaki
0948-0951	[RF90#139] Bladder, Bowel, and Beyond: Urodynamic and Functional Recovery Patterns after Surgical Decompression for Cauda Equina Syndrome	Aduri, Tharun

RAPID FIRE SESSION IV | DAY 2 | Friday | 05 June 2026 | Jasmine Room

Moderators: Billy Francis Y. Hung (Philippines) and Viennah Condor-Magcalas (Philippines)

Time	Paper Title	Presenter
1331-1334	[RF90#271] Does Prone Positioning Alter Retroperitoneal Structures Relevant to the LLIF Corridor? a Positional MRI Study of Prone vs. Lateral Decubitus Positions	Kanto, Tomoya
1335-1338	[RF90#283] Comparative Analysis of Mri-based Vertebral Bone Quality Score and Ct-based Hounsfield Unit with Dexa-based T-score in Assessing Bone Mineral Density in Degenerative Spine	Ramachandran, Karthik
1339-1342	[RF90#286] Does the Cervico-thoracic OPLL Represent a Unique Clinico-radiological Variant? an Analysis of Predictors of Neurological Recovery	Ramachandran, Karthik
1343-1346	[RF90#153] Early Outcomes on the Combined Halo-pelvic Traction and Kyphectomy from an All-posterior Approach for Severe Kyphotic Deformity	Rebato, Patrick Leo
1347-1350	[RF90#274] Precision in Spine Surgery: Meta-analysis of Robotic-assisted vs Fluoroscopy-assisted MIS-TLIF in Lumbar Spondylolisthesis – Improved Screw Accuracy, Reduced Blood Loss, and Better Clinical Outcomes	Sabloak, Rohan
1351-1354	[RF90#145] Comparison of Revision Discectomy with and without Instrumentation in Recurrent Lumbar Disc Herniation (RLDH)	Sakeb, Najmus
1355-1358	[RF90#258] Redefining the Role of Conventional Radiographs in the Management of Degenerative Cervical Myelopathy via Deep Learning to Identify Patients with Significant Cord Compression	Shea, Graham Ka Hon
1359-1402	[RF90#222] Lumbar Osteoporotic Vertebral Fractures Presenting with Radiculopathy: Clinical Characteristics and Surgical Outcomes of Vertebroplasty—a Multicenter Study	Shimizu, Takaki
1403-1406	[RF90#272] Clinical and Radiographic Predictors of Deterioration in Mild Cervical Spondylotic Myelopathy	Silverio, Immanuel V
1407-1410	[RF90#276] Incidence and Risk Factors of Venous Thromboembolism in Adult Spinal Deformity Surgery	Takada, Satoshi
1411-1414	[RF90#061] Association between Genetic Predisposition and Morphological Characteristics in Adolescent Idiopathic Scoliosis	Takeda, Kazuki
1415-1418	[RF90#051] Diagnostic Value and Periprocedural Neurological Events of CT Myelography for Preoperative Planning in Thoracic Ossification of the Posterior Longitudinal Ligament	Takino, Narimichi
1419-1422	[RF90#208] Classification and Subclassification of Adult Idiopathic Scoliosis (adis) Based on Adis Classification: a 3-year Analysis from a Single Tertiary Institution	Tan, Guan Wei
1423-1426	[RF90#226] Delayed Vertebral Fracture with Pedicle Screw Back-out in a Cement-augmented Vertebra after Fixation for Metastatic Breast Cancer: a Case Report	Tsujino, Masashi

1427-1430	[RF90#114] XLIF (Extreme Lateral Interbody Fusion): Technical Nuances and Clinical Radiological Outcome from an Institutional Experience of 20 Cases	Upadhyaya, Sunil
1431-1434	[RF90#269] Our Journey with Robotic Spine Surgery in a Tertiary Care Center with First 100 Cases: a Prospective Study	Vikram, Kattam Harsha
1435-1438	[RF90#206] Health-related Quality of Life of Patients with Adolescent Idiopathic Scoliosis in the Philippines: Validation of the Filipino Version of the Scoliosis Research Society-22 Questionnaire	Villegas, Jana Beatriz S
1439-1442	[RF90#030] Evolution of Cervical Spine Lordosis after Corrective Surgery of Adult Spinal Deformity Patients and Its Clinical Impact	Vu, Truc Tam
1443-1446	[RF90#143] Variation in Serum Magnesium Changes in an Acute Traumatic Spinal Cord Injury (ATSCI) and Its Association with Neurological Recovery- a Prospective Observational Study.	Waliullah, Shah
1447-1450	[RF90#062] Posterior Correction and Fusion for Adult Residual Adolescent Idiopathic Scoliosis (adis): Comparison between Thoracic-major (lenke 1) and Lumbar-major (lenke 5) Curves	Watanabe, Kota
1451-1454	[RF90#073] Endoscopic Posterior Instrumentation with Inter-facet Fusion for Atlantoaxial Dislocation: a Technical Note	Xu, Nanfang
1455-1458	[RF90#104] Ten-year Outcomes of Thoracopelvic Corrective Fusion for Degenerative Scoliosis	Yamato, Yu
1459-1502	[RF90#207] The Role of Lumbar Disc Replacement versus Decompression without Fusion in Radiculopathy: a Scoping Review	Yang, Cassie
1503-1506	[RF90#233] Anterior Lumbar Spine Access: Early Institutional Experience and Vascular Injury Patterns - a Case Series	Yeo, Jonathan
1507-1510	[RF90#068] Influence of Rod Characteristics and Correction Techniques on Sagittal Rod Bend-back and Thoracic Kyphosis Restoration in Adolescent Idiopathic Scoliosis Surgery	Yokogawa, Noriaki
1511-1514	[RF90#172] What Makes a Difference? Return to Driving after Cervical Disc Replacement	Yong, Jung Hahn
1515-1518	[RF90#024] Surgical Outcomes of Micro-endoscopic Lumbar Interbody Fusion (MELIF) with PPS	Yukawa, Yasutsugu

RAPID FIRE SESSION V | DAY 3 | Saturday | 06 June 2026 | Mactan 3

Moderators: Viennah Condor-Magcalas (Philippines) & Yoshiharu Kawaguchi (Japan)

Time	Paper Title	Presenter
0901-0904	[RF90#089] Is Prophylactic Foraminotomy Necessary to Prevent C5 Palsy in C3 Dome C7 Reverse Dome Open-Door Laminoplasty? A Retrospective Cohort Study	Masuda, Soichiro
0905-0908	[RF30#069] A Novel Surgical Technique to Prevent Proximal Junctional Kyphosis in Adult Spinal Deformity: the Combined Use of Sublaminar Tethering and Shorter UIV Screws	Suzuki, Satoshi
0909-0912	[RF30#090] A prospective analysis of clinical and radiological parameters in patients with lumbar canal stenosis operated by single stage DLIF & MIS pedicle screw fixation	Chaitanya, Krishna
0913-0916	[RF90#037] Long-Term Outcomes and Prognostic Factors After Spinal Metastasectomy for Renal Cell Carcinoma, Thyroid Carcinoma, and Leiomyosarcoma	Kato, Satoshi
0917-0920	[RF30#185] Predictors of Post-traumatic Kyphosis after Conservative Treatment: a Retrospective Analysis of 51 Thoracolumbar Fractures	Choudhury, Abdullah Al Mamun
0921-0924	[RF30#190] The Internal Cobb Angle: a Radiographic Parameter to Assess Curve Flexibility and Structurality in Patients with Lenke 5 Adolescent Idiopathic Scoliosis	Ong, Jia Sheng
0925-0928	[RF30#194] Predictors of Persistent Postoperative Coronal Imbalance and Distal Adding-on in Lenke 5C Adolescent Idiopathic Scoliosis with the Lowest Instrumented Vertebra at L3	Lee, Sin Ying
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0933-0936	[RF30#127] Favorable 10-year Postoperative Outcomes after Facet Fusion Using a Percutaneous Pedicle Screw System for Degenerative Lumbar Spondylolisthesis	Miyashita, Tomohiro
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[EP011] Surgical Treatment of Congenital Scoliosis in Cervicothoracic Region via combined antero-posterior approaches	Saito, Toshiki
[EP017] Three-Column Osteotomy versus Halo-Gravity Traction Combined with Posterior Column Osteotomy in the treatment of Dystrophic Neurofibromatosis Type 1 Kyphoscoliosis: A Retrospective Comparative Cohort Study	Lo, Yuan-Shun
[EP026] Short segment posterior fixation including the fracture level yields good outcomes in unstable thoracolumbar burst fractures	Humagain, Vaskar
[EP028] Diaphragmatic Hernia after Vertebral Body Replacement for Delayed Union of an L1 Fracture: A Case Report	Shimizu, Yuichi
[EP029] Stopping the Fusion at the Thoracolumbar Area is Not the Risk Factor of Proximal Junctional Kyphosis: A Prospective Study with Mean Follow-Up of 2.5 Year	Vu, Truc Tam
[EP036] Anterior Spinal Cord Decompression Via A Posterolateral Approach for the Treatment of Ossification of The Posterior Longitudinal Ligament in the Thoracic Spine	Kato, Satoshi
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[EP070] Endoscopic Segmental Fixation in Minimally Invasive Management of Hangman Fracture: A Technical Note	Xu, Nanfang
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[EP077] Clinical Profile of Chronic Low Back Pain Patients after Unilateral Biportal Endoscopic (UBE) Spine Surgery: A Retrospective Cohort Study	Valdevieso, Ma. Ella Muriel F.
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[EP081] Low-Temperature Spine-Specific PMMA Enhances Osteogenesis Through Localized Thermal Necrosis in Osteoporotic Vertebrae: Evidence from an Ovariectomized Rat Model	Kim, Young-Yul
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Our Distinguished Faculty

AUSTRALIA

Dr. John Choi, MBChB, FRACS, FAOrthA

Dr. John Y. S. Choi is an Orthopaedic and Spine Surgeon and Director of Spine Ortho Clinic in Melbourne, Australia. He is internationally recognized for his expertise in minimally invasive, endoscopic, and robotic spine surgery, and is considered a pioneer of unilateral biportal endoscopic (UBE) spine surgery in Oceania. Dr. Choi completed advanced spine fellowships across Asia and holds leadership roles in SMISS-AP and ISASS-AP. He has authored numerous publications, book chapters, and holds several surgical innovation patents. He is actively involved in international spine education and surgeon training.

Dr. Brian Hsu, MBBS, MMed, FRACS (Orth), FAOrthA, FHKAM

Dr. Brian Hsu is a spine surgeon based in Sydney, Australia, currently serving at The Children's Hospital at Westmead and several major private hospitals. He completed advanced spine fellowships at the University of California San Francisco and Twin Cities Spine Center, USA. Dr. Hsu has held major leadership roles within the Scoliosis Research Society, including committee chair positions. He is a Fellow of the Royal Australasian College of Surgeons, Australian Orthopaedic Association, and Hong Kong Academy of Medicine. He has also received multiple prestigious international travelling scholarships.

Prof. Orso L. Osti

Prof. Orso L. Osti is a Consultant Orthopaedic and Spinal Surgeon at The International Spine Centre in Adelaide, Australia. He is internationally recognized for his work in adult degenerative spinal disorders, spinal pain management, and complex spine surgery. Prof. Osti earned a PhD from the University of Adelaide for his pioneering research on intervertebral disc degeneration and has authored more than 50 scientific publications. He previously served as Australia's Chief Delegate to the Asia Pacific Spine Society and sits on the editorial boards of Spine and Asian Spine Journal. He is also a two-time recipient of the prestigious Volvo Award for Spinal Research.

Dr. Alvin Pun, BMedSci, MBBS (Hons), FRACS (Ortho), FAOrthA

Dr. Alvin Pun is an orthopaedic spine surgeon based in Melbourne and founder of Melbourne Spine Studio. His expertise includes minimally invasive spine surgery, robotic and navigation-guided procedures, artificial disc replacement, spinal deformity, and spinal tumors. He completed advanced spine fellowships in Milan, Beijing, London, and Melbourne. Dr. Pun is a Fellow of the Royal Australasian College of Surgeons and the Australian Orthopaedic Association. He also serves as Adjunct Senior Lecturer at Monash University and Board Member of the Asia Pacific Spine Society (APSS).

BANGLADESH

Prof. Dr. Shah Alam

Prof. Dr. Shah Alam is Chief Consultant and Academic Director of Bangladesh Spine Orthopedic Hospital Ltd., Bangladesh. He is a leading spine surgeon with advanced qualifications including MBBS, MS (Orthopaedics), FCPS, and multiple FRCS certifications from Edinburgh and Glasgow. He currently serves as President of the Bangladesh Spine Society and holds major international leadership positions within APSS, SICOT, and ISASS-AP. Prof. Alam is an Active Fellow of the Scoliosis Research Society and an International Faculty member of AO Spine. He is widely recognized for his contributions to spine surgery education, research, and spinal deformity management.

Prof. Dr. Syed Shahidul Islam

Prof. Dr. Syed Shahidul Islam is a Senior Consultant in Orthopaedics, Trauma, and Spine Surgery at Labaid Cancer Hospital Super Specialty Centre, Dhaka. He previously served as Professor and Academic Director at the National Institute of Traumatology and Orthopaedic Rehabilitation

(NITOR), Bangladesh. He currently serves as Chairman of the APOA Infection Section, President-Elect of the Bangladesh Spine Society, and Board Member of APSS. Prof. Islam is actively involved in spine education, research, and international academic meetings. He has contributed numerous publications and presentations in orthopaedics and spine surgery.

Dr. Md. Sarwar Jahan

Dr. Md. Sarwar Jahan is an Associate Professor of Spine Surgery at the National Institute of Traumatology & Orthopedic Rehabilitation (NITOR), Dhaka. He completed advanced spine fellowships through the Scoliosis Research Society, AO Spine, APSS, and international endoscopic spine programs in South Korea and India. His clinical focus includes minimally invasive and endoscopic spine surgery. Dr. Jahan is actively involved in clinical research and international spine education. He is also a member of major organizations including AO Spine, APSS, and NASS.

A/Prof. Dr. Sharif Ahmed Jonayed

A/Prof. Dr. Sharif Ahmed Jonayed is an Associate Professor of Spine Surgery at NITOR, Dhaka, Bangladesh. He completed advanced fellowship training in spine surgery across Japan, the United Kingdom, India, Singapore, and South Korea. His expertise includes minimally invasive spine surgery, scoliosis correction, spinal decompression, and complex spinal trauma surgery. Dr. Jonayed became the first Bangladeshi surgeon to receive the prestigious Robert B. Winter Global Outreach Fellowship from the Scoliosis Research Society in 2026. He is recognized for his contributions to spinal deformity surgery and global spine care.

CHINA

Prof. Yong Hai

Prof. Yong Hai is Professor and Chairman of Orthopedic Surgery at Beijing Chaoyang Hospital, Capital Medical University, China, and Director of the Center for Spinal Deformity. He is internationally recognized as a leader in spine surgery and currently serves as President of the Chinese Association of Spine and President of the International Society for the Study of the Lumbar Spine (ISSLS). Prof. Hai has published more than 300 SCI-indexed scientific articles and serves on the editorial boards of leading spine journals. His expertise includes spinal deformity and advanced endoscopic spine surgery. He is widely regarded for his major contributions to spine research and education internationally.

Prof. Zheng Zhaomin

Prof. Zheng Zhaomin is Professor and Director of Spine Surgery at the First Affiliated Hospital of Sun Yat-sen University, Guangzhou, China. With over 30 years of experience, he specializes in minimally invasive spine surgery and complex spinal deformity correction. He serves as President of PASMISS 2024, Board Member of APSS, and Associate Editor of the Asian Spine Journal. Prof. Zheng has published more than 80 SCI-indexed papers with major contributions in intervertebral disc degeneration and regenerative spine science. He is internationally recognized for his leadership in minimally invasive spine surgery and academic research.

HONG KONG

Dr. Paul Aarne Koljonen

Dr. Paul Aarne Koljonen is Consultant and Deputy Chief of Service in Orthopaedics and Traumatology at Queen Mary Hospital, Hong Kong, and Deputy Hospital Chief Executive of the Maclehose Medical Rehabilitation Centre. He is fully subspecialized in spinal surgery and

spinal cord injury rehabilitation and is recognized for pioneering rehabilitation technologies in Hong Kong, including robotic exoskeleton services and advanced diaphragmatic stimulation techniques. Dr. Koljonen is also an Honorary Clinical Associate Professor at The University of Hong Kong. He has authored numerous publications in scoliosis, degenerative cervical myelopathy, and spinal rehabilitation. He has received major honors including the HKUMed Faculty Clinical Service Excellence Award and Hospital Authority Young Achiever Award.

Prof. Kenny Kwan

Prof. Kenny Yat Hong Kwan is Clinical Associate Professor at The University of Hong Kong and Chief of the Division of Spine Surgery at Queen Mary Hospital. He is internationally recognized for his expertise in spinal deformity and advanced spine surgery. Prof. Kwan holds leadership positions within the Scoliosis Research Society, AO Spine, and APSS. He has secured numerous competitive research grants and authored many high-impact scientific publications. He is also actively involved in spine education and multicenter international research collaborations.

Dr. Kin Cheung Mak

Dr. Mak Kin Cheung is an orthopedic spine surgeon in private practice in Hong Kong and an Honorary Clinical Associate Professor at The University of Hong Kong. He has held major leadership roles within AO Spine East Asia and is an active international educator and speaker. His expertise includes degenerative spine conditions, spinal deformity, and spine research. Dr. Mak has contributed to numerous peer-reviewed publications and serves as reviewer for several international spine journals. He is widely involved in spine education throughout the Asia-Pacific region.

Prof. Dr. Huiren Tao

Dr. Tao Huiren is an orthopedic spine surgeon currently serving as Adjunct Clinical Professor and Consultant at HKUMed, as well as Chief of Spine Surgery at HKU-Shenzhen Hospital. He previously held major academic and leadership positions at Shenzhen University General Hospital, Xi'an Jiaotong University, and Xijing Hospital of the Fourth Military Medical University in China. Dr. Tao completed advanced fellowship and research training in Hong Kong, Singapore, Japan, and the United States, with expertise in spinal deformity, scoliosis, osteotomy, and complex spine reconstruction. He is actively involved in cutting-edge research on spinal deformity correction, robotics, navigation systems, and osteoporosis immunotherapy, serving as principal investigator for multiple major research grants in China. Dr. Tao has authored numerous high-impact scientific publications and has received several prestigious awards recognizing his outstanding contributions to spine surgery, research, and academic medicine.

Prof. Yat Wa Wong

Prof. Yat-Wa Wong is Honorary Clinical Professor at The University of Hong Kong and Honorary Consultant Orthopaedic Spine Surgeon at Hong Kong Sanatorium & Hospital. He previously served as Chief of Service and Deputy Hospital Chief Executive at Queen Mary Hospital, where he led the Division of Spine Surgery. Prof. Wong is the current President of the Asia Pacific Spine Society and an internationally recognized leader in spine surgery and education. He has extensive contributions to international spine training, research, and academic development. He continues to lecture and collaborate widely across major global spine organizations.

INDIA

Dr. Aju Bosco

Dr. Aju Bosco is an orthopaedic spine surgeon and Associate Professor at Government Medical College, Thiruvallur, India. His clinical interests include scoliosis, spinal deformity, and advanced spine surgery. He is actively involved in spine education and international academic activities through organizations such as SRS and ASSI. Dr. Bosco has received multiple recognitions, including the Best Young Spine Surgeon Award from the North American Spine Society. He is widely engaged in regional and international spine training initiatives.

Dr. Guna Pratheep Kalanchiam

Dr. Guna Pratheep Kalanchiam is a Consultant Spine Surgeon at Meenakshi Mission Hospital and Research Centre, India. He completed multiple international fellowships in endoscopic, minimally invasive, robotic, and deformity spine surgery across Asia. He serves as a research associate with the AO Spine Knowledge Forum Degenerative and has authored more than 40 peer-reviewed publications. Dr. Kalanchiam has received prestigious recognitions including the AO Spine International Fellowship and APSS Fellowship. His expertise focuses on minimally invasive and advanced spine surgical techniques.

Dr. Priyambada Kumar

Dr. Priyambada Kumar is a Consultant Spine Surgeon at Dr. Vasantrao Pawar Medical College Hospital and Research Centre, India. Her expertise includes minimally invasive spine surgery, spinal deformity, and spinal oncology. She completed advanced spine fellowships in Singapore and leading spine centers in India. Dr. Kumar has authored over 30 peer-reviewed publications and regularly serves as faculty in national and international spine meetings. She has received multiple Gold Medals and awards recognizing her contributions to spine research and clinical excellence.

Dr. Abhay Nene

Dr. Abhay Nene is a spine surgeon based in Mumbai, India, specializing in paediatric spinal deformity, spinal tumor reconstruction, spinal tuberculosis, and osteoporotic spine disorders. He has authored over 50 international publications and textbook chapters and remains actively involved in spine research and fellowship training. Dr. Nene is the immediate past Chair of AOSpine Asia Pacific and serves on committees of the Scoliosis Research Society and North American Spine Society. He received the AOSpine Educator of the Year Award in 2018. Beyond medicine, he is also active in endurance sports and high-altitude expeditions.

Prof. Rajasekaran Shanmuganathan

Prof. S. Rajasekaran is Chairman of Orthopaedics, Trauma, and Spine Surgery at Ganga Hospital, India, and is internationally recognized as one of the world's leading spine surgeons and researchers. He is a Past President of APSS, SICOT, ISSLS, and the Indian Orthopaedic Association, and previously chaired the AO Spine International Board. Prof. Rajasekaran has authored over 500 international publications and received numerous prestigious honors, including the ISSLS Lifetime Achievement Award. He is also recognized for his humanitarian initiatives in road safety, spinal rehabilitation, and affordable healthcare. His work has had major global impact on spine surgery research and education.

Dr. Ajoy Prasad Shetty

Dr. Ajoy Prasad Shetty is a Senior Consultant in Spine Surgery at Ganga Medical Centre and Hospitals, India. He currently serves as President-Elect of the Association of Spine Surgeons of India and Chair of the Educational Committee of APSS. Dr. Shetty is actively involved in regional and international spine education, training, and research initiatives. He has contributed significantly to the advancement of spine surgery across the Asia-Pacific region. His work focuses heavily on education and surgeon development.

Dr. S.K. Srivastava

Dr. S.K. Srivastava is the current President of the Association of Spine Surgeons of India (ASSI) and Professor of Orthopaedics at K.J. Somaiya Medical College and Research Centre in Mumbai, India. He previously served as Professor and Head of Orthopaedics at the prestigious Seth G.S. Medical College and K.E.M. Hospital, Mumbai, and is also a Past President of the Bombay Spine Society. An internationally recognized spine surgeon, Dr. Srivastava completed advanced spine fellowships in the United Kingdom, Germany, Switzerland, and the United States, with special expertise in atlanto-axial dislocation, rigid spinal deformity correction, and spinal reconstruction. He has been invited as faculty and speaker in numerous international spine societies including APSS, AO Spine, Global Spine Congress, CSRS-AP, and the British Spine Society. Dr. Srivastava has over 75 scientific publications and has received multiple prestigious awards, including the VTI Gold Medal and Lifetime Achievement Awards for his contributions to spine surgery and education.

Dr. Niraj B. Vasavada

Dr. Niraj B. Vasavada is a Senior Consultant Spine Surgeon at Zydus Hospitals, Ahmedabad, India. He completed advanced fellowship training in minimally invasive and endoscopic spine surgery and holds leadership positions within APSS and the Spine Association of Gujarat. Dr. Vasavada is actively involved in international spine education and training programs. He serves as faculty for SMISS-AP and AO Spine. His expertise focuses on minimally invasive deformity correction and advanced spine procedures.

INDONESIA

Dr. Primadenny Airlangga

Dr. Primadenny Ariesa Airlangga is Head of the Department of Orthopaedics and Traumatology at Airlangga University / Dr. Soetomo General Hospital, Indonesia. He is the current President of the Indonesian Orthopaedic Spine Surgery Association (IOSSA) and an active AO Trauma faculty member. His expertise includes spinal trauma, spinal tuberculosis, deformity correction, and instrumentation techniques. Dr. Airlangga is actively involved in international spine education and academic activities. He has contributed numerous publications and presentations at major spine meetings worldwide.

Dr. Asrafi Rizki Gatam

Dr. Asrafi Rizki Gatam is an orthopaedic spine surgeon in Indonesia specializing in minimally invasive and endoscopic spine surgery. He completed advanced fellowships in Singapore and Hong Kong, with additional specialized training in Germany and South Korea. His expertise includes degenerative spine disorders, scoliosis, spinal fractures, tumors, and robotic-assisted spine surgery. Dr. Gatam is widely involved in advanced endoscopic and navigation-guided spine procedures. He practices at several leading spine institutions in Indonesia.

Prof. Luthfi Gatam

Prof. Luthfi Gatam is Director of the Orthopaedic and Traumatology Department at Fatmawati General Hospital, Jakarta, Indonesia. He is a Past President of both the Indonesian Orthopaedic Association and PASMISS. Prof. Gatam completed additional spine fellowship training in the United States and holds a PhD in Clinical Epidemiology. He is actively involved in academic teaching and clinical spine research. His work has contributed significantly to minimally invasive spine surgery development in the region.

Dr. Abdul Kadir Hadar

Dr. Abdul Kadir Hadar is an orthopaedic spine surgeon and faculty member at Hasan Sadikin General Hospital and Universitas Padjadjaran, Indonesia. His expertise includes minimally invasive and endoscopic spine surgery, spinal deformity, and degenerative spine conditions. He is actively involved in academic teaching and serves regularly as speaker and instructor in APSS and

ASEAN MISST programs. Dr. Hadar contributes actively to regional spine education and training. He is recognized for his work in endoscopic cervical spine surgery.

Dr. Harmantya Mahadhipta

Dr. Harmantya Mahadhipta is an orthopaedic spine surgeon specializing in minimally invasive and endoscopic spine surgery in Indonesia. He serves as Lecturer at the University of Indonesia and holds several leadership roles in major spine centers. Dr. Mahadhipta is the Past President of ASEAN MISST and actively contributes to PASMISS and AO Spine initiatives. He is a recognized academic speaker with numerous publications and presentations on advanced spine techniques. His work focuses on innovations in minimally invasive spine surgery.

Dr. Muhamad Aulia Rahman

Dr. Muhamad Aulia Rahman is a board-certified neurosurgeon and spine specialist based in Jakarta, Indonesia. His expertise includes minimally invasive and endoscopic spine surgery, motion-preserving techniques, and regenerative spine therapies. He completed advanced international fellowships in Japan, Singapore, and China. Dr. Rahman is actively involved in spine research and has multiple international publications and presentations. He is also a recipient of the AO Spine Asia Pacific Fellowship Grant.

Dr. Yudha Mathan Sakti

Dr. Yudha Mathan Sakti is an orthopaedic spine surgeon at Sardjito General Hospital and faculty member at Universitas Gadjah Mada, Indonesia. His expertise includes minimally invasive and endoscopic spine surgery, spinal deformity, and regenerative therapies. He currently serves as President of the APOA Young Surgeons Forum and is actively involved in AO Spine and APSS programs. Dr. Sakti is an award-winning clinician-researcher with multiple international publications, patents, and invited lectures. He is widely recognized for advancing regenerative and minimally invasive spine surgery in the region.

JAPAN

Prof. Kuniyoshi Abumi

Prof. Kuniyoshi Abumi is Professor Emeritus of Hokkaido University and Chief Director of Sapporo Orthopaedic Hospital, Japan. He is internationally recognized for his expertise in complex spinal reconstruction, cervical deformity, and salvage spine surgery. Prof. Abumi is a Past President of the Asia Pacific Spine Society and founder of the CSRS-Asia Pacific Section. He has received numerous prestigious awards from the Scoliosis Research Society and the Japan Orthopaedic Association. His contributions have significantly advanced modern cervical and deformity spine surgery.

Prof. Hideyuki Arima

Prof. Hideyuki Arima is Senior Assistant Professor at Hamamatsu University School of Medicine, Japan, specializing in spine surgery and adult spinal deformity. He completed a research fellowship at the Norton Leatherman Spine Center in the United States and has authored over 170 international publications. His research focuses on spinal cord disorders and adult spinal deformity. Prof. Arima is actively involved in AO Spine, APSS, and other international spine societies. He has received multiple best paper awards and international honors in spine research.

Prof. Tomohiko Hasegawa

Prof. Tomohiko Hasegawa is Vice Director of Ensyu Hospital and Associate Professor of Orthopaedic Surgery at Hamamatsu University School of Medicine, Japan. His expertise includes adult spinal deformity, spinal cord tumors, and complex reconstructive spine procedures. His research interests focus on spinal instrumentation, bone fusion, and nerve regeneration. Prof. Hasegawa has contributed extensively to advancements in spine surgery and clinical outcomes. He remains actively

involved in academic spine research and education.

Dr. Satoshi Kato

Dr. Satoshi Kato is Associate Professor of Orthopaedic Surgery at Kanazawa University, Japan. His clinical and research focus includes spinal tumors, lumbar spine disorders, and complex spinal ligament conditions. He completed international training at Emory University Spine Center and an AO Spine fellowship in Italy. Dr. Kato has authored more than 230 scientific publications and is actively involved in major international spine societies. He is recognized for his expertise in advanced spinal tumor surgery and functional outcome research.

Prof. Yoshiharu Kawaguchi

Prof. Yoshiharu Kawaguchi is Professor and Chairman of Orthopaedic Surgery at the University of Toyama, Japan. He currently serves as Honorary Secretary of APSS and Trustee of the AO Foundation. Prof. Kawaguchi has held leadership roles in AO Spine Asia Pacific and contributes extensively to global spine research and education. He serves as editor and reviewer for multiple leading spine journals. His work has significantly influenced spine education and minimally invasive spine surgery in Asia-Pacific.

Prof. Yukihiro Matsuyama

Prof. Yukihiro Matsuyama is Professor Emeritus at Hamamatsu University School of Medicine and Director of Jyuzen Memorial Hospital, Japan. He is a Past President of the Japanese Society for Spine Surgery and Related Research and an internationally respected authority in spinal deformity surgery. Prof. Matsuyama has received multiple prestigious clinical research awards from the Scoliosis Research Society. His expertise focuses on advanced deformity correction and osteoporotic spinal conditions. He continues to contribute actively to international spine education and research.

Prof. Masashi Miyazaki

Prof. Masashi Miyazaki is Clinical Professor of Orthopaedic Surgery at Oita University Faculty of Medicine, Japan. His expertise centers on adolescent idiopathic scoliosis and adult spinal deformity surgery. His research focuses on surgical strategies for complex deformities, perioperative optimization, and imaging biomarkers. Prof. Miyazaki has authored numerous peer-reviewed publications and is actively involved in AO Spine and APSS educational activities. He is a frequent invited speaker at major international spine meetings.

Prof. Masaya Nakamura

Prof. Masaya Nakamura is Professor and Chair of Orthopedic Surgery and Vice Dean at Keio University School of Medicine, Japan. He is internationally recognized for pioneering work in spinal cord injury and regenerative medicine, including iPS cell therapy research. Prof. Nakamura has published over 1,000 scientific articles and serves as President of major Japanese spine and spinal cord societies. His work has had global impact on regenerative spine medicine and spinal cord research. He has received numerous prestigious awards in regenerative medicine and spine science.

Prof. Tetsuro Ohba

Prof. Tetsuro Ohba is Associate Professor of Orthopaedic Surgery at the University of Yamanashi, Japan. His clinical and research interests include minimally invasive spine surgery and lumbar spine disorders. He has held international academic appointments including Visiting Associate Professor at Vanderbilt University Medical Center. Prof. Ohba has received multiple awards from major orthopaedic and spine organizations. He is actively involved in clinical guideline development and spine research initiatives.

Prof. Daisuke Sakai

Dr. Daisuke Sakai is a Professor and Clinical Department Chief of the Department of Orthopaedic Surgery at Tokai University School of Medicine in Kanagawa, Japan. He is an internationally recognized orthopaedic spine surgeon and researcher specializing in spinal surgery, spinal deformity, degenerative spine disease, and regenerative medicine. His research focuses on intervertebral disc biology, stem cell therapy, and cellular regeneration for degenerative disc disease. Dr. Sakai has authored more than 200 peer-reviewed publications and has delivered over 300 presentations and invited lectures worldwide. He currently serves in several major international leadership positions, including Secretary General of the International Society for the Study of the Lumbar Spine (ISSLS) and board member roles in multiple spine societies. His contributions to spine research and regenerative medicine have earned him numerous international awards and recognition.

A/Prof. Hideki Shigematsu

A/Prof. Hideki Shigematsu is Associate Professor of Orthopaedic Surgery at Nara Medical University, Japan. He is internationally recognized for expertise in intraoperative neurophysiological monitoring and spinal cord safety during complex spine surgery. His clinical interests include scoliosis correction, spinal tumors, cervical myelopathy, and degenerative spine disorders. Dr. Shigematsu has authored over 160 scientific publications and contributes extensively to multidisciplinary spine oncology care. He is also actively involved in APSS educational and research initiatives.

Dr. Shinji Takahashi

Dr. Shinji Takahashi is Associate Professor of Orthopaedic Spine Surgery at Osaka Metropolitan University, Japan. His expertise includes spinal deformity, osteoporotic vertebral fractures, minimally invasive spine surgery, and advanced endoscopic techniques. His research focuses on optimizing treatment strategies using multicenter studies and deep learning analytics. Dr. Takahashi actively contributes to international spine education and collaborative research initiatives. He is recognized for innovative work in deformity and osteoporosis-related spine surgery.

Prof. Masahiko Watanabe

Prof. Masahiko Watanabe is Senior Executive Director of Tokai University Hospital and Professor and Chairman of Orthopaedic Surgery at Tokai University School of Medicine, Japan. He completed advanced research training at the University of Connecticut, USA, and is actively involved in major international spine societies. Prof. Watanabe has held multiple academic leadership positions in spine surgery and orthopaedics. His work contributes significantly to clinical spine care, research, and education. He is recognized as a senior academic leader in Japanese spine surgery.

Prof. Kota Watanabe

Prof. Kota Watanabe is Associate Professor of Orthopedic Surgery at Keio University School of Medicine and Director of the Scoliosis Treatment Center at Keio University Hospital, Japan. He is internationally recognized for expertise in spinal deformity and scoliosis surgery. Prof. Watanabe holds leadership roles within the Scoliosis Research Society and AO Spine. His clinical and research focus centers on spinal deformity correction and global spine education initiatives. He remains actively involved in academic leadership and international collaborative research.

Prof. Yasutsugu Yukawa

Prof. Yasutsugu Yukawa is Director of the Spine Center at Nagoya Kyoritsu Hospital and Clinical Professor at Wakayama Medical University, Japan. He has authored over 140 peer-reviewed international publications and is recognized for significant contributions to spine surgery and research. His expertise includes degenerative spine disorders, spinal deformity, and advanced reconstructive procedures. Prof. Yukawa has delivered numerous invited lectures internationally. He continues to contribute actively to

spine education and clinical research worldwide.

A/Prof. Takashi Yurube

A/Prof. Takashi Yurube is Associate Professor of Orthopaedic Spine Surgery at Kobe University Graduate School of Medicine, Japan. His expertise focuses on degenerative disc disease, tissue regeneration, autophagy, and gene therapy for spinal disorders. Dr. Yurube has authored over 100 peer-reviewed publications and serves on editorial boards of leading spine journals. He completed postdoctoral research training at the University of Pittsburgh, USA. His work has significantly contributed to translational spine science and regenerative research.

MALAYSIA

Prof. Chris Chan Yin Wei

Prof. Chris Chan Yin Wei is a Consultant Orthopaedic and Spine Surgeon at the University of Malaya Medical Centre and Professor in the Department of Orthopaedic Surgery, Malaysia. His expertise includes spinal deformity correction, adolescent idiopathic scoliosis, spinal tumors, and degenerative spine disorders. He completed advanced spine training in South Korea focusing on sagittal imbalance and kyphosis. Prof. Chan has authored over 160 scientific publications and currently serves as Fellowship Chairperson of the Asia Pacific Spine Society. He is actively involved in spine research, education, and international academic collaborations.

Prof. Chee Kidd Chiu

Prof. Chee Kidd Chiu is an Associate Professor at the University of Malaya and Consultant Spine Surgeon at the University Malaya Specialist Centre. His clinical focus includes thoracic and lumbar spine disorders, spinal deformity, and degenerative spine conditions. He completed advanced spine fellowship training in Singapore, Taiwan, Korea, and Italy. Prof. Chiu is actively involved in APSS, AO Spine, and SRS educational and research initiatives. He is also widely recognized as a reviewer and editorial contributor to major international spine journals.

Dr. Nur Aida Faruk Senan

Dr. Nur Aida Faruk Senan is Consultant Orthopedic Spine Surgeon and Head of Spine Service at Sarawak General Hospital, Malaysia. She completed multiple international spine fellowships across Asia, Europe, and Australia focusing on spinal deformity and advanced spine techniques. Dr. Faruk is actively involved in spine research, education, and international meetings as faculty and speaker. She also serves as an AO Spine fellowship director at her institution. Her work focuses on spinal deformity and complex spine surgery.

Prof. Dato' Dr. Mun-Keong Kwan

Prof. Dato' Mun-Keong Kwan is Professor and Senior Orthopaedic Consultant at Universiti Malaya, Malaysia, and a Past President of both APSS and the Malaysia Spine Society. He is internationally recognized as a leading authority in paediatric spinal deformity and adolescent idiopathic scoliosis. Prof. Kwan has authored numerous international publications focusing on scoliosis correction, balance outcomes, and pedicle screw safety. He is actively involved in global spine education and international scientific meetings. His work has significantly advanced pediatric deformity surgery in the Asia-Pacific region.

Dato' (Dr) KS Sivananthan

Dato' Dr. K.S. Sivananthan is a senior Consultant Orthopaedic Surgeon at ALTY Hospital, Kuala Lumpur, Malaysia, with more than four decades of experience in spine surgery. He is a Past President of APSS, APOA, and the Malaysian Spine Society and has held numerous international leadership positions. Dr. Sivananthan has contributed extensively to spine education, research, and regional orthopaedic development. He has received multiple honors, including the Excellence in the Field of Spine Surgery Award in 2025. He is widely respected for his lifelong contributions to spine surgery and academic leadership.

Dr. Wong Chung Chek

Dr. Wong Chung Chek is a Consultant Orthopaedic and Spine Surgeon at ALTY Orthopaedic Hospital, Malaysia, with over 25 years of experience in spine surgery. His expertise includes spinal deformity, degenerative spine disorders, minimally invasive and endoscopic spine surgery, and spine infections. He previously served as Senior Orthopaedic Spine Consultant at Sarawak General Hospital and completed spine fellowship training at The University of Hong Kong. Dr. Wong has held major leadership roles within AO Spine Asia Pacific and the Kuching Operative Spine Course. He remains actively involved in international spine education and research.

Prof. Zamzuri Zakaria

Dr. Zamzuri Zakaria @ Mohamad is a Malaysian orthopaedic spine surgeon currently serving as Consultant Spine Surgeon at KPJ Pahang Specialist Hospital. He completed his Fellowship in Spinal Surgery in Adelaide, Australia, and has extensive experience managing complex spinal disorders, including spinal trauma, malignancy, revision spine surgery, and scoliosis. He previously served as Professor and Clinical Director at Sultan Ahmad Shah Medical Centre, International Islamic University Malaysia (IIUM), where he also mentored and trained junior spine surgeons. Dr. Zamzuri is a former President of the Malaysia Spine Society and has held several leadership positions within the organization. He is actively involved in spine research with publications focusing on spinal tuberculosis, cervical myelopathy, scoliosis, and minimally invasive spine interventions. His contributions to spine surgery and medical innovation have earned him multiple national and international awards.

MYANMAR

Dr. Kyaw Linn Linn

Dr. Kyaw Linn Linn is a Senior Consultant Spine Surgeon at Yangon Orthopaedic Hospital, Myanmar. He completed advanced international spine fellowship training across Malaysia, Japan, Singapore, India, and Indonesia with focus on minimally invasive and advanced spine techniques. His expertise includes spinal trauma, degenerative spine disorders, and deformity surgery. Dr. Linn is actively involved in APSS, AO Spine, NASS, and SICOT educational and research activities. He regularly contributes to international publications and presentations in global spine meetings.

NEPAL

Dr. Binod Bijukachhe

Dr. Binod Bijukachhe is Chief Consultant Orthopaedic and Spine Surgeon and Medical Director at Grande International Hospital, Kathmandu, Nepal. He also serves as Head of Orthopedics and Director of the Division of Spine Surgery. His work focuses on complex spine surgery and training future spine surgeons in Nepal. Dr. Bijukachhe is actively involved in academic teaching and fellowship training programs. He is widely recognized for his contributions to spine care and education in Nepal.

Prof. Gaurav Raj Dhakal

Prof. Gaurav Raj Dhakal is Professor of Orthopedics and Consultant Spine Surgeon at Manmohan Memorial Teaching Hospital, Kathmandu, Nepal. He serves as General Secretary of the Association of Spine Surgeons of Nepal and actively participates in APSS and AO Spine initiatives. Dr. Dhakal has published numerous research articles and frequently presents at international spine conferences. He is also involved in AO Spine educational programs and curriculum development. His work contributes significantly to spine education and research in Nepal.

Prof. Dipak Shrestha

Prof. Dipak Shrestha is Professor of Orthopaedic Surgery at Dhulikhel Hospital, Kathmandu University Hospital, Nepal, and Chief of the Dhulikhel Hospital Trauma and Emergency Center. He is the current President of the Association of Spine Surgeons of Nepal and Board Member of CSRS-Asia Pacific. His expertise includes cervical spine surgery, minimally invasive and endoscopic spine surgery, spinal deformity, and spine infections. Prof. Shrestha has authored numerous international publications and received several prestigious awards and fellowships from organizations including AAOS, APSS, and SRS. He is internationally recognized for his contributions to spine surgery and education.

PAKISTAN

Prof. Muhammad Arif Khan

Prof. Muhammad Arif Khan is Professor of Orthopedic and Spine Surgery at Khyber Girls Medical College, Pakistan, and former Chairman of Orthopedics at Hayatabad Medical Complex. His expertise includes minimally invasive and endoscopic spine surgery, spinal trauma, deformity correction, arthroplasty, and spinal rehabilitation. He currently serves as President-Elect of the Society of Spine Surgeons Pakistan and Secretary General of the Asia Pacific Orthopaedic Association. Prof. Khan is actively involved in APSS regional spine education and international scientific collaboration. He is recognized as one of the leading spine surgeons and educators in Pakistan.

SINGAPORE

A/Prof. Dennis Hey

A/Prof. Dennis Hey is a Senior Consultant Spine Surgeon and Associate Professor at the National University Spine Institute, National University Hospital, Singapore. His expertise includes adult spinal deformity, motion-preserving surgery, and minimally invasive and endoscopic spine techniques. He has held leadership roles within APSS and other major spine organizations and has authored over 150 scientific publications. A/Prof. Hey has received numerous international awards, including the Global Spine Journal Best Paper Award and the Scoliosis Research Society Whitecloud Award. He is widely recognized for his contributions to academic spine surgery and research.

Prof. Gabriel Liu

Prof. Gabriel Liu is an orthopaedic spine surgeon and Associate Professor at the National University Health System, Singapore. He previously served as Deputy Head of Spine Surgery at the National University Hospital. Dr. Liu has received multiple teaching and research awards and has authored more than 20 scientific publications. He is actively involved in education, research, and international spine surgery development. His work continues to shape spine training and patient care in Singapore.

A/Prof. Jacob Oh

A/Prof. Jacob Oh is Head of Spine Surgery and Senior Consultant at Tan Tock Seng Hospital, Singapore, and Founder of the NHG Spine Centre. His expertise includes minimally invasive and endoscopic spine surgery, robotic and navigation-guided surgery, spinal tumors, trauma, and adult spinal deformity. He completed advanced fellowships in complex spine surgery in Canada and endoscopic spine surgery in India. Dr. Oh is President-Elect of the Singapore Spine Society and Singapore Country Lead for AO Spine. He has authored more than 50 peer-reviewed publications and received multiple teaching excellence awards.

Dr. John Nathaniel M. Ruiz

Dr. John Nathaniel M. Ruiz is a spine surgeon at the National University Hospital, Singapore, and Adjunct Clinical Lecturer at the National University of Singapore. His expertise includes spine deformity and biomechanics, with active involvement in undergraduate and postgraduate

medical education. Dr. Ruiz has contributed to several international publications and book chapters. He has received recognition for his research, including a Best Deformity Paper Award from the Scoliosis Research Society. He remains actively engaged in academic spine surgery and research.

A/Prof. Reuben Soh

A/Prof. Reuben Soh is Director of Spine Surgery at Singapore General Hospital and Clinical Associate Professor at Duke-NUS Medical School. His expertise includes adult and pediatric spinal deformity and complex reconstructive spine surgery using minimally invasive techniques. He currently serves as Chairman of AO Spine East Asia and is actively involved in international spine education. A/Prof. Soh has an extensive academic portfolio with numerous publications and multiple teaching excellence awards. He is widely recognized for advancing deformity and reconstructive spine surgery in the region.

Adj. Asst. Prof. Jiong Hao Jonathan Tan

Adj. Asst. Prof. Jiong Hao Jonathan Tan is Consultant at the National University Spine Institute and Programme Director of the Orthopaedic Surgery Residency Programme at NUHS, Singapore. His expertise focuses on metastatic and primary spinal tumors as well as artificial intelligence applications in spinal imaging and diagnostics. He has authored over 100 peer-reviewed publications and received multiple competitive research grants. Prof. Tan is actively involved in musculoskeletal innovation and academic spine research. He is recognized for integrating AI and machine learning into spine surgery research.

Prof. Wong Hee Kit

Prof. Wong Hee Kit is Emeritus Consultant at the National University Spine Institute and Honorary Professor of Orthopaedic Surgery at the National University of Singapore. He is internationally recognized as a pioneer in spine surgery and previously served as Chair of Orthopaedic Surgery and Head of Spine Surgery at the National University Hospital. His expertise includes spinal deformity, scoliosis, minimally invasive keyhole spine surgery, and complex reconstructive procedures. Prof. Wong is a Past President of both ISASS and APSS and founding President of the Singapore Spine Society. He has received multiple national honors for his contributions to healthcare and spine surgery.

A/Prof. Ou Yang Youheng

A/Prof. Ou Yang Youheng is Consultant Orthopaedic Spine Surgeon at Singapore General Hospital and Director of Education at the SingHealth Duke-NUS Spine Centre. His expertise includes adult spinal deformity, revision spine surgery, metastatic spine disease, trauma, and spinal oncology. He completed advanced fellowship training in the United Kingdom focusing on complex geriatric spine conditions. A/Prof. Ou Yang has received multiple international teaching and research awards and secured competitive research grants. He currently serves as AO Spine Country Chair for Singapore and actively contributes to regional spine education.

SOUTH KOREA

Prof. Dong-Gune Chang

Prof. Dong-Gune Chang is Professor of Orthopaedic Surgery at Inje University Sanggye Paik Hospital, Seoul, Korea. He specializes in pediatric and adult spinal deformity, complex revision surgery, and osteoporosis-related spine disorders. Prof. Chang has authored more than 120 peer-reviewed publications and holds leadership roles within the Scoliosis Research Society and APSS. He is internationally recognized for contributions to deformity and degenerative spine research. His work continues to advance spine care and education throughout Asia-Pacific.

Prof. Kyu-Jung Cho

Prof. Kyu-Jung Cho is Professor of Orthopaedic Surgery at Inha University School of Medicine, Korea. He has served as President of the Korean Society of Spine Surgery and Chair of the APSS Membership Committee. Prof. Cho is actively involved in major international societies including SRS, AO Spine, and NASS. He has received multiple academic awards and contributed extensively to spinal instrumentation innovation and spine research. He is widely respected for leadership in spine surgery education and academic development.

Prof. InBo Han

Prof. InBo Han is a spine surgeon from South Korea specializing in spine trauma and advanced spinal surgery. He is recognized internationally for contributions to spine research, education, and clinical spine care. Prof. Han has actively participated in major international spine meetings and collaborative educational programs. His expertise includes spinal trauma management and complex spine procedures. He remains actively involved in advancing spine surgery education in Korea and internationally.

Prof. Ho-Joong Kim

Prof. Ho-Joong Kim is Professor of Orthopedic Surgery at Seoul National University and Head of the Spine Center at Seoul National University Bundang Hospital, Korea. His expertise includes spinal deformity, degenerative lumbar spine disease, and minimally invasive spine surgery. Prof. Kim has authored more than 160 SCI-indexed publications and is actively involved in SRS, AO Spine, NASS, and ISSLS. He has received multiple prestigious clinical research awards and international presentation honors. He is internationally recognized for work in deformity surgery and osteoporosis-related spinal conditions.

Prof. Ki-Tack Kim

Prof. Ki-Tack Kim is Honorary Professor at Kyung Hee University and Honorary Director of Dongtan City Hospital, Korea. He previously served as President of the Korean Orthopaedic Association and Korean Society of Spine Surgery. Prof. Kim is internationally respected for expertise in spinal deformity and complex spine surgery. He has held numerous academic and administrative leadership positions within Korean spine surgery. His contributions have significantly influenced spine education and surgical advancement in Korea.

Prof. Seok-Woo Kim

Prof. Seok-Woo Kim is Professor of Orthopedic Surgery at Hallym University School of Medicine and Director of the Spine Center at Hallym University Sacred Heart Hospital, Korea. He is a Past President of PASMISS and inaugural President of ISASS-Asia Pacific. Prof. Kim has authored over 100 scientific publications and performed more than 6,000 spine surgeries. He has received numerous prestigious awards including the NASS Best Paper Award. He is internationally recognized for leadership in minimally invasive spine surgery and global spine education.

Prof. Yong-Chan Kim

Prof. Yong-Chan Kim is Head of the Department of Orthopaedic Surgery at Kyung Hee University Hospital at Gangdong, Korea. His expertise includes spinal deformity, scoliosis, kyphosis, degenerative spine disease, spinal tumors, infections, and osteoporosis-related spinal conditions. He has authored over 80 peer-reviewed publications focusing on sagittal balance, proximal junctional kyphosis, and spinal osteotomy techniques. Prof. Kim is internationally recognized for his work in complex spinal deformity surgery. He remains actively involved in research and international spine education.

Prof. Dong-Ho Lee

Prof. Dong-Ho Lee is Professor and Chair of Orthopaedic Surgery at Asan Medical Center, University of Ulsan College of Medicine, Korea. He specializes in cervical spine disorders and advanced cervical spine surgery. Prof. Lee has contributed significantly to spine education, clinical care, and academic research in Korea. He completed additional international training at Washington University in St. Louis, USA. He is widely recognized for expertise in cervical spine disease and craniovertebral junction pathology.

Prof. Jong-Beom Park

Prof. Jong-Beom Park is Professor of Orthopedic Surgery at The Catholic University of Korea and Director of Spine Surgery at Uijeongbu St. Mary's Hospital. He is a globally recognized leader in cervical spine surgery and has served as President of CSRS-Asia Pacific and the Korean Society of Spine Surgery. Prof. Park has received multiple international best paper awards and serves on editorial boards of leading spine journals. He is actively involved in AO Spine and APSS leadership initiatives. His work has greatly influenced cervical spine surgery and research internationally.

Prof. Jiwon Park

Prof. Jiwon Park is Assistant Professor of Orthopaedic Surgery at Korea University College of Medicine, Korea. Her expertise includes cervical and thoracic spine disorders, spinal tumors, and degenerative myelopathy. Her research focuses on artificial intelligence, big data, and outcome prediction in spine surgery. Prof. Park completed AO Spine fellowship training in Germany focused on spinal oncology. She also serves on the Editorial Board of the Asian Spine Journal.

Prof. Sub-ri Park

Prof. Sub-ri Park is Assistant Professor of Orthopaedic Surgery at Yongin Severance Hospital, Yonsei University College of Medicine, Korea, and Director of the Spine Endoscopic Surgery Center. His expertise focuses on minimally invasive and endoscopic spine surgery. Prof. Park is actively involved in KSSS, PASMISS, ISASS-AP, and other international spine societies. He has received multiple awards for outstanding research and surgical video presentations. He is recognized for advancing modern endoscopic spine surgery techniques in Korea.

Dr. Jae-Hung Shin

Dr. Jae-Hung Shin is Director of Dongtan City Hospital, Korea, specializing in advanced endoscopic and minimally invasive spine surgery. His expertise includes full endoscopic spine surgery, spinal fusion, and revision spine procedures. He currently serves as Co-Chair of PASMISS and holds leadership roles in several Korean spine organizations. Dr. Shin is a frequent international speaker on endoscopic spine surgery. He is widely recognized for expertise in cervical and lumbar endoscopic procedures.

Prof. Kyung-Soo Suk

Prof. Kyung-Soo Suk is Professor and Chairman of Orthopedic Surgery at Yonsei University College of Medicine, Korea. He has served as President of the Korean Society of Spine Surgery, Chairman of the Korean Orthopaedic Association, and President of CSRS-Asia Pacific. Prof. Suk has authored more than 200 scientific publications and contributes extensively to AO Spine and other international organizations. He is internationally respected for expertise in cervical spine surgery and spinal deformity. His work has had major influence on spine surgery education and research in Asia.

A/Prof. Jae Jun Yang

A/Prof. Jae Jun Yang is Associate Professor of Orthopaedic Surgery at Dongguk University Ilsan Hospital, Korea. His expertise includes cervical spine surgery, degenerative spinal disorders, spinal stenosis, osteoporosis-related spine disease, and advanced fusion techniques. His research focuses on artificial intelligence applications in cervical stenosis detection and 3D-printed titanium cages in spinal fusion surgery. Dr. Yang actively contributes to AO Spine and Korean Society of Spine Surgery educational activities. He is recognized for integrating advanced technology into spine surgery practice.

TAIWAN

Prof. Chih-Wei Chen

Prof. Chih-Wei Chen is an Attending Spine Surgeon at National Taiwan University Hospital, Taiwan. His expertise includes minimally invasive spine surgery, spinal metastasis, vertebral compression fractures, degenerative lumbar spine disease, and osteoporosis management. He is actively involved in research focusing on machine learning applications and regenerative therapies for intervertebral disc degeneration. Prof. Chen completed advanced international spine fellowship training through the APSS-Depuy Synthes Spine Clinical Fellowship. He is recognized for contributions to both clinical spine surgery and translational research.

Prof. Tsai-Sheng Fu

Prof. Tsai-Sheng Fu is Chairman of Orthopaedic Surgery at Chang Gung Memorial Hospital, Taiwan, and Professor at Chang Gung University and National Tsing Hua University. His expertise includes minimally invasive and endoscopic spine surgery, osteoporosis-related spine conditions, and regenerative medicine. Prof. Fu is a prolific researcher with numerous international publications focusing on spine surgery innovation and biomaterials. He currently serves as Executive Director of both the Taiwan Orthopaedic Association and Taiwan Spine Society. His work has significantly advanced minimally invasive spine surgery in Taiwan.

Prof. Meng-Huang Wu

Prof. Meng-Huang Wu is Chair of Orthopedics at Taipei Medical University Hospital and Associate Professor at Taipei Medical University, Taiwan. His expertise includes spinal deformity, degenerative spine disease, spinal tumors, minimally invasive surgery, robotic-assisted spine surgery, and navigation-guided procedures. He serves on editorial boards including Neurospine and is actively involved in AO Spine East Asia. Prof. Wu has authored multiple international publications focusing on surgical innovation and artificial intelligence applications in spine surgery. He is internationally recognized for integrating advanced technologies into spine care.

Prof. Wen-Tien Wu

Prof. Wen-Tien Wu is Chief of Orthopedics at Hualien Tzu Chi Hospital and Professor at Tzu Chi University, Taiwan. He currently serves as President of the Taiwan Spine Society. His expertise includes cervical spine disorders, spinal deformity, sagittal alignment, minimally invasive spine surgery, and osteoporosis. Prof. Wu completed additional international training at Twin Cities Spine Center in the United States. He is actively involved in major regional spine organizations and international academic activities.

Prof. Shu-Hua Yang

Prof. Shu-Hua Yang is Professor of Orthopaedic Surgery at the College of Medicine, National Taiwan University, and Attending Spine Surgeon at National Taiwan University Hospital. His expertise includes spinal deformity, cervical spine disorders, degenerative spine disease, and minimally invasive spine surgery. Prof. Yang is actively involved in spine research, education, and international academic collaborations. He has contributed extensively to scientific publications and spine training initiatives in Taiwan and internationally.

He is recognized for advancing modern spine surgery and academic spine education.

THAILAND

A/Prof. Torphong Bunmaprasert

A/Prof. Torphong Bunmaprasert is an Associate Professor of Orthopaedic Surgery at Chiang Mai University, Thailand, specializing in spine surgery and spinal trauma. He completed advanced fellowship training in cervical spine surgery at Washington University in St. Louis and Columbia University Medical Center, USA. Prof. Bunmaprasert has authored over 20 peer-reviewed publications and is actively involved in clinical spine research. He contributes extensively to spine education and international academic collaborations. His work focuses on cervical spine surgery and advanced spinal trauma management.

A/Prof. Wongthawat Liawrungrueang

A/Prof. Wongthawat Liawrungrueang is an orthopaedic spine surgeon at the Spine & Joints Center, Samitivej Srinakarin Hospital, Bangkok, Thailand. His expertise includes endoscopic and minimally invasive spine surgery, surgical decision-making, and artificial intelligence applications in spine care. He serves as AO Spine International Faculty and leads the AO Spine Asia Pacific Frontier Technologies Research Study Group. A/Prof. Liawrungrueang is actively involved in international spine research and academic collaborations. He is recognized for advancing endoscopic spine surgery and AI-driven spine care technologies.

Dr. Borriwat Santipas

Dr. Borriwat Santipas is a spine surgeon at Siriraj Hospital, Mahidol University, Thailand. He completed advanced fellowships in minimally invasive, endoscopic, and robotic spine surgery across Thailand, South Korea, and Australia. His work focuses on advanced spine surgery techniques, education, and research. Dr. Santipas has received several prestigious awards including the International Young Spine Surgeon Award (2024). He is recognized for contributions to modern minimally invasive and robotic spine surgery.

TURKEY

Prof. Ahmet Alanay

Prof. Ahmet Alanay is internationally recognized as one of the leading spine surgeons in Turkey and globally, particularly in pediatric and adolescent spinal deformities such as scoliosis and kyphosis. He completed his orthopaedic training at Hacettepe University and pursued additional fellowship training at Kansas University Medical School and UCLA Comprehensive Spine Center. Prof. Alanay specializes in spinal deformity, disc herniation, spinal fractures, tumors, infections, and lumbar stenosis. He has held major academic appointments and continues to contribute extensively to spine surgery education and research. His work has significantly influenced modern scoliosis and pediatric deformity surgery worldwide.

USA

Prof. Jonathan Sembrano

Prof. Jonathan Sembrano is an orthopedic spine surgeon and Associate Professor of Orthopedic Surgery at the University of Minnesota, USA, where he also serves as Spine Surgery Fellowship Director. His expertise focuses on adult and pediatric spinal deformity, spinopelvic fixation, minimally invasive techniques, and computer-assisted navigation in spine surgery. He is actively involved in international collaborative research through AO Spine Knowledge Forum Deformity and the Spinopelvic Study Group. Prof. Sembrano serves as site principal investigator for the multicenter prospective AILLIANCE study. He is internationally recognized for contributions to spinal deformity correction and navigation-assisted spine surgery.

VIETNAM

Dr. Tran Vu Hoang Duong

Dr. Tran Vu Hoang Duong is a neurosurgeon and spine specialist at Xuyen A General Hospital, Ho Chi Minh City, Vietnam. His expertise includes minimally invasive, full-endoscopic, and biportal endoscopic spine surgery, particularly for lumbar disc herniation and degenerative spinal disorders. He completed advanced training in Korea and Thailand and is actively involved in spine research and academic presentations across Asia. Dr. Duong has received recognition for award-winning presentations in major spine and neurosurgical meetings. He is recognized for advancing minimally invasive spine techniques in Vietnam.

A/Prof. Dinh Ngoc Son

A/Prof. Dinh Ngoc Son is Head of the Spine Surgery Department at Viet Duc University Hospital and Senior Lecturer at Hanoi Medical University, Vietnam. He specializes in minimally invasive and endoscopic spine surgery, including treatment of spinal stenosis, herniated discs, spinal deformities, and complex degenerative disorders. His expertise includes full-endoscopic decompression, endoscopic discectomy, and advanced spinal reconstruction techniques. A/Prof. Son is actively involved in spine research and international educational collaborations. He is widely recognized for advancing modern minimally invasive spine surgery technologies and training in Vietnam.

PHILIPPINES

Dr. Orland Joshua M. Alimbuyuguen

Dr. Orland Joshua M. Alimbuyuguen is a board-certified orthopaedic spine surgeon and Assistant Training Officer at Mariano Marcos Memorial Hospital, Ilocos Norte. His expertise includes minimally invasive spine surgery, biportal endoscopy, robotic spine surgery, and deformity correction. He completed spine fellowships in Japan and at Vicente Sotto Memorial Medical Center. Dr. Alimbuyuguen is actively involved in research, with presentations in international spine meetings and publications in the Asian Spine Journal. He also contributes to academic teaching and spine surgery education in the Philippines.

Dr. Francisco P. Altarejos

Dr. Francisco P. Altarejos is an orthopedic spine surgeon specializing in degenerative spine and trauma surgery, with affiliations at St. Luke's Medical Center, Veterans Memorial Medical Center, Lung Center of the Philippines, and the University of Santo Tomas Hospital. He is a former President of both the Philippine Spine Society and the Philippine Orthopaedic Association, Past Chairman of the Philippine Board of Orthopaedics, and presently serves as Vice President of PAMOS (Philippine Academy of Military Orthopaedic Surgeons). A retired military and police orthopedic surgeon with the rank of Brigadier General, he also served as Former Director of the Philippine National Police Health Service. Beyond medicine, Dr. Altarejos is a public servant currently serving as Mayor of San Jacinto, Masbate, where he is recognized for his commitment to healthcare and community development.

Dr. Jose Joefrey F. Arbatin Jr.

Dr. Jose Joefrey Arbatin Jr. is a board-certified orthopaedic spine surgeon and Head of the Spine Section at Chong Hua Hospital, Cebu. His expertise includes minimally invasive and endoscopic spine surgery, adult reconstruction, and vertebral fragility fracture management. He completed advanced fellowship training in South Korea and Australia, including at Royal Adelaide Hospital. Dr. Arbatin is actively involved in spine practice and education

through Spine Orthopaedics Cebu and major Cebu hospitals. He is a Fellow of the Philippine Orthopaedic Association and Philippine Spine Society.

Dr. Eric Astelo O. Belarmino

Dr. Eric Astelo Belarmino is a Cebu-based orthopaedic spine surgeon specializing in minimally invasive and endoscopic spine surgery, including unilateral biportal endoscopy (UBE). He currently serves as Spine Section Head at Chong Hua Hospital and Fellowship Training Officer at Vicente Sotto Memorial Medical Center. His expertise includes scoliosis, spinal stenosis, herniated discs, and degenerative cervical and lumbar disorders. Dr. Belarmino actively participates in international spine education and has represented the Philippines in major spine meetings including APSS and the Global Spine Congress. He is recognized for advancing modern endoscopic spine surgery in the Visayas.

Dr. Rafael C. Bundoc

Dr. Rafael Bundoc is one of the pioneers of minimally invasive spine surgery in the Philippines and a Professor at the University of the Philippines Manila College of Medicine. His expertise includes minimally invasive spine surgery, scoliosis correction, and spinal reconstruction. He completed advanced fellowship training in cervical spine surgery at Oxford University and pediatric spine surgery at the Chinese University of Hong Kong. Dr. Bundoc is also an innovator, having developed medical and educational devices including the Bundoc ESR ergonomic spine instrument and the DISSECT immersion anatomy table. He is widely respected for his contributions to spine surgery education and surgical innovation.

Dr. David M. Cabatan Jr.

Dr. David Cabatan Jr. is a highly experienced orthopaedic spine surgeon and among the pioneers of minimally invasive spine surgery in the Philippines. He completed spine fellowship training at Hennepin County Medical Center in the United States. With more than three decades of experience, his expertise includes lumbar microdiscectomy and Percutaneous Endoscopic Lumbar Discectomy (PELD). Dr. Cabatan is affiliated with several leading hospitals including Cardinal Santos Medical Center and Makati Medical Center. He remains actively involved in contemporary minimally invasive spine surgery practice and education.

Dr. Ryan Conrad A. Carnero

Dr. Ryan Conrad Carnero is an orthopaedic spine surgeon specializing in degenerative spine disorders and minimally invasive spinal surgery. He currently serves as Chairman of the Spine Surgery Unit at the Philippine Orthopedic Center and Training Officer of the Spine Fellowship Program at The Medical City. Dr. Carnero completed advanced spine fellowships in South Korea and Japan. He is actively involved in spine education and serves as a Board Member of the Philippine Spine Society. His work focuses on training, academic development, and modern spine surgery techniques.

Dr. Bienvenido Leo Antonio M. Caro

Dr. Bienvenido Leo Antonio Caro is a board-certified orthopaedic and spine surgeon based in Metro Manila. His expertise includes degenerative spine disorders, spinal trauma, and complex spinal conditions. He practices at several major institutions including Capitol Medical Center and ManilaMed. Dr. Caro is actively involved in multidisciplinary spine care and orthopaedic education. He is a Fellow of the Philippine Orthopaedic Association and member of the Philippine Spine Society.

Dr. Adrian B. Catbagan

Dr. Adrian Catbagan is an orthopaedic spine surgeon and former Chairman of the Philippine Board of Orthopaedics. He played a major role in establishing the Philippine Board of Spine Surgery. Dr. Catbagan currently leads spine services at East Avenue Medical Center and previously served as Chief of the Spine Section at the Philippine General Hospital. He completed advanced fellowship training in Hong Kong and Paris and remains active in academic teaching at the University of the Philippines College of Medicine. He is widely recognized for his leadership in spine surgery education and certification in the Philippines.

Dr. Gilbert E. Cauilan

Dr. Gilbert E. Cauilan is an orthopedic spine surgeon specializing in spine trauma and spinal surgery, with active affiliations at Southern Philippines Medical Center, Davao Medical School Foundation Hospital, and Davao Doctors Hospital Orthopedic Center. He completed his orthopedic residency training at the Philippine Orthopedic Center and pursued advanced fellowship training in spine surgery in Canada, Hong Kong and Australia. Dr. Cauilan served as Spine Section Head of the Orthopedic Department of Southern Philippines Medical Center for nearly 15 years and previously held leadership roles within the Philippine Orthopaedic Association South Mindanao Chapter.

Dr. Richard V. Condor

Dr. Richard Condor is a Cebu-based orthopaedic spine surgeon specializing in minimally invasive and endoscopic spine surgery, scoliosis correction, and degenerative spine disorders. He currently serves as Chairman of the Philippine Board of Orthopaedics and Vice President of the Philippine Spine Society. Dr. Condor completed advanced fellowship training in Switzerland and Hong Kong. He is affiliated with several major hospitals in Cebu and remains actively involved in spine education and certification. He is recognized for expertise in contemporary minimally invasive spine surgery.

Dr. Viennah Condor-Magcalas

Dr. Viennah Condor-Magcalas is a board-certified orthopaedic and spine surgeon in Cebu specializing in minimally invasive spine procedures, spinal stenosis, disc herniation, and fracture fixation. She completed advanced spine fellowship training in Japan and Australia. Dr. Condor-Magcalas practices at the Cebu Orthopaedic Institute and major hospitals in Cebu. She is actively involved in comprehensive spine care and surgical treatment. She is a Fellow of the Philippine Orthopaedic Association and member of the Philippine Spine Society.

Dr. Gian Karlo P. Dadufalza

Dr. Gian Karlo Dadufalza is a fellowship-trained orthopaedic spine surgeon specializing in endoscopic spine surgery of the cervical, thoracic, and lumbar spine. His expertise includes minimally invasive spine procedures, radiofrequency ablation, and management of chronic disc-related back pain. Dr. Dadufalza treats herniated discs, spinal stenosis, and degenerative spine disease using modern less invasive techniques. He is actively involved in spine surgery education and professional collaboration through the Philippine Spine Society. He is recognized for advancing endoscopic spine surgery in the Philippines.

Dr. Wencito A. Daya

Dr. Wencito Daya is a neurosurgeon specializing in brain and spine surgery. His expertise includes spinal tumors, degenerative spine disease, minimally invasive spine surgery, and advanced neurosurgical procedures. Based in Cagayan de Oro, he is recognized for managing complex cranial and spinal conditions using modern surgical strategies. Dr. Daya is affiliated with ACE Medical Center–Cagayan de Oro and several major institutions in Mindanao. He is a Fellow of the Philippine Spine Society, Philippine College of Surgeons, and Academy of Filipino Neurosurgeons.

Dr. Dave Anthony G. Dizon

Dr. Dave Anthony Dizon is an Associate Professor at the UP College of Medicine and an attending spine surgeon at the Philippine General Hospital. He was instrumental in establishing the PGH Spine Fellowship Program and completed advanced fellowships in Australia and Germany. His expertise includes spine surgery, bone transplantation, and complex spinal reconstruction. Dr. Dizon is a recipient of the AAOS Surgical Skills Scholarship for Spine Surgery and the Kokobun Spine Fellowship. He is actively involved in AO Spine and Philippine Spine Society educational initiatives.

Dr. Romel P. Estillore

Dr. Romel Estillore is a graduate of the University of Santo Tomas Faculty of Medicine and Surgery and completed his orthopaedic residency training at East Avenue Medical Center in Manila. He pursued international spine fellowship training at Seoul National University Bundang Hospital in South Korea under Professor Jin Sup Yeom, a renowned cervical spine surgeon specializing in upper cervical spine surgery. Dr. Estillore currently serves as Head of the Spine Section of the Department of Orthopedics at both the University of Santo Tomas and East Avenue Medical Center. He is a member of the Board of Trustees of the Philippine Spine Society, where he actively promotes spine research and academic development. He is also an active member of the Asia Pacific Spine Society and AO Spine. Dr. Estillore regularly participates as faculty in local and international spine symposia and workshops.

Dr. Rommel F. Fernando

Dr. Rommel Fernando is an experienced orthopaedic spine surgeon with more than 27 years of clinical practice in orthopaedics and spine surgery. He completed advanced fellowship training in spine surgery at the University of Western Ontario, Canada. His expertise includes degenerative spine disorders and complex spinal conditions. Dr. Fernando is affiliated with several leading institutions including St. Luke's Medical Center and Manila Doctors Hospital. He remains actively involved in spine care and surgical practice in the Philippines.

Dr. Katrina Jean G. Gabriel-Ramos

Dr. Katrina Jean Gabriel-Ramos is a board-certified anesthesiologist specializing in perioperative anesthesia care for complex spine surgery. She is affiliated with St. Luke's Medical Center in Quezon City and Global City, collaborating closely with multidisciplinary spine teams. Her expertise includes spine anesthesia, perioperative pain management, patient safety, and enhanced recovery protocols for spine surgery patients. Dr. Gabriel-Ramos has participated in international anesthesia forums and academic activities. She is recognized for advancing perioperative care in spine surgery.

Dr. Anne Kathleen B. Ganal-Antonio

Dr. Anne Kathleen Ganal-Antonio is a Clinical Associate Professor at the UP College of Medicine and consultant spine surgeon in several top tertiary hospitals in the Philippines. She serves on the Board of Trustees of both the Philippine Orthopaedic Association and the Philippine Spine Society and is AO Spine East Asia Member-at-Large for the Philippines. Her expertise includes spinal deformity, fragility fractures, minimally invasive surgery, and spinal infections. Dr. Ganal-Antonio is a prolific speaker and educator actively involved in international spine meetings. She is also a founding member and past president of the Philippine Society of Women Orthopaedic Surgeons.

Dr. Rodolfo III B. Garcia

Dr. Rodolfo Garcia III is an orthopedic and spine surgeon practicing at Premiere Medical Center in Nueva Ecija, Philippines. He completed his spine fellowship training at the University of the Philippines–Philippine General Hospital. His expertise includes spinal trauma, degenerative spine disorders, spinal deformity, infections, and tumors. Dr. Garcia has a special research interest in spine tuberculosis and spinal infections. He also serves as assistant head of the trauma research study group of the Philippine Spine Society.

Dr. Pamela Louise G. Gervasio

Dr. Pamela Louise Gervasio is a fellowship-trained orthopaedic surgeon specializing in spine surgery, joint replacement, and revision arthroplasty. She is affiliated with major institutions including Manila Doctors Hospital and Asian Hospital and Medical Center. Her expertise includes degenerative spine disorders, spinal injuries, orthopaedic trauma, and complex revision arthroplasty procedures. Dr. Gervasio completed her fellowship training in Joint Replacement and Revision Surgery at the Philippine General Hospital. She remains actively involved in multidisciplinary orthopaedic and spine care.

Dr. Michael Louis A. Gimenez

Dr. Michael Louis Gimenez is neurosurgeon with expertise in complex brain and spine surgery. He currently practices at Cardinal Santos Medical Center and previously served as Chairman of the Brain Spine Institute. His expertise includes minimally invasive and technology-assisted spinal procedures using advanced operative technologies such as 3D exoscope-assisted neurosurgery. Dr. Gimenez is recognized for leadership in multidisciplinary brain and spine care in the Philippines. He is a Fellow of the Academy of Filipino Neurosurgeons, Philippine Spine Society, and Philippine College of Surgeons.

Dr. Samuel Arsenio M. Grozman

Dr. Samuel Arsenio M. Grozman is a Filipino orthopaedic spine surgeon specializing in spinal surgery and degenerative spine conditions. He completed his Orthopaedic Surgery residency training at the UP-Philippine General Hospital Department of Orthopedics and currently serves as Chief of the Division of Spine Surgery Faculty. He is affiliated with Asian Hospital & Medical Center, UP-Philippine General Hospital, Ospital ng Muntinlupa, and QualiMed Hospital Sta. Rosa, where he practices comprehensive spine and orthopaedic care.

Dr. Clint P. Guitarte

Dr. Clint Guitarte is a Cagayan de Oro-based orthopaedic and spine surgeon specializing in scoliosis management and complex spine surgery. He gained national recognition after topping the 2019 Philippine Board of Orthopaedics Diplomate Examinations. Dr. Guitarte completed advanced fellowship training in spine surgery in Sydney, Australia. He currently practices at CDO Polymedic Medical Plaza and Madonna and Child Medical Center. He is a Fellow of the Philippine Orthopaedic Association and Philippine Spine Society.

Dr. Billy Francis Y. Hung

Dr. Billy Francis Hung is an orthopaedic and spine surgeon specializing in minimally invasive and endoscopic spine surgery. He completed advanced fellowship training in South Korea focusing on degenerative spine disorders, endoscopic decompression, and adult spinal deformity surgery. Dr. Hung practices in several institutions in Metro Manila and actively participates in international academic meetings. His expertise includes minimally invasive lumbar and cervical procedures. He is actively involved in advancing contemporary spine surgery techniques in the Philippines.

Dr. Ingrid Frances D. Ignacio

Dr. Ingrid Frances Ignacio is a Filipino orthopaedic surgeon with fellowship training in spine surgery across Malaysia and Japan. She completed advanced spine fellowships at Universiti Malaya Medical Center, Tohoku University, Hamamatsu University School of Medicine, and Okayama Rosai Hospital. Her clinical interests include adult and pediatric spinal deformity surgery. Dr. Ignacio is actively involved in spine research and academic work. She contributes to contemporary deformity surgery and spine education in the Philippines.

Dr. Jose Manuel F. Ignacio

Dr. Jose Manuel Ignacio is a distinguished orthopaedic spine surgeon and former Head of the Spine Section at the University of the Philippines–Philippine General Hospital. He also heads Orthopedic Spine services at St. Luke's Medical Center Global City. His expertise includes spinal deformity, cervical spine surgery, degenerative disorders, spinal tumors, and infections. Dr. Ignacio has held leadership positions in AO Spine East Asia and the Asia Pacific Spine Society. He is widely recognized for contributions to spine surgery education, research, and mentorship in the Philippines.

Dr. Eric Dennis C. Legaspi

Dr. Eric Dennis Legaspi is a distinguished neurospine surgeon with expertise in complex spine surgery, spinal tumors, spinal trauma, minimally invasive spine surgery, and degenerative spinal disorders. He completed advanced fellowship training in Pediatric Neurosurgery and Spine Surgery at the University of Louisville in the United States. Dr. Legaspi currently serves as President of the Academy of Filipino Neurosurgeons and is actively involved in neurosurgical education and research. He is affiliated with UP-Philippine General Hospital, NKTI, and Capitol Medical Center. He is widely respected for advancing neurospine surgery and mentorship in the Philippines.

Dr. Jean Pierre F. Leung

Dr. Jean Pierre Leung is a distinguished orthopaedic and spine surgeon specializing in spine trauma, pediatric orthopaedics, limb reconstruction, and complex musculoskeletal care. A graduate of the prestigious UP INTARMED Program, he completed multiple international fellowships in Australia, Hong Kong, the United Kingdom, and the United States. Dr. Leung currently practices in Baguio and Northern Luzon and serves as Chairman of Orthopaedics at Notre Dame de Chartres Hospital. He is actively involved in numerous subspecialty societies including the Philippine Spine Society and Philippine Orthopaedic Trauma Society. He is recognized for contributions to orthopaedic education, trauma care, and pediatric spine surgery.

Dr. Nicole Teresa C. Lukban-Venida

Dr. Nicole Teresa Lukban-Venida is an orthopaedic spine surgeon specializing in minimally invasive spine surgery, degenerative spinal disorders, deformity surgery, and musculoskeletal trauma. She is part of the growing group of female spine surgeons actively contributing to modern spine care and surgical education in the Philippines. Her clinical interests include cervical and lumbar degenerative disease, spinal stabilization, and minimally invasive spinal procedures. Dr. Lukban-Venida is actively involved in professional, academic, and research initiatives through the Philippine Spine Society and Philippine Orthopaedic Association. She is recognized for promoting patient-centered spine care and improved functional outcomes.

Dr. Jose Miguel T. Lumawig

Dr. Jose Miguel Lumawig is a distinguished orthopaedic spine surgeon specializing in minimally invasive spine surgery, spinal deformity, and complex spinal reconstruction. He completed advanced fellowship training in Japan and Australia focusing on contemporary spinal techniques. Dr. Lumawig currently practices at The Medical City and St. Luke's Medical Center Global City and serves as a Board Member of the Philippine Spine Society. He is also affiliated with major international organizations including APSS, CSRS-AP, and NASS. He is widely recognized for contributions to spine education, research, and regional spine surgery development.

Dr. Rina Therese R. Madelar

Dr. Rina Therese Madelar is an orthopaedic and spine surgeon specializing in degenerative spine disease and minimally invasive spine surgery. She completed advanced fellowship training in Japan and South Korea, including at Hamamatsu University School of Medicine and Yongin Severance Hospital. Dr. Madelar practices at The Medical City and several institutions in Laguna. She is actively involved in evidence-based and motion-preserving spine surgery techniques. She represents a new generation of Filipino spine surgeons advancing modern spine care in the Philippines.

Dr. Ken Jeffrey O. Magcalas

Dr. Ken Jeffrey Magcalas is a Cebu-based orthopaedic and spine surgeon specializing in minimally invasive and endoscopic spine surgery, spinal trauma, and degenerative spine disorders. He completed advanced fellowship training in internationally recognized centers including South Korea. Dr. Magcalas practices at Cebu Orthopaedic Institute and several major hospitals in Cebu. He actively participates in spine education, surgical training, and research initiatives through the Philippine Spine Society. He is recognized among the emerging spine specialists in the Visayas.

Dr. Paul Albert C. Manuel

Dr. Paul Albert Manuel is an orthopaedic spine surgeon specializing in minimally invasive spine surgery, degenerative spinal disorders, and contemporary spinal reconstruction. He completed his orthopaedic training at the AFP Medical Center–V. Luna Medical Center and later pursued subspecialty training in spine surgery. Dr. Manuel is affiliated with several major institutions including Asian Hospital, Cardinal Santos Medical Center, and Victoriano Luna General Hospital. His expertise includes modern minimally invasive spinal procedures and trauma-related spine injuries. He remains actively involved in advancing minimally invasive spine surgery in both civilian and military settings.

Dr. Paul Julius A. Medina

Dr. Paul Julius Medina is an orthopaedic spine surgeon specializing in minimally invasive spine surgery, spinal trauma, oncology, infections, and degenerative spine disorders. He completed advanced spine fellowship training in Singapore and the United Kingdom. Based in Iligan City, he is recognized as one of Northern Mindanao's leading spine specialists. Dr. Medina actively participates in APSS and Philippine Spine Society operative courses and scientific meetings. He is widely involved in advancing contemporary spine surgery and education in Mindanao.

Dr. Pierre M. Mella

Dr. Pierre Mella is a Cebu-based orthopaedic spine surgeon specializing in degenerative and oncologic spine surgery, minimally invasive procedures, and wound care management. He completed his orthopaedic training at the University of the Philippines–Philippine General Hospital. Dr. Mella practices in several major hospitals in Cebu including Chong Hua Hospital and Cebu Doctors' University Hospital. He is also actively involved in regional spine education and surgical initiatives in the Visayas. His work integrates advanced wound care principles into orthopaedic and spine management.

Dr. Frederick Patrick I. Nicomedez

Dr. Frederick Patrick Nicomedez is a practicing pediatric and spine orthopaedic surgeon affiliated with Philippine General Hospital, St. Luke's Medical Center, and Asian Hospital. He completed fellowship training at Duchess of Kent Children's Hospital in Hong Kong. Dr. Nicomedez currently serves as Chairman of the Philippine Board of Spine Surgery. His expertise includes pediatric spinal deformities and pediatric orthopaedic spine care. He remains actively involved in spine surgery education and leadership in the Philippines.

Dr. Harjoland L. Obenieta

Dr. Harjoland L. Obenieta is an is an orthopedic spine surgeon based in Mindanao, Philippines, with affiliations at Davao Doctors Hospital and General Santos Doctors Hospital, Inc. He completed his orthopedic surgery training at the University of the Philippines - Philippine General Hospital and completed both local and international fellowship training in spine surgery. He specializes in spinal disorders with special interest in minimally invasive, endoscopic spine surgery.

Dr. Oliver Y. Ong

Dr. Oliver Y. Ong is a Cebu-based spine surgeon specializing in degenerative spine disorders. He is affiliated with several major hospitals in Cebu including Chong Hua Hospital, Perpetual Succour Hospital, St. Vincent General Hospital, and the University of Cebu Medical Center. Dr. Ong is actively involved in spine surgery practice and academic activities in the Visayas. His work focuses on contemporary management of degenerative spinal conditions. He continues to contribute to spine care and education in Cebu.

Dr. Mary Ruth A. Padua

Dr. Mary Ruth Padua is a Filipino spine surgeon specializing in cervical spine disorders, degenerative disease, endoscopic and minimally invasive surgery, scoliosis, and spine tumors. She is affiliated with UP-Philippine General Hospital, Cardinal Santos Medical Center, The Medical City, and Diliman

Doctors Hospital. Dr. Padua is actively involved in advanced spine surgery and multidisciplinary spine oncology care. Her expertise spans minimally invasive and complex spinal procedures. She remains actively engaged in spine education and clinical practice.

Dr. Neilson G. Palabrica

Dr. Neilson Palabrica is a spine surgeon based in Northern Mindanao specializing in Surgical Infections, Minimally Invasive, Oncology, and Trauma (SIMOT). He is affiliated with Northern Mindanao Medical Center and Polymedic Medical Center. Dr. Palabrica actively participates in spine surgery education and operative video discussions within the Philippine Spine Society. His clinical interests include spine trauma and complex spinal infections. He contributes to multidisciplinary spine care in Mindanao.

Dr. Miguel Rafael D. Ramos

Dr. Miguel Rafael Ramos is a Filipino spine surgeon specializing in minimally invasive spine surgery (MISS). He is affiliated with major institutions including St. Luke's Medical Center, The Medical City–Clark, Angeles University Foundation Medical Center, and Sacred Heart Medical Center. His expertise includes minimally invasive treatment of degenerative spine disorders and spinal reconstruction. Dr. Ramos is actively involved in promoting quality, safety, and professionalism in contemporary spine care. He continues to contribute to modern MISS techniques and spine education.

Dr. Gilbert J. Rañoa

Dr. Gilbert Rañoa is a spine neurosurgeon specializing in cervical spine surgery and craniovertebral junction disorders. He practices at University of Santo Tomas Hospital, Cardinal Santos Medical Center, Chinese General Hospital, and St. Martin de Porres Charity Hospital. Dr. Rañoa is recognized for expertise in craniocervical instability and complex cervical spine surgery. He actively participates in spine education and academic discussions on craniovertebral junction surgery. His work focuses on prevention and management of complications in cervical spine procedures.

Dr. Ma. Ramona B. Reyes-Diyco

Dr. Ma. Ramona Reyes-Diyco is a Filipino spine surgeon specializing in degenerative spine disease. She is affiliated with Cardinal Santos Medical Center, Quirino Memorial Medical Center, Southern Philippines Medical Center, and Davao Doctors Hospital. Her clinical expertise includes cervical spine tuberculosis and degenerative spinal disorders. Dr. Reyes-Diyco actively participates in academic discussions on complex spinal infections and women in spine surgery. She contributes to multidisciplinary spine care in both Metro Manila and Mindanao.

Dr. Mamer S. Rosario

Dr. Mamer Rosario is a Filipino spine surgeon specializing in Surgical Infections, Minimally Invasive Surgery, Oncology, and Trauma (SIMOT). He is affiliated with East Avenue Medical Center, Philippine Heart Center, UERM Memorial Medical Center, and Lung Center of the Philippines. His expertise includes spine oncology, minimally invasive tumor surgery, and complex spinal disorders. Dr. Rosario actively participates in spine oncology education and free paper scientific sessions. He is recognized for contributions to modern spine tumor surgery in the Philippines.

Dr. Yehlen Francis R. Saligumba

Dr. Yehlen Francis Saligumba is a Filipino spine surgeon specializing in cervical spine disorders. He practices at St. Luke's Medical Center, Batangas Medical Center, and Batangas Healthcare Specialists Medical Center. Dr. Saligumba is actively involved in operative video discussions and women in spine initiatives within the Philippine Spine Society. His clinical work focuses on cervical spine surgery and complex spinal conditions. He contributes to spine education and contemporary spinal care in Southern Luzon.

Dr. Erika Paulina Stefani H. See

Dr. Erika Paulina Stefani See is a Filipino spine surgeon affiliated with East Avenue Medical Center, Quezon Medical Center, and De Los Santos Medical Center. She actively participates in academic

and scientific activities within the Philippine Spine Society. Dr. See is involved in free paper scientific sessions and contemporary spine care initiatives. Her work focuses on advancing multidisciplinary spine management and surgical education. She contributes to the growing role of women in spine surgery in the Philippines.

Dr. Antonio B. Sison

Dr. Antonio B. Sison is a founding president of the Philippine Spine Society and a pioneering Filipino spine surgeon specializing in degenerative spinal disorders. He practices at The Medical City, National Kidney and Transplant Institute, University of Santo Tomas Hospital, and Capitol Medical Center. Dr. Sison played a major role in the development of organized spine surgery practice in the Philippines. He continues to contribute to national discussions on the future of spine care. He is widely respected for his leadership and lifelong contributions to Philippine spine surgery.

Dr. Ronald P. Tangente

Dr. Ronald Tangente is President of the Philippine Spine Society and one of the leading spine surgeons in the Philippines. He completed fellowship training in spine surgery and scoliosis surgery at University of Toronto-affiliated institutions in Canada and additional training in Japan and the United States. His expertise includes complex spine conditions, deformity surgery, and metastatic spine disease. Dr. Tangente is Program Director of the Davao Doctors Hospital Clinical Fellowship in Spine Surgery and Head of its Brain, Spine, and Scoliosis Center. He is widely recognized for leadership in spine surgery education, organizational development, and multidisciplinary spine care.

Dr. Rommel L. Tan

Dr. Rommel Tan is a Davao-based spine surgeon specializing in spinal deformity surgery. He practices at Davao Doctors Hospital, Lanang Premiere Doctors Hospital, Brokenshire Medical Center, and several major hospitals in Davao. Dr. Tan actively participates in free paper scientific sessions and trauma-related spine discussions. His expertise includes multilevel posterior fusion and complex deformity correction. He contributes actively to spine surgery education and clinical practice in Mindanao.

Dr. Mario R. Ver

Dr. Mario Ver is a pioneering Filipino orthopaedic spine surgeon and founding member of the Philippine Spine Society. He is widely recognized for introducing modern spine surgery techniques in the Philippines, including awake spine surgery, image-guided navigation, microsurgical decompression, and artificial disc replacement. Dr. Ver completed advanced fellowship training in Singapore, the United States, and Japan and currently practices at St. Luke's Medical Center. He has authored numerous scientific publications and served as faculty in major international spine meetings. His contributions have significantly advanced modern spine surgery and spine education in the Philippines.

Dr. Mikhail Lew P. Ver

Dr. Mikhail Lew Ver is a Filipino spine surgeon specializing in degenerative spine disorders. He practices at St. Luke's Medical Center Global City and Quezon City. Dr. Ver is actively involved in contemporary spine care and postoperative functional rehabilitation. His clinical interests include management of postoperative disability and recovery after spine surgery. He contributes to multidisciplinary spine care and education in the Philippines.

Dr. Daniel William T. Yu

Dr. Daniel William Yu is a Filipino spine surgeon specializing in cervical spine disorders. He practices at Chinese General Hospital and ManilaMed Medical Center. Dr. Yu is actively involved in discussions and academic activities focusing on complications and management of the aging spine. His expertise includes cervical spine surgery and degenerative spinal conditions. He contributes to contemporary cervical spine care and spine education in the Philippines.

BEST PAPER: CLINICAL

[BPC041] **False-Positive Transcranial Motor Evoked Potential Alerts in Spinal Surgery: Insights from A 13,743-PatientMulticenter Study by the JSSR Spinal Monitoring Committee**

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Transcranial motor evoked potential (Tc-MEP) monitoring is widely used to detect intraoperative neural injury during spinal surgery; however, Tc-MEP signals can be affected by patient- and surgery-related factors, potentially leading to false-positive (FP) alerts. Large-scale prospective multicenter data evaluating risk factors for FP alerts remain limited. This prospective multicenter study, conducted by the Japanese Society for Spine Surgery and Related Research (JSSR) Spinal Monitoring Committee, analyzed 13,743 consecutive patients from 17 institutions who underwent spinal surgery with multi-channel Tc-MEP monitoring between 2017 and 2024. An alarm was defined as a ≥70% reduction in Tc-MEP amplitude in at least one limb compared with baseline. Postoperative neurological deterioration was defined as a decrease of at least one grade in manual muscle testing immediately after surgery. Patient demographics, preoperative paralysis, surgical level, operative duration, and intraoperative blood loss were evaluated using univariate analyses and multivariate logistic regression. Among all cases, 268 were true-positive, 958 false-positive (FP rate 7.0%), 12,240 true-negative, 107 false-negative, and 170 rescue cases. Overall sensitivity and specificity of Tc-MEP monitoring were 71% and 93%, respectively. Compared with the true-negative group, the FP group was significantly younger, had longer operative duration, greater intraoperative blood loss, and a higher prevalence of preoperative paralysis (all $p < 0.01$), while sex and body mass index did not differ. Multivariate analysis identified younger age, preoperative paralysis, thoracic-level surgery, and longer operative duration as independent risk factors for FP alerts. Receiver operating characteristic analysis demonstrated that an operative time cutoff of 3 hours and 30 minutes yielded a sensitivity of 60%, specificity of 65%, and an area under the curve of 0.67. These findings indicate that prolonged surgery, preoperative neurological deficits, and thoracic procedures significantly increase the likelihood of false-positive Tc-MEP alerts. Awareness of these factors is crucial for accurate intraoperative interpretation of Tc-MEP changes and may help avoid unnecessary surgical interruption or intervention.

[BPC032] **Changes in Spinal Alignment Following a Nutritional and Exercise Intervention in a Community Health Screening Program: A Prospective Randomized Controlled Trial**

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University School of Medicine

Background: Age-related declines in muscle mass and strength contribute to postural imbalance, frailty, and progression of sagittal spinal deformity. Although protein supplementation combined with resistance training improves muscle strength and physical performance in older adults, its effects on spinal alignment remain unclear.

Methods: This prospective randomized controlled trial enrolled 90 community-dwelling adults aged ≥60 years participating in a community health screening program. Participants were randomly assigned to an intervention group (n = 45) or a control group (n = 45). The intervention group performed resistance training three times per week and consumed a protein supplement containing 9 g of protein twice daily, whereas the control group received no structured intervention. Outcomes included knee extension strength, frailty status, and whole spine malnutrition and spinal alignment standing radiographic parameters, including sagittal vertical axis (SVA), assessed at baseline, 3 months, and 6 months.

Results: After attrition, 44 participants in the intervention group and 42 in the control group completed the study (mean age, 72 years in both groups). Knee extension strength increased significantly in both groups, with greater improvement in the intervention group (0.70 to 0.82 kgf/body weight) than in the control group (0.74 to 0.79 kgf/body weight; $P < 0.001$). Frailty status improved significantly in the intervention group, shifting from 26 robust and 18 pre-frail participants at baseline to 36 robust and 8 pre-frail participants at follow-up, whereas changes in the control group were modest ($P = 0.033$). SVA remained largely unchanged in the control group (31 to 26 mm) but improved significantly in the intervention group (32 to 23 mm; $P = 0.001$). In a subgroup analysis of participants with baseline SVA ≥50 mm (13 per group), the intervention group showed a marked reduction in SVA (89 to 57 mm; $P = 0.001$), while no significant improvement was observed in controls.

Conclusions: Protein supplementation combined with resistance training significantly improved muscle malnutrition and spinal alignment strength, frailty status, and sagittal spinal alignment within 3 months. This combined intervention may represent a feasible nonoperative strategy for managing adult spinal deformity, particularly in individuals with pronounced sagittal imbalance.

[BPC175] **Segmental Lumbar Lordosis and Spinopelvic Alignment Across Different Pelvic Incidence (PI) Groups in Adolescent Idiopathic Scoliosis (AIS): Implications for Surgical Sagittal Correction**

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Pelvic incidence (PI) is a fundamental determinant of sagittal spinal alignment. The concept of PI–lumbar lordosis (LL) relationship has emerged as a key parameter in the assessment of sagittal balance, with growing evidence supporting its association with clinical outcomes. However, the relationship between PI with segmental LL especially on distribution of proximal lumbar lordosis (PLL) and distal lumbar lordosis (DLL) in adolescent idiopathic scoliosis (AIS) is not well established. The objective of this study is to determine the influence of PI, stratified into low, average and high groups on segmental lumbar lordosis and spinopelvic alignment in AIS. A retrospective analysis was performed on preoperative sagittal radiographic parameters of 506 AIS patients (Lenke 1–4). PI, global and segmental lumbar lordosis, sacral slope (SS), and pelvic tilt (PT) were measured. Patients were stratified into low (<45°), average (45°–60°), and high (>60°) PI groups. Segmental LL distribution and pelvic parameters were compared across PI groups. Pairwise comparisons of DLL distributions were performed using the Kolmogorov–Smirnov test. LL increased progressively from low to high PI groups (51.4°±10.7° vs 57.4°±10.9° vs 63.4°±10.8°; $p<0.001$), driven primarily by a corresponding increase in PLL (16.8°±8.4° vs 23.3°±9.3° vs 28.2°±8.3°; $p<0.001$). In contrast, DLL remained comparable across PI groups ($p=0.507$). Although there were no significant differences in DLL distribution between groups, the plotted data demonstrated distinct patterns. In the low PI group, the average DLL ranged from 30–34°. In the

high PI group, the average DLL ranged from 35–39°. SS and PT increased progressively across PI groups ($p<0.001$). In conclusion, PI significantly influence the LL, PLL, SS and PT while the DLL remain relatively constant. These findings underscore the adaptive role of the proximal lumbar spine in accommodating sagittal balance. Restoration of lumbar lordosis (via rod contouring) should be carefully tailored to achieve an optimal distribution of proximal and distal lumbar lordosis according to the PI especially in AIS patients requiring distal lumbar fusion.

[BPC179] **Prediction of Revision Surgery After Balloon Kyphoplasty Based on a Novel Computed Tomography-Based Endplate Injury Classification for Osteoporotic Vertebral Fractures**

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Study Design: Case-control study. Objective: This study aimed to develop a computed tomography (CT)-based endplate injury classification and a scoring system reflecting the risk of revision surgery after balloon kyphoplasty (BKP) for fresh osteoporotic vertebral fractures (OVF). Summary of Background Data: BKP is a minimally invasive option for OVF, providing immediate pain relief. However, postoperative complications such as adjacent fractures, cement loosening, or cement dislodgement can require reoperation. Although the fracture morphology is related to reoperation, detailed classification of endplate injury has not been established. Methods: This study included 108 patients without any reoperation and 33 patients who required revision surgery after BKP. Revision surgery was defined as additional posterior fusion surgery that included the previously BKP-treated vertebra. The CT-based endplate injury classification was categorized as: (1) isolated endplate (none, unilateral, bilateral); (2) endplate injury (none, unilateral, bilateral, split type); and (3) endplate defect (none, ≥3-mm defect). Logistic regression identified independent risk factors for revision surgery, and a point-based risk score was developed using regression coefficients. The point-based risk score was validated using receiver operating characteristic (ROC) analysis. Results The CT-based endplate injury classification showed excellent reliability (intra-observer $\kappa = 0.82–0.91$; inter-observer $\kappa = 0.81–0.86$). Independent risk factors included unilateral isolated endplate (1 point), bilateral isolated endplates (2 points), split-type fracture (2 points), endplate defect ≥3 mm (2 points), and intervertebral instability ≥10° (1 point). The optimal cutoff score was 1.5 points; patients with scores of ≥2 had a significantly increased risk of revision surgery after BKP ($p < 0.001$). The area under the ROC curve for the risk score was 0.870. Conclusions The novel CT-based endplate classification is simple and reliable. A scoring system combining isolated endplate, split-type fracture, endplate defect, and vertebral instability can predict reoperation risk and guide surgical decision-making in patients with severe OVF..

[BPC161] **Deep-Learning-Based Automated Kinematic Analysis of the Lumbar Spine: A Multicenter Study on Precision Measurement and Clinical Alignment**

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Objective: This study aimed to develop and validate a fully automated, deep-learning framework for the precise and standardized measurement of lumbar intervertebral range of motion (IROM) and sagittal translation (ΔST) from dynamic radiographs, to overcome the labor-intensity and high inter-observer variability of manual methods. Methods: We conducted a multicenter retrospective study using a dataset of 905 patients (1810 images) from three institutions. A Multi-task High-Resolution Network (HRNet) was developed, utilizing an encoder for multi-scale feature extraction and two decoders for the automated identification of vertebral body centroids (L1-S1) and localization of vertebral corners. IROM and ΔST were then automatically calculated from these landmarks. Model performance was trained and validated on an internal set of 748 patients and tested on an external set of 157 patients. Results were compared against a gold standard established by expert consensus, with evaluation metrics including identification rate (IR), mean absolute error (MAE) for landmark detection, and MAE for the kinematic parameters. Results: The model demonstrated outstanding performance. On the internal (external) test sets, the centroid identification rate was 98% (98%), and the MAE for corner localization was 2.13 mm (2.37 mm). Clinical parameter measurement showed excellent alignment with radiologists, with MAEs of 2.98° (3.14°) for IROM and 1.67 mm (1.64 mm) for ΔST on the internal (external) datasets, revealing no significant systematic bias. The automated system drastically improved efficiency, reducing average processing time per patient from 180 seconds to 0.1 seconds. Conclusion: The proposed Multi-task HRNet provides a highly precise, efficient, and objective solution for automated lumbar kinematic analysis. Its robust performance across multicenter data and strong clinical alignment support its potential as a viable tool for standardizing the assessment of spinal mobility and instability in clinical practice.

[BPC228] **Effect of Psoas Muscle Quantity and Density on Post-operative Outcomes in Patients with Metastatic Spine Tumors**

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Introduction: Sarcopenia, characterized by low muscle strength and mass, has been associated with adverse surgical outcomes. This study aims to evaluate the influence of psoas muscle quantity and quality, as a surrogate for sarcopenia, on postoperative outcomes in patients undergoing surgery for metastatic spine tumors (MSTs), including delays in adjuvant oncologic therapy, observed versus prognosticated survival, postoperative infection, and ambulatory status.

Materials and Methods: We retrospectively analyzed 260 patients who underwent surgery for MSTs between 2005 and 2022. Sarcopenia was quantified using total psoas area normalized to vertebral body area (TPA/VBA) and psoas muscle density (PMD). Associations with outcomes were evaluated using two-sample T-test and multivariate logistic regression adjusted for age, preoperative ECOG status, Charlson Comorbidity Index and Oswestry Spinal Risk Index ($p<0.05$).

Results: 260 patients (mean age 61.5 ± 10.7 years; 50.4% male) were included. Males demonstrated significantly higher TPA/VBA compared with females (1.15 ± 0.32 vs 0.91 ± 0.31, $p < 0.001$) while PMD was comparable between sexes (46.50 ± 8.16 vs 44.60 ± 10.34, $p = 0.114$). On multivariate analysis, lower muscle quantity and quality were associated with delays in initiation of systemic therapy. In females, both lower TPA/VBA (OR 0.160, 95% CI 0.040–0.639; $p = 0.01$) and lower PMD (OR 0.955, 95% CI 0.914–0.997; $p = 0.04$) were independently associated with treatment

delay. In males, only lower PMD was independently associated with treatment delay (OR 0.957, 95% CI 0.927–0.988; p = 0.007). Higher PMD in males was significantly associated with longer observed relative to prognosticated survival (OR 1.143, 95% CI 1.071–1.219; p < 0.001), whereas no such association was observed in females. Postoperative complication rates included urinary tract infection (16.2%), pneumonia (11.5%), and thromboembolic events (6.5%), with no significant associations between TPA/VBA or PMD and postoperative infection or ambulatory outcomes.

Conclusions: Reduced psoas muscle quality was independently associated with treatment delays and survival in patients undergoing surgery for metastatic spine tumors, demonstrating stronger prognostic value than TPA/VBA. Prospective validation is warranted to confirm its role in preoperative risk stratification.

[BPC042] **Impact of Smoking Status and Cumulative Smoking Exposure on Surgical Outcomes in Degenerative Cervical Myelopathy: A Multicenter Prospective Cohort Study**

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Degenerative cervical myelopathy (DCM) is a prevalent cause of spinal cord dysfunction in adults, with surgical intervention being the standard method for preventing neurological decline and enhancing functional outcomes. While smoking is known to impair healing and diminish outcomes in spinal surgery, its specific impact on postoperative recovery in DCM remains uncertain. Few studies have differentiated smoking status from lifetime exposure or assessed detailed neuropathic sensory profiles of smokers. This prospective multicenter cohort study aimed to examine the influence of smoking status and cumulative smoking exposure on postoperative neurological and functional outcomes in patients with DCM. A total of 935 patients with DCM were categorized as non-smokers, past-smokers, or current-smokers. Demographics, operative variables, and outcomes (Japanese Orthopaedic Association (JOA) score, visual analog scale (VAS) pain scores, JOA Cervical Myelopathy Evaluation Questionnaire (JOACMEQ), Short Form-36 physical (PCS) and mental (MCS) component scores, and Neuropathic Pain Symptom Inventory (NPSI)) were compared across groups over a 2-year follow-up. For current-smokers, cumulative exposure was quantified using the Brinkman index and correlated with postoperative outcomes. Current-smokers exhibited significantly lower JOA recovery rates and poorer postoperative JOACMEQ upper- and lower-extremity function compared to non-smokers and past-smokers (p < 0.05). No significant intergroup differences were observed in the JOA score, SF-36 PCS/MCS, VAS, or NPSI. Among current-smokers, the Brinkman index did not correlate with the JOA, JOACMEQ, or SF-36 scores but was significantly associated with reduced improvement in the NPSI-burning (r = 0.678, p = 0.022) and pressing (r = 0.602, p = 0.048) domains. Active smoking was associated with less favorable functional recovery following DCM surgery, whereas cumulative smoking exposure showed no clear relationship with neurological or functional improvements. However, greater cumulative exposure appeared to be associated with persistent neuropathic sensory symptoms. These results suggest that smoking status and cumulative exposure may influence different aspects of postoperative recovery, supporting smoking cessation as part of preoperative patient management.

BEST PAPER: BASIC SCIENCE

[BPBS131] **When ageing becomes degeneration: Evidence from Metabolomics of Healthy Age-stratified organ-donor and degenerated lumbar discs**

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Background: Ageing and degeneration are biologically distinct processes in intervertebral discs but are difficult to differentiate radiologically. Metabolomics reflects real-time biochemical activity, and age-stratified metabolomic profiling of normal and degenerated discs may identify pre-clinical degeneration and reveal molecular signatures distinguishing normal ageing from degeneration.

Methods: Nucleus pulposus tissue from 21 healthy organ donors (Pfirrmann gradeI) was stratified by age: young(20–30yrs), middle-aged(31–50yrs), and old(>50yrs), and compared with 40 degenerated discs (grades III–V) from surgical specimens. Untargeted UHPLC–MS/MS was performed in both ionization modes. Metabolites were identified using Compound Discoverer v3.7, HMDB, KEGG. Statistical and pathway enrichment analyses were performed via MetaboAnalyst 6.0.

Results: Untargeted UHPLC-MS/MS analysis revealed 831 significant metabolites (VIP >1). Lipids and lipid-like molecules, especially sphingolipids, fatty acyls, and steroids, constituted 39%. Four distinct metabolic trends observed:(i) progressive decline of antioxidants (ubiquinone, glutathione, N-acetyl seretonin);(ii) increased oxidative/inflammatory markers (4-HNE, prostaglandin E_2 ethanolamide, N1-acetylspermidine);(iii) transient midlife antioxidant elevation; (4OH benozoic acid, 4OH phenylpyruvic acid) (iv) partial recovery in older discs (Hypoxanthine, Paraxanthine, CerP(d18:1/18:0). In old-aged discs, accumulation of sphingolipids (sphingosine, ceramides) and redox drift indicated enhanced senescence and energy imbalance. Degenerated discs exhibited suppression of bioactive lipids, particularly resolvins, PGE2, and SOFAs, accompanied by disrupted sphingolipid metabolism and reduced redox capacity.

Conclusion: Metabolomic shifts offer physio-pathological staging - "metabolically stable ageing," "compensated ageing," and "metabolic degeneration". Unique sphingolipid and redox signatures clearly distinguished physiological ageing from degeneration and provide a strong foundation for biomarker discovery and therapeutic strategies to stop/reverse disc degeneration at the preclinical stage.

[BPBS004] **Low-Temperature Spine-Specific PMMA Enhances Osteogenesis Through Localized Thermal Necrosis in Osteoporotic Vertebrae: Evidence from an Ovariectomized Rat Model**

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Osteoporotic vertebral compression fractures (OVCFs) are common complications of osteoporosis and contribute to significant morbidity in aging populations. Percutaneous vertebroplasty using polymethyl methacrylate (PMMA) bone cement provides stabilization, but conventional PMMA has limitations, including high stiffness, poor osteointegration, and excessive polymerization temperatures (>100 °C) that may cause thermal necrosis. To address these drawbacks, spine-specific PMMA was developed to polymerize at a reduced temperature (~47.5 °C), potentially minimizing tissue damage while harnessing localized mild heat to stimulate osteogenesis. This study evaluated whether spine-specific PMMA promotes bone regeneration in an ovariectomized (OVX) rat model. Twenty-four female Sprague–Dawley rats (8 weeks old) were assigned to three groups: untreated control, OVX with defect, and OVX with PMMA injection. Eight weeks after bilateral ovariectomy, spine-specific PMMA was injected into caudal vertebrae (C3–C5). Animals were evaluated 12 weeks later. Bone regeneration was assessed using dual-energy X-ray absorptiometry (DXA), micro-computed tomography (Micro-CT), quantitative PCR, Western blotting, and immunohistochemistry. Osteoblast and osteoclast activity were analyzed by protein markers and TRAP staining. As a result, DXA showed marked bone loss in OVX rats, whereas PMMA-treated animals demonstrated partial recovery of bone mineral density and content. Micro-CT revealed severe trabecular deterioration in OVX rats, while the PMMA group exhibited significantly higher bone volume fraction

and trabecular thickness. Bone formation was most pronounced adjacent to cement deposits. Gene and protein analyses confirmed upregulation of osteogenic markers (ALP, RUNX2, OCN) in the PMMA group, exceeding control levels. Immunohistochemistry localized osteoblast activity to the cement–bone interface, and TRAP staining indicated reduced osteoclast activity compared with untreated OVX rats. Mechanistically, moderate localized thermal necrosis appeared to recruit osteoblasts via heat shock proteins (HSP70) and ERK/Wnt signaling pathways, supporting enhanced osteogenesis. In conclusion, spine-specific PMMA provides mechanical stabilization and simultaneously induces biologically favorable bone remodeling through controlled thermal effects. Unlike conventional PMMA, it promotes osteoblast activity and extracellular matrix production while limiting excessive necrosis. These findings suggest that low-temperature PMMA may represent a paradigm shift in managing OVCFs by combining structural stability with osteogenic stimulation. Further validation in large animal studies and clinical trials is warranted to optimize its safety, handling, and potential combination with osteoanabolic agents.

[BPBS121] **Plasma proteomic signatures of skeletal muscle mass linked to diet and digital phenotypes: UK Biobank discovery and YMoC (Japan) validation**

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Skeletal muscle mass is central to mobility and metabolic health, yet it remains unclear whether muscle mass–related plasma proteomic signals align with free-living behaviours and physiology captured by wearable devices and smartphone-based logs (Taohealth).

We used a two-step discovery–replication design. We first screened 2,919 plasma proteins quantified by Olink Normalized Protein eXpression (NPX) for association with bioimpedance-derived skeletal muscle mass index (SMI) in UK Biobank (UKB; n=43,434) using multivariable linear regression adjusted for age, sex, smoking, physical activity, and income, with Benjamini–Hochberg false discovery rate (FDR) control ($q<0.05$). We then defined replicated proteins as those showing concordant directions and $q<0.05$ in the Yamanashi Multi-omics Cohort (YMoC; n=162) in Japan. In YMoC, replicated proteins were further related to food-frequency questionnaire (FFQ) nutrients and to digital phenotypes from Taohealth logs (body weight, sleep timing, resistance training) and Fitbit-derived sleep and heart rate variability (HRV) metrics using Spearman correlations in YMoC.

Seven proteins replicated across cohorts (IGSF3, CKB, IGFBP2, THBS4, CRYBB2, COMP, CTHRC1). In YMoC, IGSF3 was positively associated with α-carotene intake, whereas THBS4 was inversely associated with ethanol intake (FDR $q<0.1$). Taohealth logs showed that weight gain was positively associated with THBS4 and inversely associated with CKB and IGFBP2; later average bedtime was associated with lower COMP; and resistance training frequency was positively associated with CKB. Fitbit analyses showed inverse associations of changes in sleep efficiency with CKB and IGFBP2 ($p<0.01$), positive associations of changes in daily HRV with CKB, and an inverse association of changes in sleep duration with CRYBB2.

These findings identify a cross-cohort muscle mass–related proteomic signature that links diet, sleep, autonomic function, and app-logged behaviours with extracellular matrix integrity (THBS4, COMP), growth-factor signaling (IGFBP2), energy metabolism (CKB), tissue remodeling (CTHRC1), and emerging stress/adhesion pathways (IGSF3, CRYBB2). Prospective and mechanistic studies are needed to clarify causal pathways and to evaluate potential applications in personalised strategies for skeletal muscle health.

[BPBS109] **Subclinical Infection Drives Progressive Intervertebral Disc Degeneration: Experimental Insights from a Rabbit Model**

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Background: Infectious aetiology has been increasingly implicated as a potential contributor to

intervertebral disc degeneration and the development of low back pain. While clinical observations suggest a role for bacterial pathogens in disc pathology, the precise mechanisms by which infection initiates and accelerates degeneration remain poorly defined. Experimental models are therefore essential to elucidate the causal relationship between infection and disc degeneration.

Methods: A rabbit model was used to investigate the effects of bacterial inoculation on intervertebral disc degeneration. Eight male New Zealand rabbits were included. Two served as controls and received sham injections with tryptic soy broth (TSB), while the remaining six were divided into three groups (two rabbits per group). Clinical isolates of Pseudomonas aeruginosa, obtained from human disc specimens during surgery, were prepared at concentrations ranging from 1×10^7to 1×10^9CFU/ml. These inocula were injected into the nucleus pulposus of the L3–L4 discs. MRI imaging was performed at 1, 2, 4, and 8 weeks to monitor degenerative changes. At 8 weeks, animals were euthanised, and discs were harvested for histological analysis and bacterial culture. Microbial identification was confirmed using the VITEK 2 system.

Results: Injection of P. aeruginosa consistently induced disc degeneration, with severity dependent on inoculum concentration. High-dose inoculation (1×10^9 CFU/mL) resulted in rapid degeneration of IVD within 1 week, which was evident on MRI. Lower doses (1×10^7–1×10^8 CFU/mL) produced similar degenerative changes more gradually, between two and four weeks. Subclinical infections, without overt systemic manifestations, nevertheless led to persistent disc degeneration. Histological analysis revealed marked neutrophil infiltration, destruction of the nucleus pulposus, and structural collapse of the disc, findings that correlated closely with MRI observations.

Conclusion: This experimental rabbit model demonstrates that bacterial inoculation of the intervertebral disc reproducibly initiates and accelerates degeneration in a dose-dependent manner. High bacterial loads produced rapid and destructive changes, whereas lower inocula led to insidious, subclinical progression. These findings strengthen the hypothesis that infection may serve as a primary trigger of disc disease, while also providing a reproducible framework to study its pathophysiology

[BPBS178] **Do Combustible Cigarette– and Heated Tobacco Product–Derived Extracts Exacerbate Cervical Myelopathy? In Vivo and In Vitro Evidence**

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Objective: Degenerative cervical myelopathy (DCM) is a progressive spinal cord disorder, yet modifiable risk factors that accelerate its progression remain poorly understood. While cigarette smoking worsens surgical outcomes, its influence on disease progression under conservative management is unclear. This study examined the effects of combustible cigarette and Heated tobacco products (HTPs) extracts on cervical myelopathy progression.

Methods: Male Sprague–Dawley rats underwent cervical spinal cord compression surgery and received intraperitoneal injections of saline (CM), cigarette smoke extract (cCM), or HTP extract (hCM) every 5 days for 10 weeks. Motor and sensory function were assessed using the Basso, Beattie, and Bresnahan (BBB) scale and the von Frey test. Histological evaluation was performed postmortem. In vitro, differentiated PC12 cells were exposed to cigarette smoke extracts from combustible cigarettes or HTPs, and neurite length, cell viability, and apoptosis were assessed.

Results: BBB scores at postoperative 10 weeks were significantly lower in the cCM and hCM groups than in the CM group. Hind paw withdrawal thresholds were significantly higher in the cCM and hCM groups. Histological analysis revealed neuronal loss, gray matter cavitation, and white matter demyelination. In PC12 cells, both extracts significantly reduced neurite length and viability and increased apoptosis, accompanied by oxidative stress–associated mitochondrial dysfunction.

Conclusions: Both combustible cigarette and HTP

extracts exacerbated neurological deterioration in a cervical myelopathy model. HTPs, despite their perceived safety, exerted detrimental effects comparable to those of combustible cigarettes. These findings highlight the need to address all forms of tobacco use in patients with DCM receiving conservative treatment.

[BPBS146] **Age- and sex-related differences in physiological rotation patterns of the cervical spine: A detailed upright CT analysis**

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This cross-sectional study aimed to characterize cervical rotational kinematics under physiological upright, weight-bearing positions using upright multidetector CT (MDCT) and to clarify the associations between rotational range of motion (ROM), age, sex, and cervical sagittal alignment. Forty-nine healthy volunteers—24 younger (21–40 years) and 25 elderly (61–79 years)—underwent upright MDCT in natural standing and maximal right cervical rotation. Rotational angles from the occiput to C7 were measured relative to T1. Key parameters included segmental rotational ROM (rsd: the change in intervertebral rotation from neutral to maximal position), rotated segmental position (rd: the intervertebral rotation between adjacent vertebrae at maximal rotation), and percentage contribution of each segment (%rsd).

The results revealed that the largest segmental ROM occurred at C1–2 (rsdC1: 34.3°), providing a dominant %rsdC1 of 66.1%, while %rsd for C2–C7 segments remained low, ranging from 2.4% to 8.6%. Compared with younger participants, the elderly group showed significantly reduced total rotation and lower rsdC1 (30.3° vs. 37.0°, p=0.008). Correlation analysis showed that rsdC1 correlated negatively with age (r = –0.31), whereas rsd at C7–T1 correlated positively (r = 0.29). Multivariable regression for rsdC1 identified elderly age as the only significant negative predictor (β = -5.99, p=0.004), whereas sex, BMI, and sagittal parameters were not significant. In contrast, rdC1 was independently associated with multiple factors: elderly age (β = -6.05, p < 0.001), male sex (β = -5.30, p=0.003), and a smaller C2–7 angle (β= -0.14, p=0.020).

In conclusion, under physiological weight-bearing conditions, cervical rotation is predominantly generated at C1–2. Aging reduces segmental rotational ROM at the upper cervical levels, which may lead to compensatory motion at the cervicothoracic junction. Regression analysis highlights that while rotational ROM is primarily affected by aging, the intervertebral position at maximal rotation is independently influenced by age, sex, and sagittal alignment. These findings provide essential normative data and underscore the importance of evaluating cervical kinematics under physiological upright, load-bearing conditions.

[BPBS003] **Bone Regeneration Efficacy and Applicability of Defect-Fitting 4D Scaffolds Based on Shape Conformity in Three-dimensional Curved Bone Defects for possibility spinal cage**

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Catholic University of Korea

Recent advances in bone regeneration have introduced the concept of four-dimensional (4D) scaffolds that can undergo morphological and functional changes in response to external stimuli. While several studies have proposed patient-specific designs for defect sites, they often fail to adequately distinguish the advantages of 4D scaffolds over conventional 3D counterparts. This study aimed to investigate the potential benefits of 4D scaffolds in clinically challenging scenarios involving curved defects, where fixation is difficult. We proposed the use of Shape-Memory Polymers (SMPs) as a solution to address critical issues in personalized scaffold fabrication, including dimensional accuracy, measurement error, and manufacturing imprecision. Experimental results demonstrated that the Curved-Layer Fused Deposition Modeling (CLFDM) scaffold, which offers superior conformability to curved defects, achieved significantly higher interfacial contact with the defect area compared to traditional Fused Deposition Modeling (FDM) scaffolds. Specifically, the CLFDM scaf-fold facilitated bone

regeneration of 25.59 ± 4.72 mm^3, which is more than twice the 9.37 ± 1.36 mm^3 observed with the 3D FDM scaffold. Furthermore, the 4D CLFDM scaffold achieved 75.38 ± 11.65 mm^3 of new bone formation after four weeks, approximately three times greater than that of the 3D CLFDM scaffold, regardless of surface micro-roughness. These results underscore that improved geometrical conformity between the scaffold and the defect site enhances cellular infiltration and contributes to more effective bone regeneration. The findings also highlight the promise of 4D scaffolds as a compelling strategy to overcome geometric and dimensional mismatches in the design of patient-specific spinal cage application.

FREE PAPER: DEGENERATIVE

[FPD203] **Utilizing a novel combinatorial Physical Performance Test-based clinical assessment tool to screen for radiologically severe Degenerative Cervical Myelopathy**

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Background: Diagnosis of Degenerative Cervical Myelopathy (DCM) relies on Magnetic Resonance Imaging (MRI), which is often delayed due to long wait times and non-specific findings. The modified Japanese Orthopaedic Association Scoring System for Cervical Myelopathy (mJOA) lacks objectivity; combining performance tests such as the NIH Toolbox, grip and release test, and grip strength improves sensitivity for earlier detection.

Objective: This study aimed to develop a novel bedside Physical Performance Test (PPT)-based scoring system by linking PPTs to the radiological severity of DCM.

Study design: Prospective cross-sectional observational study

Methods: DCM severity was assessed by MRI, the cross-sectional area (CSA), while functional deficit was assessed by the mJOA and PPT (10-second Grip and Release Test (GR), Foot Tapping Test (FTT), 10-second Step Test (SST), Nine hole Peg Test (HPT), and 30 m Walking Test (30MWT). CSA correlations were analyzed, and the Hong Kong Myelopathy Criteria (HKMC) were developed via Principal Component Analysis and K-means Clustering.

Results: 269 DCM patients (57% female, mean age 63±9) were studied. 55% had CSA less than 70mm^2 (mean CSA 55.92±7.37mm^2), symptoms for 19±6 months, and mJOA of 14.4±2.0. PPTs showed

significant correlations with CSA (r = -0.473 to 0.837, p < 0.001), but not with mJOA. The HKMC, combining GR, FTT, and SST (loadings > 0.87), with a four- tier scoring system (0-3) showed a strong correlation (r = 0.896, p < 0.001). A cutoff of 4.5 effectively indicates significant cervical stenosis, with 90% sensitivity and 94% specificity.

Conclusion: This study is the first to demonstrate a strong association among MRI evidence, the severity of spinal cord compression, and physical performance in DCM. As a novel DCM-specific assessment, the HKMC demonstrates bedside utility and superior validity compared with individual PPTs and mJOA for identifying individuals with radiologically severe DCM.

[FPD182] **Comparative Efficacy of Arthroscopy-assisted Unilateral Single-portal Lumbar Fusion (AUSS-TLIF) versus Uniportal Full-endoscopic Transforaminal Lumbar Interbody Fusion (Endo-TLIF) for Lumbar Spinal Stenosis with Segmental Instability: A Prospective Cohort Study**

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Arthroscopy-assisted unilateral single-portal surgery for transforaminal lumbar interbody fusion (AUSS-TLIF) is an innovative minimally invasive spinal technique that combines the magnified visual field of endoscopy with the flexibility and efficiency of open surgery. This study is the first to prospectively compare the perioperative parameters, clinical outcomes, and radiographic results between AUSS-TLIF and uniportal full-endoscopic transforaminal lumbar interbody fusion (Endo-TLIF) for single-level lumbar spinal stenosis with segmental instability, aiming to provide comprehensive evidence-based guidance for surgical technique selection.

Methods: Eighty patients meeting the inclusion criteria between March 2024 and March 2025 were allocated to either the AUSS-TLIF group (n=40) or the Endo-TLIF group (n=40) based on the surgical procedure. Operative time, intraoperative blood loss, length of hospital stays, and complication rates were compared. Clinical efficacy was evaluated using the Visual Analog Scale (VAS) for pain, the Oswestry Disability Index (ODI), and the Japanese Orthopaedic Association (JOA) score. Radiographic assessments included disc height, segmental lordosis angle, and interbody fusion rate. The minimum follow-up was 12 months.

Results: The Endo-TLIF group showed significantly less intraoperative blood loss (45.2±10.5 mL vs. 85.8±20.3 mL, P<0.05) and a shorter postoperative hospital stay (3.8±0.9 days vs. 4.5±1.2 days, P<0.05) compared to the AUSS-TLIF group. However, operative time was significantly shorter in the AUSS-TLIF group (118.5±25.6 min vs. 142.3±30.4 min, P<0.05). Postoperative VAS, ODI, and JOA scores improved significantly in both groups at all follow-ups compared to preoperative values (P<0.01), with no significant intergroup differences (P>0.05). At the final follow-up, no significant differences were found in the fusion rates (92.5% for AUSS-TLIF vs. 90.0% for Endo-TLIF) or radiographic parameters (P>0.05). The overall complication rates were similar (12.5% vs. 15.0%), but the complication profiles differed.

Conclusion: Both AUSS-TLIF and Endo-TLIF are safe and effective ultra-minimally invasive techniques for treating lumbar spinal stenosis with instability. Endo-TLIF demonstrates advantages in minimizing blood loss and facilitating faster recovery, reflecting its "extreme minimally invasive" nature, while AUSS-TLIF offers greater procedural efficiency. Both techniques achieve equivalent mid-term pain relief, functional improvement, and solid fusion.

[FPD054] **Mid-term surgical outcomes of posterior lumbar interbody fusion for lumbar spondylolisthesis with diffuse idiopathic skeletal hyperostosis**

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Diffuse idiopathic skeletal hyperostosis (DISH) has been reported as a risk factor for revision surgery after posterior decompression or decompression with fusion for lumbar spinal stenosis. Although ankylosis extending into the lumbar segments (L-DISH) has been associated with poor outcomes, evidence regarding mid- to long-term outcomes after fusion surgery in patients with DISH remains limited. This study evaluated clinical outcomes and revision rates

following posterior lumbar interbody fusion (PLIF) for lumbar degenerative spondylolisthesis in patients with DISH who were followed for more than 5 years postoperatively.

We retrospectively reviewed 321 consecutive patients who underwent 1- or 2-level PLIF for lumbar degenerative spondylolisthesis. Patients were classified into DISH (D) and non-DISH (N) groups according to the Resnick criteria and Mata grading system. Demographic data, preoperative and postoperative visual analog scale (VAS) scores and Japanese Orthopaedic Association Back Pain Evaluation Questionnaire (JOABPEQ) domain scores, and revision rates were compared between groups.

A total of 100 patients (25 in the D group and 75 in the N group; mean age 66.5 years; mean follow-up 8.1 years) were included. Among the 25 patients in the D group, 8 had L-DISH, whereas the remaining cases had thoracic-limited DISH (T-DISH). Baseline characteristics were comparable between groups. Postoperative VAS scores for all symptoms significantly improved in both groups; however, postoperative lower-extremity numbness VAS scores were significantly higher in the D group (D: 4.3 vs. N: 2.5, P = 0.039). Regarding JOABPEQ, the effective rate for walking ability was significantly lower in the D group (D: 52.0% vs. N: 74.3%, P = 0.037). The overall revision rate was significantly higher in the D group (D: 28.0%, N: 10.7%, P = 0.042). Within the D group, revision rates were 24% in T-DISH cases and 38% in L-DISH cases. The mean interval from the initial surgery to revision surgery was 3.7 years in L-DISH cases and 5.6 years in T-DISH cases, with revisions occurring later in T-DISH.

With postoperative follow-up exceeding 5 years, increased revision rates became evident even in patients with thoracic-limited DISH. Preoperative assessment of thoracic DISH may therefore be crucial when planning PLIF for lumbar degenerative spondylolisthesis.

[RF90#257] **Aspirin Attenuates Neurological Decline in the Preclinical Cervical Spondylotic Myelopathy Model via Improving Cord Perfusion and Modulating Microglial Phenotype**

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Cervical spondylotic myelopathy (CSM) is a progressive disorder causing irreversible neurological damage, for which no effective non-surgical treatment modality exists. As chronic ischemia is a hallmark of pathology that may be amenable to pharmacological treatment, we hypothesized that aspirin could attenuate neurological decline. The twy (tiptoe) mouse hyperostosis model of chronic cervical cord compression was subject to daily intake of 25 mg / kg / day aspirin via drinking water from 4-weeks maturity onwards, equivalent to 100 mg / day in humans. Canal occupancy approached 40% by 3 months maturity but was unaffected by aspirin treatment. Aspirin significantly improved neurological measures as evidenced by prolonging balance (seconds, s) upon rotarod testing (39.12 ± 19.89s vs. 8.38 ± 6.46 vs, $p = 0.011$) and increasing forelimb grip strength (grams, g per gram body weight) at 3-months (0.54 ± 0.06 g/g, vs. 0.33 ± 0.06, $p < 0.001$) compared to untreated controls. This coincided with increased vessel volume (VV) of the cervical spinal cord visualized by micro-CT imaging at 3-months in aspirin-treated animals compared to controls (6.41 ± 2.27% vs. 1.50 ± 0.65% VV/total volume, $p = 0.002$). Single-cell RNA sequencing identified microglia as a key responsive cell type, whilst lipidomic profiling indicated upregulation of the specialized pro-resolving mediator (SPM) lipoxin A4 (LXA_4) within the cervical cord. Moreover, the therapeutic response to aspirin was attenuated by Boc-2 which antagonizes LXA4 receptor binding; expression of the cytotoxic NLRP3 inflammasome was elevated in BV2 microglia culture with aspirin and Boc-2, whilst drug co-administration in twy mice reduced rotarod and grip strength to that of untreated controls. Our results provide compelling preclinical evidence supporting aspirin as a novel pharmacological avenue to treat DCM.

[FPD048] **The Over-Widening Phenomenon due to suboptimal Lordosis Distribution Index: As a Risk factor for Rod fracture after Anterior Column Realignment in Patients with Degenerative Sagittal Imbalance**

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Purpose: To demonstrate the over-widening phenomenon (OWP) that can cause rod fracture (RF) when performing deformity corrective surgery using anterior column realignment (ACR) in patients with degenerative sagittal imbalance (DSI).

Materials and Methods: 199 patients diagnosed with DSI and underwent deformity correction using ACR were retrospectively analyzed. Finally, 35 patients with OWP (Group I) and 63 patients without ODP (Group II) were compared. OWP was defined as the upper or lower endplate of the cage does not meet the endplate of the adjacent vertebral body at all. Demographic data, radiologic sagittal spinopelvic parameters, and perioperative factors were analyzed. Additional statistical analyses were performed to identify risk factor for the development of RF.

Results: The incidence of RF [I; 23 (65.7%) vs II; 24 (38.1%)] and subsequent revision surgery [I; 13 (56.5%) vs II; 3 (14.3%)] was significantly higher in patients in Group I than in patients in Group II. The postoperative L4-S1 lordosis was significantly greater in Group II patients than in Group I patients, and the postoperative lordosis distribution index (LDI) in Group I was confirmed to be 43.5%, which was lower than the ideal 50-80%, and this was significantly smaller than the postoperative LDI of 57.7% in Group II. Logistic regression analysis showed that OWP was a significant risk factor for the development of RF (OR: 1.09, 95% CI: 1.01-1.19, p =0.028).

Conclusions: In patients with DSI, the suboptimal LDI after deformity correction using ACR causes an OWP, which is thought to be a risk factor for RF.

[FPD129] **Feasibility of Intra-cage vs Extra-cage Application of Recombinant Human Bone Morphogenetic Protein-2 in Posterior Lumbar Interbody Fusion**

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Although recombinant human bone morphogenetic protein-2 (rhBMP-2) is widely used to enhance fusion in posterior lumbar interbody fusion (PLIF), direct comparative studies at different rhBMP-2 application strategies remain limited. Therefore, this study aimed to compare the clinical efficacy of rhBMP-2 applied outside the cage and inside the cage in patients undergoing PLIF. A retrospective comparative study was conducted on patients who underwent one- or two-level PLIF. Patients were allocated into three groups according to graft materials: a control group without application of rhBMP-2, an extra-cage group receiving rhBMP-2 soaked in allogeneic bone grafts anteriorly located outside the cages, and an intra-cage group receiving rhBMP-2 soaked in collagen sponges located inside the cages. Radiographic fusion was evaluated at 1 year postoperatively using plain radiographs and computed tomography (CT). Clinical outcomes and postoperative complications were compared. CT-based fusion rates differed significantly among the three groups, with the highest fusion rate observed in the extra-cage group (80%), followed by the intra-cage group (60%) and the control group (52.2%) (p=0.024). Multivariate regression analysis revealed that the extra-cage application of rhBMP-2 was independently associated with higher odds of fusion compared with both no application (odds ratio [OR], 4.16; p=0.008) and the intra-cage application of rhBMP-2 (OR, 3.29; p=0.024). All groups exhibited significant improvement in clinical outcomes after surgery, with continued improvement over time; however, no significant differences were observed among the three groups at any time point after surgery. There were no significant differences among groups with regard to the postoperative complications, including heterotopic ossification, cage subsidence, osteolysis, and reoperation. In conclusion, extra-cage application of rhBMP-2 is safe and more efficient for fusion than intra-cage application of rhBMP-2 in PLIF.

[FPD106] **Preoperative Metabolite Ratio Predicts Postoperative Recovery in Cervical Myelopathy: A Prospective MRS-Based Study**

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Background: Degenerative cervical myelopathy (DCM) is the leading cause of spinal cord dysfunction worldwide. Surgical decompression remains the standard of care, yet postoperative recovery is highly variable. Conventional imaging, particularly T2-weighted MRI, provides anatomical detail but correlates poorly with functional outcomes. Magnetic resonance spectroscopy (MRS) provides metabolic insights into DCM, but its prognostic role in DCM has not been fully validated.

Objective: To assess the predictive value of preoperative MRS-derived metabolite ratios, alongside clinical and imaging parameters, in determining postoperative recovery in cervical myelopathy, and to develop and validate a simplified Predictive Recovery Score (PRS) for clinical prognostication.

Methodology: This prospective observational cohort study included sixty-nine consecutive patients with cervical myelopathy who underwent surgical decompression and were enrolled and followed for two years. Neurological recovery was evaluated using the modified Japanese Orthopaedic Association (mJOA) score and Hirabayashi's recovery rate formula. Patients were stratified into good-recovery (>50%) and poor-recovery (<50%) groups. Data collected included demographics, comorbidities, stenosis grade, compression ratio, and diffusion tensor imaging (DTI) metrics. Single voxel MRS at C2 quantified metabolite ratios (NAA/Cr, Cho/NAA, Cr/NAA, MIn/NAA). A composite PRS was formulated by weighting significant predictors (mJOA, Cho/NAA, Cr/NAA, MIn/NAA, comorbidity, stenosis grade) and validated against recovery outcomes.

Results: Thirty-five patients achieved good recovery, while 34 had poor recovery. Comorbidities were significantly more frequent in the poor recovery group (64.7% vs. 34.3%, p = 0.012). Preoperative mJOA scores were lower (10.91 ± 1.64 vs. 14.31 ± 1.51, p = 0.001), and grade 3 stenosis was more prevalent (82.4% vs. 48.6%, p = 0.003) in poor recovery patients. MRS revealed elevated Cho/NAA, Cr/NAA, and MIn/NAA ratios in poor recovery patients, all inversely correlated with recovery rate. ROC analysis demonstrated good discriminative power (Cho/NAA AUC = 0.759, Cr/NAA AUC = 0.750, MIn/NAA AUC = 0.686). Validation of the PRS showed sensitivity of 83%, specificity of 91%, and AUC of 0.92, with an optimal cutoff of 36.

Conclusion: MRS-derived metabolite ratios, particularly Cho/NAA, Cr/NAA, and MIn/NAA, are robust predictors of postoperative recovery in DCM. The PRS, validated at a threshold score of 36, demonstrated excellent discriminative accuracy in stratifying recovery potential.

[FPD268] **Cervical Sagittal Alignment Changes Following Long-segment Lumbar Instrumentation: a Longitudinal Follow-up Study**

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Introduction: Long-segment lumbar instrumentation extending to the sacrum or thoracolumbar junction is commonly performed for adult spinal deformity and degenerative conditions. While proximal junctional complications have been extensively studied, the compensatory changes in cervical alignment following long-segment lumbar fusion remain poorly understood. This study aimed to investigate the temporal changes in cervical sagittal alignment over three years following long-segment lumbar instrumentation.

Methods: A retrospective review was conducted on 30 patients who underwent long-segment posterior lumbar instrumentation extending to either the sacrum or thoracolumbar junction. Patients with previous cervical spine surgery or cervical pathology were excluded. Lateral standing radiographs of the entire spine were obtained preoperatively and at postoperative intervals up to three years. Cervical sagittal parameters including C2-C7 lordosis, C2-C7 sagittal vertical axis, and T1 slope were measured. Spinopelvic parameters including lumbar lordosis,

pelvic tilt, and global sagittal vertical axis were also assessed. Clinical outcomes were evaluated using the Neck Disability Index and visual analog scale for neck pain.

Results: Patients demonstrated progressive loss of cervical lordosis and increased forward cervical inclination over the three-year follow-up period. These changes were more pronounced in patients with instrumentation extending to the sacrum compared to the thoracolumbar junction. Greater postoperative lumbar lordosis correction and larger global sagittal vertical axis were associated with more significant cervical alignment changes. Despite these radiographic changes, clinical neck symptoms remained mild in most patients at final follow-up.

Conclusion: Long-segment lumbar instrumentation is associated with progressive compensatory changes in cervical sagittal alignment over three years, particularly in patients with instrumentation to the sacrum. Despite radiographic changes, most patients maintain adequate cervical compensation without significant clinical symptoms. Understanding these changes may help in preoperative planning and patient counseling.

[FPD224] **Characterizing Proprioceptive Dysfunction as an Early Sensory Indicator of Mild Degenerative Cervical Myelopathy**

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Study Design: Prospective observational cross-sectional study

Purpose: Degenerative Cervical Myelopathy (DCM) is a common spinal disorder with subtle, non-specific symptoms that can hinder awareness, causing delayed diagnosis and lasting disabilities. This study aimed to identify early somatosensory deficits in mild DCM to promote early detection and prevent delayed diagnosis.

Methods: Chinese DCM subjects aged 45 or above were assessed with the modified Japanese-Orthopaedic-Association Scoring System for cervical myelopathy (mJOA) and somatosensory functions, including superficial pain, temperature, discriminative touch, vibration, and proprioception. The prevalence and correlation between somatosensory deficits and disease severity were analyzed.

Results: Among the 436 DCM cohort, 20% were asymptomatic, and proprioceptive deficit had the highest prevalence among the symptomatic DCM subjects (54%; odds ratio: 7, p=0.002), even among individuals with very mild symptoms across disease severity. A substantial association with disease severity was confirmed in proprioceptive and vibratory deficits. Proprioceptive deficit exhibited the strongest correlation with mJOA ($r = -0.51$, $p < 0.001$) concerning disease progression. It was observed in milder DCM cases compared to other sensory modalities, with a cutoff mJOA of 15.3 and an Area-Under-the-Curve of 0.84.

Conclusion: This study is the first comprehensive sensory testing to reveal the trend of somatosensory deficits in DCM, occurring from 'mild' to 'moderate' and 'severe' DCM. Spinal cord disturbances can evolve from an isolated proprioceptive deficit to complex impairments. Notably, proprioceptive deficit was the most common somatosensory symptom, ranging from mild to severe DCM. These findings highlight the importance of assessing proprioception in suspected cases of DCM to enable early detection for further investigations.

[FPD086] **Semi-Dynamic Implant Stabilization Versus Posterior Interspinous Silicone Implant for Single-Level Degenerative Lumbar Disease: A Retrospective Comparative Cohort from Vietnam**

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Dynamic stabilization is a surgical option for degenerative lumbar disease with instability or a risk of postoperative instability. In Vietnam, the semi-dynamic B-Dyn device and the interspinous silicone Intraspine® device are commonly used, yet head-to-head data are scarce. We compared outcomes and complications between B-Dyn and Intraspine®

in single-level degenerative lumbar disease. We retrospectively reviewed patients with single-level lumbar disc herniation and/or lumbar spinal stenosis with segmental instability or a risk of postoperative instability who underwent surgery from January 2018 to December 2021. Outcomes included the Visual Analog Scale (VAS) for low back and radicular pain (preoperative, postoperative, and last follow-up), the Oswestry Disability Index (ODI) (preoperative and last follow-up), and segmental range of motion at the treated level (preoperative and last follow-up). Segmental range of motion (ROM) was measured on dynamic flexion–extension lateral radiographs as the change in the intervertebral angle at the treated level. Complications and reoperations were extracted from medical records. Twenty-eight patients received B-Dyn and 30 received Intraspine®; age was similar (42.68±9.01 vs 43.93±9.02 years; p=0.598). Both groups showed marked pain reduction by the last follow-up. Low back pain improvement was greater with B-Dyn (5.25±1.08) than with Intraspine® (4.37±1.54; p=0.014), while radicular pain improvement was comparable (5.89±0.96 vs 5.43±2.16; p=0.296). ODI improved in both groups and tended to be higher with B-Dyn (61.57±17.09) than with Intraspine® (52.80±24.92; p=0.122). Segmental ROM changed from 3.50±1.91 to 3.14±1.53 with B-Dyn and from 3.20±1.92 to 3.03±1.96 with Intraspine®. Intraspine® had two infections and two recurrent disc herniations requiring reoperation; no complications occurred with B-Dyn. Both devices provided substantial postoperative improvement. B-Dyn achieved greater low back pain improvement, while functional recovery was similar; complications and reoperations occurred only with Intraspine®.

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[FPIT176] **Artificial Intelligence-Driven Predictive Modelling for Tuberculous versus Non-Tuberculous Spondylodiscitis Using Magnetic Resonance Imaging: A Pilot Study**

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Spondylodiscitis is a serious infectious condition characterized by inflammation and destruction of the vertebral bodies and intervertebral discs, often leading to significant morbidity—including chronic pain, spinal deformity, and neurological compromise. In the Philippine healthcare setting, both tuberculous and non-tuberculous spondylodiscitis pose significant diagnostic and therapeutic challenges. An accurate diagnosis is essential to prevent unnecessary expenditures and decrease the burden on an already strained system. This pilot study determined if a Machine Learning (ML) model can distinguish between biopsy-proven tuberculous and non-tuberculous spondylodiscitis using Magnetic Resonance Imaging (MRI) features, with the goal of improving diagnostic accuracy for spondylodiscitis. This would enable timely and appropriate treatment to prevent complications such as spinal deformities or neurological deficits. A total of 28 patients seen at the Medical City Ortigas between January 2018 until May 2025 were screened and selected, including only those with laboratory or histopathologic confirmation of tuberculous or non-tuberculous spondylodiscitis. After analysis by board-certified radiologists, findings were systematically extracted based on established radiological criteria. A linear Support Vector Machine (SVM) algorithm was then used for model training. Results showed the efficacy of this model in differentiating tuberculous from non-tuberculous spondylodiscitis using MRI features, achieving an 85.7% accuracy and 0.93 AUC-ROC. On further analysis, imaging features were identified as key predictors such as abscess wall thickness, edge smoothness, and vertebral involvement. Findings in this study offer significant insight for both radiologists and orthopedic surgeons in facing the diagnostic challenge of differentiating between tuberculous

and non-tuberculous spondylodiscitis. Although this study was limited by a small sample size, it can serve as a blueprint for further studies with a larger population to hopefully improve the accuracy and other key parameters of the machine learning model, which have both diagnostic and clinical implications.

[FPIT132] **Instability matters more - A Paradigm Shift in Understanding Neurological Deficit in Spinal Tuberculosis**

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Background: Neurological deficit is the most serious complication of spinal tuberculosis (TB). While several predictors, such as canal compromise, deformity, and cord signal changes, have been extensively studied, the role of mechanical instability has not been systematically assessed. Objective: To evaluate the association between mechanical instability and neurological deficit in spinal TB, and to compare its predictive strength against previously recognized radiological predictors.

Methods: Clinical and radiological data of patients with active thoracic spinal TB were analysed. Instability was assessed using the Spinal Instability Scoring System (SISS) for spinal TB by Rajasekaran et al and categorised as stable, potentially unstable, or definitely unstable. Neurological status and Radiological parameters, including canal encroachment area (CEA), kyphotic deformity, vertebral body loss, spine-at-risk signs, cord signal changes, and epidural compression, were analysed to identify predictors of neurological deficit.

Results: A total of 122 patients with thoracic spinal TB were included. The average age was 51 18 years, and 54.9% were males. Among the 122 patients, 32.8% (n=40) had neurological deficits at presentation, and 70% (n=85) were managed surgically. Based on the SISS, 71 (58%) patients were categorised as stable, 10 (8.2%) as potentially unstable, and 41 (34%) as definitely unstable. On MRI, cord signal changes and epidural compression were noted in 18% and 64% of the patients, respectively. The definite instability was found to be the strongest independent predictor of neurological deficit (OR 9.77, 95% CI 2.85-38.9, $p<0.001$), followed by greater CEA (OR 1.08, 95% CI 1.03-1.13, $p=0.002$). The age, potentially unstable, and cord signal changes did not show a significant association on multivariate analysis. In a stable spine with epidural compression, the predicted probability of neurological deficit is 27%. In an unstable spine, the likelihood of neurological deficit is 50% even without epidural compression, and highest (63%) when instability was associated with epidural compression.

Conclusion: our study revealed that mechanical instability in Spinal TB is an independent and dominant predictor of neurological deficit, even in the absence of epidural compression. Incorporating the Spine Instability Scoring System into routine clinical evaluation improves risk stratification, enables timely decision-making, and prevents irreversible neurological deficit.

[FPIT082] **Surgical Outcomes of Posterior-Only Surgery for Thoracolumbar Spinal Tuberculosis: A Five-Year Case Series of 83 Patients from A High-Burden Region**

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Thoracolumbar spinal tuberculosis (TLSTB) remains a significant health burden in developing countries. Although anterior approaches have traditionally been considered the standard, posterior-only surgery has emerged as a promising alternative due to advantages including effective deformity correction, reduced surgical invasiveness, and shorter hospitalization. However, evidence regarding its long-term outcomes and complication profile remains limited. This retrospective case series evaluated the clinical and radiological outcomes, as well as perioperative complications, of posterior-only surgery for TLSTB. A total of 83 patients underwent posterior-only long-segment pedicle screw fixation with debridement and anterior column reconstruction using structural autograft, an anterior distraction device, or a titanium mesh cage over a five-year period. Clinical outcomes were assessed using the Visual Analog Scale (VAS), American Spinal Injury Association (ASIA) impairment scale, and Oswestry Disability Index (ODI), while radiological outcomes included

kyphotic Cobb angle, fusion status based on Bridwell criteria, and implant failure. All parameters were evaluated preoperatively, postoperatively, and at final follow-up. Multivariable regression analysis was performed to identify predictors of poor outcomes, and intraoperative and postoperative complications were systematically recorded. The mean patient age was 41.6 ± 5.3 years, with a mean follow-up of 28 ± 6.1 months. VAS improved from 7.1 ± 1.84 to 1.8 ± 0.52. Neurological recovery was achieved in 92% of patients, with 73% showing improvement of at least two ASIA grades. ODI decreased from 64.2 ± 10.74 to 24.6 ± 6.23. The kyphotic Cobb angle improved from 47.4° ± 23.94° to 16.7° ± 4.78°. Solid fusion (Bridwell grade I–II) was achieved in 87% of patients, while hardware failure occurred in 7.2%. Disease recurrence was observed in 2.4%, and the overall complication rate was 13.2%. Severe preoperative neurological deficit, delayed-onset paralysis, and greater baseline kyphosis were identified as predictors of poorer outcomes. Posterior-only surgery resulted in substantial improvements in pain, neurological function, and deformity correction in TLSTB, supporting its role as an effective alternative to conventional approaches; however, implant-related complications and nonunion highlight the importance of appropriate patient selection and long-term follow-up.

[FPIT060] **Trends in Surgical Site Infections and Causative Pathogens After Spinal Surgery: A 15-Year Analysis of 10,432 Cases (2010–2024)**

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Objective: Surgical site infection (SSI) after spinal surgery has substantial clinical and economic impact and remains difficult to prevent completely despite preventive strategies, including perioperative antibiotic prophylaxis. We aimed to clarify the SSI rate and trends in causative pathogens over 15 years in our department.

Methods: We reviewed 10,432 spinal surgeries performed at our institution between 2010 and 2024. SSI was defined as infection requiring operative irrigation and debridement in the operating room. We analyzed SSI rates according to implant use, causative organisms, patient characteristics (e.g., age and diabetes), surgical factors (operative time and blood loss), and the interval from surgery to SSI recognition, with statistical analyses. For pathogen-based comparisons, cases were categorized into three common groups: MSSA+MSSE, MRSA+MRSE, and P. acnes.

Results: The overall SSI rate was 0.96% (100/10,432). SSI occurred in 0.56% (33/5,857) of surgeries without implants and 1.46% (67/4,575) with implants, indicating a significantly higher rate in the implant group. Pathogens were heterogeneous; however, P. acnes and MRSA were detected significantly more often in implant-associated cases. The most frequent groups were MSSA+MSSE (n=34), MRSA+MRSE (n=19), and C. acnes (n=13). There were no significant between-group differences in age, implant use, operative time, or blood loss; however, time to SSI recognition differed significantly, with the P. acnes group showing the latest presentation.

Discussion: Implant use was a risk factor for SSI, and P. acnes was characteristic of delayed-onset infection. Longer postoperative follow-up and refinement of antimicrobial protocols may be required.

Conclusion: SSI occurred in approximately 1% of spinal surgeries, and implant-associated SSI and delayed-onset P. acnes infection remain important clinical issues.

[FPIT144] **To elucidate the role of serum Nogo-A as a predictor of neurological recovery in Spinal Cord Injury (SCI): A Prospective Case-Control Study**

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Introduction: Nogo-A, also known as reticulon 4, belongs to the reticulon family of proteins, where it is primarily expressed in oligodendrocytes, where it is localised to the membranes of myelin sheaths. The expression pattern of Nogo A after injury will enable the development of methods to effectively manipulate its levels, which will be beneficial for treating axonal regeneration after spinal cord injury.

Methods: This prospective case-control study included 27 patients with ASCI and 27 age and sex-matched healthy controls. Serum Nogo-A levels were

measured using ELISA at baseline and at 3 months. Neurological recovery was evaluated using the ASIA Impairment Scale (ASIA) and the Spinal Cord Independence Measurement (SCIM).

Results: Serum Nogo A levels in ASCI patients were significantly higher than those of controls at baseline (4.1309 ±0.400 ng/ml vs. 2.0266 ±0.194 ng/ml; $p < 0.05$) and at 3 months ($p < 0.05$). Additionally, when comparing Serum Nogo A levels among cases, they were higher in the paraplegia group than in the paraparesis group. Elevated serum Nogo A levels correlated with greater injury severity and poorer neurological outcomes.

Conclusion: Elevated serum Nogo A levels often indicate poor prognosis in SCI patients, and it is used as a prognostic biomarker to predict the prognosis of SCI.

[FPIT046] **Predicting Surgical Indications and Outcomes in Ankylosing Spondylitis Patients with Thoracolumbar Fractures: A Classification-Based Approach**

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Background: Surgical indications for PSO in unstable AS-related thoracolumbar fractures with sagittal imbalance remain unclear. This study evaluates surgical indications using a simplified classification—vertebral body (VB) vs. intervertebral space (IS)—and develops a predictive model from sagittal parameters.

Methods: 41 AS patients surgically treated for thoracolumbar fractures were reviewed. Fractures were classified as VB- or IS-type. Radiographic parameters, clinical outcomes, and complications were compared. Propensity score matching (1:1) using demographic and sagittal variables yielded 17 matched pairs. Logistic regression and decision tree analyses identified predictors for choosing PSO over posterior spinal fusion (PSF).

Results: VB-type fractures (n=24) showed greater sagittal imbalance (C7SVA 201.1 mm vs. 139.9 mm) and more frequent PSO (75% vs. 5.8%) than IS-type fractures (n=17). After matching, VB-type fractures demonstrated larger corrections in C7SVA and LL, while clinical outcomes were similar. Complications occurred more often in VB/PSO cases but without statistical significance. Predictive modeling achieved 86.2% accuracy, identifying C7SVA > 180 mm—especially with LL < –10°—as the strongest indication for PSO.

Conclusion: VB-type fractures with marked imbalance benefit from deformity correction, whereas IS-type fractures are effectively managed with PSF. A classification-based algorithm using C7SVA and LL offers objective surgical indications for AS-related thoracolumbar fractures.

[FPIT252] **Investigation of bone union rate and associated factors after posterior fixation combined with vertebroplasty for osteoporotic thoracolumbar vertebral fractures**

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Posterior fixation combined with vertebroplasty for osteoporotic vertebral fractures has shown favorable clinical outcomes. However, limited evidence exists regarding postoperative bone union. This study investigated the bone union rate at one year after surgery and analyzed factors associated with union in patients with osteoporotic thoracolumbar vertebral fractures.

This case control study included 67 patients who underwent posterior fixation combined with vertebroplasty and were followed for at least one year. The mean age was 79.1 years. 41 patients were female and 26 were male. Bone union at one year was defined as bridging formation between adjacent vertebrae on both cranial and caudal sides of the fractured vertebra on plain radiographs, or a change of less than 1 degree in the vertebral wedge angle on dynamic radiographs. Evaluated variables included time from injury to surgery, preoperative Hounsfield unit value, preoperative and postoperative osteoporosis medication, preoperative vertebral instability angle defined as the difference in wedge angle between standing and supine positions, changes in vertebral

wedge angle, and activities of daily living.

Bone union was achieved in 48 patients (72 percent). No significant differences were observed in age, sex, or body mass index. The mean interval from injury to surgery was significantly shorter in the union group than in the nonunion group (1.9 months versus 3.9 months, $p < 0.01$). The preoperative vertebral instability angle was significantly smaller in the union group (9.6 degrees versus 15.3 degrees, $p < 0.01$). Other variables showed no significant differences. Receiver operating characteristic analysis identified cutoff values of 3 months for time to surgery and 12 degrees for instability angle. Approximately 70 percent of patients achieved bone union at one year. Early surgery within 3 months and lower preoperative instability angle of 12 degrees or less were associated with successful union.

[FPIT059] **Long-Term Cervical MRI Changes After Whiplash-Associated Disorders: Twenty-Year Findings and Expectations at Thirty Years**

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Background: The long-term prognosis of whiplash-associated disorders (WAD) is generally considered favorable; however, objective longitudinal MRI data extending beyond two decades are limited. Whether WAD accelerates cervical degenerative changes or contributes to persistent symptoms later in life remains unclear.

Methods: This prospective longitudinal study compared cervical MRI findings and clinical symptoms over 20 years between an inception cohort of patients with WAD and asymptomatic controls. Baseline assessments were performed in 1995, with follow-up evaluations at 10 and 20 years. Cervical degeneration was graded using five MRI parameters: decreased disc signal intensity, anterior compression of the dura or spinal cord, posterior disc protrusion, disc space narrowing, and foraminal stenosis. Degenerative progression was defined as a one-grade or greater increase in any parameter. Longitudinal symptom trends and their associations with MRI progression were analyzed.

Results: At 20 years, cervical degenerative changes were highly prevalent in both groups, with no significant difference between the WAD and control cohorts (95.1% vs 95.3%). The most frequently progressive findings were decreased disc signal intensity, anterior compression, and posterior disc protrusion, most commonly at the C5–C6 level. Neck pain and headache decreased over time in both groups, whereas shoulder stiffness increased, particularly among controls, consistent with age-related changes. By 20 years, differences in symptom prevalence between groups had largely disappeared, and a history of WAD was no longer a significant risk factor for neck pain. No significant correlation was identified between MRI degenerative progression and symptom worsening.

Conclusions: Cervical degenerative changes progress over time regardless of prior whiplash injury, and long-term symptoms appear to be driven primarily by aging rather than WAD history. Structural MRI degeneration showed no meaningful association with late symptom severity. The planned 30-year follow-up is expected to further distinguish normal aging from injury-related effects and to clarify whether functional outcomes diverge despite similar degenerative changes.

[FPIT231] **Preoperative Vertebral Hounsfield Unit Values Predict Correction Loss After Posterior Corrective Fixation for Thoracolumbar Burst Fractures**

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Thoracolumbar burst fractures are common unstable spinal injuries often treated with posterior fixation when neurological deficit or marked instability is present. Despite advances in pedicle screw systems enabling strong intraoperative reduction, postoperative correction loss and kyphotic recurrence still occur. Therefore, identifying preoperative risk

factors for correction loss is clinically important.

The Load Sharing Classification (LSC) has been widely used to predict implant failure; however, fracture morphology alone may not sufficiently explain postoperative stability. Hounsfield unit (HU) values obtained from computed tomography images serve as a convenient marker of bone quality, but their role in maintaining postoperative correction after thoracolumbar burst fracture surgery remains unclear. The purpose of this study was to evaluate the impact of preoperative vertebral HU values on postoperative correction loss after posterior fixation.

We retrospectively reviewed 42 consecutive patients (mean age 42.6 years; 83.3% male) who underwent posterior fixation between 2014 and 2025 using the USS fracture system with a consistent surgical technique. Only two-level fixation constructs were included, and all patients were followed for at least six months. HU values were measured at L1 and at the instrumented vertebrae using the mean of three axial CT slices. Kyphotic angle and vertebral body height were assessed at 1 and 6 months postoperatively.

Although satisfactory reduction was achieved immediately after surgery, gradual correction loss occurred over time. Correction loss was associated with patient age and magnitude of reduction, but low vertebral HU values—particularly at the instrumented vertebrae—showed the strongest association with vertebral height loss and progression of kyphosis. Multivariate analysis identified decreased HU at the screw-inserted vertebra as an independent predictor of correction loss, whereas LSC showed no significant association. Preoperative vertebral HU values significantly influence maintenance of postoperative alignment. Patients with low HU values may require modified surgical strategies or closer follow-up.

[FPIT126] **Non cervical diffuse idiopathic skeletal hyperostosis is a risk factor for severity of cervical spinal cord injury**

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Background: Diffuse idiopathic skeletal hyperostosis (DISH) is a degenerative condition characterized by progressive ossification of anterior longitudinal ligaments, creating rigid spinal segments that act as lever arms susceptible to traumatic forces. The resulting fused segments restrict spinal flexibility and increase fracture instability compared to normal spine. While cervical DISH (c DISH) is known to be associated with increased paralysis severity and high mortality rates, the impact of DISH not extending to the cervical region (non-c DISH) on cervical spinal cord injury (SCI) severity remains unexplored. We investigated the relationship between non-c DISH and paralysis severity in cervical SCI patients.

Methods: Among 516 cervical SCI patients (2011-2023), 403 who underwent whole-spine CT and had classifiable ASIA impairment scales were included. DISH prevalence in thoracic, cervicothoracic, thoracolumbar, and whole-spine regions was examined. Relationships between DISH presence, age >65 years, high-energy trauma, sex, cervical OPLL, and severe paralysis (ASIA grades A-B) were analyzed using ANOVA. Multivariate logistic regression explored associations between severe paralysis and c DISH/non-c DISH after Bonferroni correction.

Results: DISH prevalence was 21.1% (thoracic), 5.7% (cervicothoracic), 7.9% (thoracolumbar), and 2.2% (whole spine). Significant differences in ASIA impairment scale distribution were observed between DISH and non-DISH groups ($P<0.05$). Multivariate analysis revealed significant associations between severe paralysis and DISH presence (OR 2.03, 95% CI 1.20-3.42) and male sex (OR 2.00, 95% CI 1.00-4.02). Both c DISH and non-c DISH were associated with severe paralysis compared to no DISH (c DISH: OR 4.56, 95% CI 2.09-9.96, $P<0.001$; non-c DISH: OR 1.76, 95% CI 1.01-3.06, $P<0.05$).

Conclusions: This study demonstrates that non-c DISH significantly increases the risk of severe cervical SCI, suggesting that thoracolumbar rigidity may biomechanically compromise cervical spine vulnerability during trauma. These findings have important clinical implications for risk assessment and management strategies in DISH patients sustaining cervical injuries.

FREE PAPER: TUMOR

[FPT050] **Risk factors for local recurrence after total en bloc spondylectomy for spinal tumors: A retrospective study**

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Local recurrence after total en bloc spondylectomy (TES) for spinal tumors remains a significant clinical issue. The aim of this study was to evaluate local recurrence and survival outcomes after total en bloc spondylectomy for spinal tumors. We retrospectively analyzed data from 185 patients with spinal tumors who underwent total en bloc spondylectomy at our institution between April 2010 and December 2022. We assessed the incidence, primary cancer type, and sites of local recurrence. Risk factors for local recurrence were also examined through the statistical analysis of 17 items, including clinico-pathological characteristics, treatment history, and preoperative or surgical complications. Survival outcomes were evaluated with particular attention paid to the presence of local recurrence. The median follow-up duration was 93.8 months (range, 12~180 months). Local recurrence was diagnosed in 21 of 185 patients (11.4%). The carcinomas included 16 cases of metastatic spinal tumors originating from primary malignancies such as thyroid cancer, renal cell carcinoma, and breast cancer, as well as two cases of carcinoma of unknown primary. In addition, one case each of primary tumors, including osteosarcoma, chordoma, and spindle cell sarcoma, was identified. The sites of recurrence were intradural in 4 cases, epidural in 4 cases, in a vertebral body adjacent to the resected vertebral body in 10 cases, and in the paraspinal muscle in 5 cases. Multivariate analysis indicated that radiotherapy history was the only risk factor for local recurrence. The 2-year survival rate was significantly lower for the recurrence group than for the non-recurrence group ($p < 0.05$). A history of radiation was the only risk factor for local recurrence. Patients with recurrence had a significantly worse prognosis than those without recurrence. These findings may aid in surgical decision-making when considering TES for spinal tumors.

[FPT216] **Development and Validation a deep learning-based algorithm for differentiating malignant vertebral metastasis from benign vertebral fracture on plain spine radiographs**

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Study Design: A retrospective, single-center study with external validation using plain spine radiographs (PSR) and corresponding MRI/CT as reference standards. Objective: To develop and validate deep learning (DL) models for differentiating malignant vertebral metastases (MVM) from benign vertebral fractures (BVF) on PSR and assess their diagnostic performance and generalizability.

Summary of Background Data: MVM is a common cancer complication, with spinal involvement in up to 20% of patients. Early detection is crucial for treatment, yet PSR—the most accessible imaging modality— often fails to reveal early-stage metastases. DL has demonstrated expert-level performance in orthopedic imaging but has not been applied specifically to MVM detection on PSR.

Methods: We included 426 patients with MRI-confirmed MVM and 1,088 patients with CT/MRI confirmed BVF treated between 2016 and 2022. PSR images were annotated by an orthopedic spine surgeon. Multiple single (AP, Lateral, Merge, Concat, ChConcat) and ensemble models were developed using EfficientNet-B0 with contrast-limited adaptive histogram equalization (CLAHE) and down-sampling preprocessing. Performance metrics included accuracy, sensitivity, specificity, precision, F1 score, and area under the receiver operating characteristic curve (AUC). External validation was performed with an independent dataset from another institution.

Results: The AP Views ensemble model with down-sampling achieved the best overall performance (F1 score 0.7786, AUC 0.8559). The Merge (Lateral) model demonstrated stable sensitivity for "sign" cases (0.833) and "no-sign" cases (0.8037), suggesting utility in early-stage detection. External validation showed fair performance with accuracy of 0.67, sensitivity of 0.76, and F1 score of 0.76, respectively.

Conclusion: DL models showed fair diagnostic performance in differentiating MVM from BVF on PSR, with the potential to assist clinicians in both specialized and resource-limited settings. Expanding datasets and conducting multi-center validations are essential to enhance

[FPT066] **Intratumoral Flow Void Diameter on Standard Magnetic Resonance Imaging: A Practical Marker of Vascularity in Metastatic Spinal Tumors**

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Massive intraoperative blood loss remains a major complication in surgery for metastatic spinal tumors, and accurate preoperative assessment of tumor vascularity is essential for bleeding risk prediction and surgical planning. Although digital subtraction angiography (DSA) is considered the gold standard for evaluating tumor vascularity, it is invasive and logistically demanding. In routine clinical practice, vascularity is often inferred from primary tumor type; however, this approach is frequently unreliable because of substantial tumor heterogeneity. The purpose of this study was to evaluate the diagnostic performance of intratumoral flow void (IFV) diameter measured on standard MRI for predicting tumor vascularity, using DSA as the reference standard, and to compare its performance with primary tumor type–based assessment.

We retrospectively analyzed 134 patients who underwent spondylectomy for isolated spinal metastasis between 2010 and 2023 and had both preoperative MRI and DSA. Tumor hypervascularity was defined as an angiographic grade of 3 or higher on DSA. IFV diameter was measured on standard MRI sequences and correlated with angiographic grade using Spearman's rank correlation. Receiver operating characteristic analysis was performed to identify the optimal IFV diameter cutoff for predicting hypervascular tumors, and diagnostic performance was compared with primary tumor type–based vascularity assessment.

IFV diameter demonstrated a strong correlation with angiographic grade ($r = 0.73$, $p < 0.05$), whereas primary tumor type–based assessment showed only a moderate correlation ($r = 0.39$, $p < 0.05$). An IFV diameter cutoff of 2.5 mm provided optimal discrimination for hypervascular tumors, yielding a sensitivity of 78.0%, specificity of 97.6%, and an area under the curve of 0.91. In contrast, primary tumor type–based assessment showed inferior diagnostic performance, with a sensitivity of 70.0% and specificity of 60.7%.

IFV diameter measured on standard MRI represents a reliable, noninvasive imaging marker for evaluating tumor vascularity in metastatic spinal tumors. A cutoff value of 2.5 mm enables effective preoperative bleeding risk stratification and may support decision-making regarding surgical strategy and adjunctive interventions, particularly in clinical settings where DSA is not routinely available.

[FPT124] **Is Shape Factor a Useful Prognostic Factor for Functional Outcome in Cervical Intradural Extramedullary Tumors?**

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Cervical intradural extramedullary tumors (IDEMTs) are generally benign lesions that can cause neurological impairment by compressing the spinal cord. Although tumor occupancy ratio within the spinal canal has been reported to be associated with symptoms and postoperative outcomes, patients with similar occupancy ratios may show different neurological status and recovery. This suggests that tumor size alone may not fully explain functional outcomes. Shape factor (SF) is a quantitative MRI-based index of spinal cord morphology, but its clinical significance in cervical IDEMTs remains unclear. This study investigated whether SF is associated with postoperative functional recovery after surgery for cervical IDEMTs. We retrospectively reviewed 35 patients with benign cervical IDEMTs who underwent surgery at our institution between January 2011 and December 2024 and were followed for at least 1

year. Neurological function was evaluated using the cervical Japanese Orthopaedic Association (JOA) score preoperatively and at 1 year postoperatively. Because most patients achieved clinically meaningful improvement, patients were divided according to whether they achieved a full JOA score of 17 points at 1 year. MRI parameters included tumor occupancy ratio, spinal cord occupancy ratio, and SF at the level of maximal compression. Cervical alignment, C2–7 range of motion, local segmental range of motion, and flexion-extension slip distance were also assessed. The mean JOA score improved from 12.8 ± 2.67 preoperatively to 16.3 ± 1.02 at 1 year. Full recovery was achieved in 19 patients. Dynamic radiographic parameters did not differ between groups. Among MRI parameters, SF was significantly higher in the full-score group. Multivariable logistic regression analysis showed that SF was an independent predictor of achieving a full JOA score at 1 year, with an odds ratio of 2.06 per 0.1 increase. The area under the receiver operating characteristic curve was 0.697, with a cutoff value of 0.568. SF was independently associated with achieving a full JOA score after surgery for cervical IDEMTs. Assessment of spinal cord morphology may provide additional prognostic information beyond conventional compression-based indices.

[FPT049] **Clinical Characteristics and Surgical Outcomes of Intradural Spinal Metastases: A Comparative Analysis Between Intramedullary and Extramedullary Lesions**

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Intradural spinal metastases are rare manifestations of systemic malignancies and include intramedullary (IM) and intradural extramedullary (IDEM) lesions with distinct anatomical and biological characteristics. Owing to their rarity, the optimal surgical indications and expected neurological outcomes remain unclear. This study aimed to compare the clinical presentation, surgical feasibility, and postoperative neurological recovery between IM and IDEM spinal metastases. We retrospectively reviewed 15 consecutive patients (mean age 49.7 ± 19.2 years) who underwent surgical treatment for intradural spinal metastases at our institution between 2010 and 2024. The lesions were classified as IM (n = 6) or IDEM (n = 9) based on radiological and intraoperative findings. Patient demographics, neurological symptoms, tumor location, operative variables, extent of resection, adjuvant therapy, and perioperative complications were analyzed. Neurological function was evaluated preoperatively and postoperatively using the Modified McCormick Scale (MMCS). IM lesions were most often thoracic (66.7%), whereas IDEM lesions occurred at various spinal levels. Gross total resection was achieved in only one IM (16.7%) and four IDEM (44.4%) lesions. No perioperative complications were observed. Preoperatively, half of the patients with IM were classified as MMCS grade V, whereas most patients with IDEM retained their ambulatory function. Postoperatively, neurological improvement was observed in five patients (33.3%), no change in six (40.0%), and deterioration in four (26.7%). MMCS analysis showed improvement in three IM (50.0%) and two IDEM (22.2%) patients; however, IDEM lesions achieved better final grades, with several patients improving to grades I–II. In contrast, half of the patients with IM remained at grade V. Surgery for intradural spinal metastases is safe and can maintain or improve neurological function in patients. IDEM lesions are more amenable to complete resection and functional recovery, whereas IM lesions generally require limited, function-preserving procedures for diagnosis and palliation within a multidisciplinary treatment framework.

[FPT064] **Long-term outcomes of total spondylectomy for giant cell tumor of the mobile spine**

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Curettage-based surgery for spinal giant cell tumors (GCTs) often results in high local recurrence. To prevent local recurrence, we routinely perform total en bloc spondylectomy (TES). When TES is anatomically unfeasible (e.g., in patients with prior surgery or cervical cases), we perform total piecemeal spondylectomy (TPS), ensuring adequate tumor margins. We report the long-term outcomes of these strategies over a period of approximately ten years.

We retrospectively reviewed 34 patients with spinal GCTs patients who were treated surgically at our institution between 1994 and 2022. Data included sex, age, tumor level, surgical classification of spinal tumor (SCST), history of prior surgery, preoperative denosumab treatment, surgical procedure (TES or TPS), and time to recurrence. Local tumor recurrence was monitored by computed tomography every 6 months for the first 2 years postoperatively, and annually thereafter. The recurrence-free survival was estimated using the Kaplan-Meier method, and recurrence-free survival rates were calculated at 10 years postoperatively.

The cohort (9 men, 25 women, mean age 33.8 years) presented with tumors located in the cervical (n= 5), thoracic (n=14), and lumbar (n=15) levels. Nine patients (26.5%) had undergone prior surgery at the other institutions. Procedures included 18 TES and 16 TPS. The mean follow-up duration was 118.9 months. Local tumor recurrences occurred in 3 patients (8.8%) at 12, 48, and 72 months after surgery, respectively. The estimated recurrence-free survival was 223.1 months. The recurrence-free survival rates were 88.9%. All three recurrences occurred in patients who underwent TPS for tumors classified as SCST type 6 (tumor involves adjacent vertebrae). Among the 9 patients with a history of prior surgery, 7 underwent TPS, and 1 experienced recurrence.

All 5 cervical cases underwent TPS with zero recurrences. In cases of spinal GCTs, TES provided excellent local control with no recurrences over 10 years. TPS also yielded favorable outcomes in most cases. Even in patients with prior surgeries or anatomically challenging cases such as in cervical spine, total excision with adequate tumor margins should be pursued wherever feasible.

[FPT105] **Validation of Risk Factors for Tumor Regrowth After Spinal Dumbbell-Shaped Schwannoma Surgery**

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Spinal dumbbell-shaped schwannomas (SDS) are often difficult to resect completely and safely because of their anatomical characteristics. As a result, there is no clear consensus regarding the optimal surgical strategy or postoperative management. Previous studies have reported that postoperative pathological findings, such as the Ki-67 labeling index, and residual tumor margins on postoperative MRI are associated with tumor recurrence or regrowth. However, these factors can only be evaluated after surgery, and the relationship between preoperative clinical data and postoperative tumor regrowth has not been fully clarified. This study aimed to evaluate preoperative clinical and imaging data in patients with SDS and to identify risk factors for postoperative tumor regrowth. We retrospectively reviewed 20 patients who underwent surgery for SDS at our institution between January 2013 and March 2023 and had at least two postoperative MRI evaluations. The standard surgical approach at our institution is a single-stage posterior surgery with maximal safe resection, without aiming for total resection. Clinical data, preoperative and postoperative MRI findings, reoperations, and complications were analyzed. Tumor growth was defined as the difference in maximum residual tumor diameter between the first and second postoperative MRI examinations. Patients were divided into an enlargement group (tumor growth ≥2 mm) and a non-enlargement group (<2 mm). Twelve patients were classified into the enlargement group and eight into the non-enlargement group. Patients whose preoperative MRI showed a homogeneously high signal on T2-weighted images did not demonstrate postoperative tumor regrowth, and this difference was statistically significant ($p = 0.012$). Furthermore, the mean tumor growth rate was significantly higher in patients without homogeneously high T2 signal compared with those with homogeneously high T2 signal ($p = 0.008$). The mean growth rate in the non–T2-high group exceeded 3 mm per year, suggesting a potential increased risk for reoperation. These findings indicate that preoperative MRI signal characteristics, particularly T2-weighted signal patterns, may help predict postoperative tumor regrowth in patients with SDS. Preoperative MRI-based risk stratification may be useful for optimizing surgical planning and tailoring postoperative follow-up strategies.

[FPT229] **Sudden negative chronotropic change during TES for large undifferentiated pleomorphic sarcoma arising from T12 vertebra - a rare case report**

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Background: Total en bloc spondylectomy (TES) is a lengthy, physically demanding procedure that entails circumferential removal of the affected vertebra, typically performed for selected primary spinal malignancies. Negative chronotropy during spinal surgery has been recognized in very few literature reports, citing possible connection to an apparent spinal cord-brainstem-heart loop that can trigger sudden cardiovascular collapse. We report, to the best of our knowledge, the first TES case that involved sudden supraventricular tachycardia that progressed to hypotension, then pulseless electrical activity within one minute, during closure of surgical site.

Case presentation: A 24-year-old male presented with progressively enlarging mass on the back, accompanied by paraplegia. MR and CT imaging described large mass arising from T12 vertebra that extended to left 11th and 12th ribs, posterior columns of T11 and L1, and paraspinal soft tissues, measuring 8.6 x 10 x 13.9 cm. Core-needle biopsy with immunohistochemical sstudies yieldedundifferentiated pleiomorphic sarcoma, while PET/CT found no evidence of other primary or metastatic lesions. Patient underwent 4 cycles of neoadjuvant chemotherapy (AIM), then preoperative 3-level arterial embolization (T11-L1) 24 hours prior to surgery. Patient subsequently underwent TES with en bloc removal of both T12 vertebral body and paraspinal mass involving left 11th and 12th ribs and posterior columns of T11 to L1, along with thoracotomy, circumferential spinal stabilization, and unilateral chest tube insertion. During skin closure, negative suction tube was connected to surgical site drain, right after which abrupt supraventricular tachycardia occurred that progressed to hypotension, then pulseless electrical activity, within a minute. Cardiopulmonary resuscitation resulted in return of hemodynamic circulation after 2 cycles, and patient recovered with no new-onset neurologic deficits.

Conclusion: The report concludes that cardiovascular collapse during TES, although multifactorial, can possibly be sudden and connected to an apparent spinal cord-brainstem-heart loop triggering negative chronotropy following excessive dural manipulation. The authors recommend vigilance by both surgical and anesthetic teams throughout whole conduct of TES, as mechanical stretching of spinal cord not only occurs during removal of tumor but also when applying negative-pressure surgical site drain.

[FPT166] **GLP-1 Receptor Agonists as a Potential Alternative Strategy to Reduce Spine-related Morbidities in Obese Population**

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Background: Spine-related morbidities are strongly influenced by obesity-related mechanical and

inflammatory factors. Glucagon-like peptide-1 receptor agonists (GLP-1 RAs), widely used for weight management, have shown potential musculoskeletal benefits, but their association with spinal degeneration remains unclear.

Methods: We conducted a propensity score-matched active comparator new-user cohort study using the TriNetX global federated database. Adults aged 20-79 years with obesity (BMI ≥30) prescribed GLP-1 RAs or other anti-obesity medications between January 2015 and June 2024 were included. After 1:1 matching on >70 baseline covariates, 233,567 patient pairs were followed for up to 9.5 years. The primary outcome was incidence of spine-related morbidities; secondary outcomes included spinal surgery. Analyses were stratified by BMI and spinal regions.

Results: A total of 467 134 matched participants were included in this study. The mean (standard deviation) age was 49.2 (13.4) years in the GLP-1 RA group and 49.1 (14.5) years in the non-GLP-1 RA group, and 67% of all participants were women. GLP-1 RA use was associated with a reduced risk of spine-related morbidities (HR: 0.911, 95% CI: 0.897 to 0.926).

Conclusion: In this large real-world cohort, GLP-1 RA therapy was associated with reduced incidence of spine-related morbidities in obese adults, though not with surgical outcomes. These findings suggest potential region-specific and BMI-dependent protective effects of GLP-1 RAs on spinal degeneration. Prospective studies are warranted to validate these associations and clarify underlying mechanisms.

[FPT165] Microscope-Assisted Open-Door Plasty for Early Recovery Approach (Opera) via A 3-cm Incision: Technical Note and Clinical Outcomes of 300 Consecutive Cases Wataru Narita, Kameoka Municipal Hospital Kameoka Municipal Hospital wnari77@gmail.com Conventional cervical laminoplasty requires extensive paraspinal muscle detachment, frequently causing severe postoperative axial neck pain. While minimally invasive modifications exist, they often involve prolonged operative times. We evaluated the operative protocol and clinical outcomes of a novel ultra-minimally invasive technique—Open-door Plasty for Early Recovery Approach (OPERA)—in 300 consecutive patients with cervical myelopathy. Through a 3-cm midline incision, the C3–C6 spinous processes were sagittally split under a standard operating microscope, completely preserving bilateral paraspinal muscle attachments. Bilateral gutters were created rapidly by relying entirely on direct microscopic visualization of strict anatomical landmarks. The laminae were elevated and stabilized using mini-plates. The mean skin-to-skin operative time was remarkably short at 41.2 ± 8.5 minutes, with a mean estimated blood loss of 15.3 g. There were no instances of incision extension, conversion to open surgery, or intraoperative neurovascular complications. At the 1-year follow-up, the mean Japanese Orthopaedic Association score improved significantly from 10.4 ± 2.1 to 14.6 ± 1.5, representing a recovery rate of 63.6% ($P < 0.001$). The Visual Analog Scale for axial neck pain decreased substantially from 48.5 ± 15.0 mm preoperatively to 15.2 ± 10.5 mm postoperatively ($P < 0.001$), indicating excellent preservation of the posterior dynamic tension band. Transient C5 palsy occurred in 7 patients (2.3%), all resolving completely. In conclusion, the OPERA technique via a 3-cm incision is a highly efficient, safe, and reproducible alternative to traditional laminoplasty. By synergizing strict muscle preservation and microscopic visualization, OPERA achieves unprecedented reductions in operative time and blood loss while excellently preventing postoperative axial neck pain.

FREE PAPER: DEFORMITY

[FPDY093] **Lateral interbody release technique improves the bone union at L5/S1 in posterior lumbar interbody fusion for adult spinal deformity surgery**

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This retrospective comparative study investigated whether adding a lateral interbody release technique to L5/S1 posterior lumbar interbody fusion (PLIF) enhances sagittal alignment, intervertebral restoration, and reliable interbody fusion in adult spinal deformity (ASD) surgery. A total of 110 consecutive patients who underwent long-segment fusion extending from the thoracic spine to the pelvis between 2013 and 2021 were included. Patients were allocated to a non-release group (n = 54) or a release group (n = 56) according to the surgical period and operative strategy. Standing radiographs were obtained preoperatively and at 2 years postoperatively to assess lumbar lordosis and sagittal vertical axis. Fusion status and lateral bridging callus (LBC) formation at the L5/S1 level were evaluated using computed tomography and classified according to the Berjano system, with complete or stable union defined as successful fusion. Postoperative lumbar lordosis was significantly greater and sagittal vertical axis was significantly smaller in the release group compared with the non-release group. Segmental lordosis at L5/S1 increased to a greater extent in the release group, accompanied by significantly larger postoperative anterior and posterior disc heights and a greater magnitude of disc height restoration. Endplate injury was observed less frequently in the release group. Furthermore, LBC formation occurred more often, and the overall fusion rate at the lumbosacral junction was significantly higher in patients who underwent the lateral interbody release technique. No neurological, vascular, or approach-related complications attributable to the release maneuver were identified during the follow-up period. These results indicate that lateral interbody release during L5/S1 PLIF reproduces key biomechanical advantages associated with lateral lumbar interbody fusion, including more complete annular release, improved segmental lordosis, and enhanced peripheral bone formation. This posteriorly applied technique may represent a safe, reproducible, and clinically meaningful strategy for optimizing sagittal alignment and promoting durable fusion at the lumbosacral junction in complex ASD surgery.

[FPDY189] **Automated Alpha Angle Calculation for Adolescent Idiopathic Scoliosis Surgery Planning Using Deep Learning Pose Model**

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Accurate selection of lowest instrumented vertebra (LIV) tilt is essential to prevent distal adding-on in adolescent idiopathic scoliosis. We previously showed that achieving an intraoperative LIV tilt (β) ≥ preoperative Alpha Angle (α) from supine left side-bending radiographs reduced adding-on to 10%. This study aimed to develop an AI model to automate Alpha Angle calculation and provide an objective, patient-specific LIV tilt target. This study included 249 AIS patients (Lenke 1–6) undergoing posterior spinal fusion. Supine left side-bending radiographs were divided into training (n=199) and validation (n=50) sets. A YOLOv11-pose CNN was trained to identify T11–L4 vertebrae and the pelvis to calculate the Alpha Angle. Performance was validated against expert consensus using ICC, mean absolute error, clinical success rates (±3° and ±5°), and mean average precision. The AI system achieved robust technical performance on the validation set, with a bounding box mAP50 of 99.4% and pose estimation mAP50 of 97.6%. In clinical validation, the model demonstrated excellent reliability with an ICC of 0.931 (95% CI: 0.89–0.96). The Mean Absolute Error was 1.68°, with negligible systematic bias (-0.12°; p=0.78). The AI achieved a clinical success rate of 92.0% within a 5° threshold and 80.0% within a 3° threshold. AI- surgeon agreement rate at 3° was 80.0%, and at

5° was 94.0%. There was no significant difference in X-angle, Alpha angle, and adjusted Alpha angle between surgeon consensus and AI. For the Y-angle, the AI measured a significantly lower displacement (p-value<0.001). Stratified analysis showed robust accuracy from T11 to L1, though reliability decreased at the L2 level (ICC=0.39). This study introduces the first AI system to automate Alpha Angle calculation for AIS surgical planning, demonstrating expert-level reliability (ICC >0.93) and accuracy exceeding inter-surgeon variability. With 92% of measurements within 5° of expert consensus, it provides a rapid and consistent alternative to manual measurement, bridging complex modeling and practical clinical application.

[FPDY199] *Automated Upper Instrumented Vertebra Tilt Angle Measurement for Adolescent Idiopathic Scoliosis Using Deep Learning Pose Estimation*

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Achieving optimal Upper Instrumented Vertebra (UIV) tilt has been shown to reduce postoperative neck tilt in Lenke 1-2 curves. Optimal UIV tilt angle calculation serves as an intraoperative guide to mitigate neck tilt and shoulder imbalance. However, manual calculation is time-consuming and subject to inter-observer variability. We aimed to develop an artificial intelligence (AI) model to automate UIV tilt angle calculation. This study analysed 60 consecutive AIS patients undergoing posterior spinal fusion. Left and right side-bending radiographs were used to train and validate a YOLOv11-Large pose estimation CNN to detect C7-L4 vertebrae (6 keypoints/vertebrae). The system geometrically calculates vertebral centroids, constructs transpedicular reference lines, and measures UIV tilt angles (T2-T4) following established methodology. Clinical validation included 60 measurements against a senior spine surgeon. Primary outcomes included Intraclass Correlation Coefficient (ICC), Mean Absolute Error (MAE), and Clinical Success Rate (within 3° and 5° thresholds). The AI system achieved robust technical performance with bounding box mAP50 of 99.5% and pose estimation mAP50 of 99.2% on 100-patient detection dataset. In clinical validation, the model demonstrated good reliability with an ICC of 0.761 (95% CI: 0.63-0.85). The MAE was 1.43°, with systematic bias of -0.11°(p=0.683). The AI achieved clinical success rates of 91.7% within 3° threshold, and 96.7% within 5° threshold. Component angle agreement was similarly good: RSB (ICC=0.69, MAE=2.05°), LSB (ICC=0.77, MAE=1.98°). Level-specific analysis showed consistent performance: T2 (ICC=0.72), T3 (ICC=0.66), T4 (ICC=0.71).

This study presents the first AI system to automate optimal UIV tilt angle calculation for AIS surgery, achieving good to excellent reliability (ICC=0.76) and clinical accuracy (92% within 3°, 97% within 5°). With mean error of 1.43° and minimal bias, the tool offers a rapid, consistent, and reproducible alternative to manual measurement for routine preoperative planning.

[FPDY078] **Correlation between nutritional status, assessed by MNA-SF, and clinical outcomes in patients undergo spinal deformity surgery**

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Summary of Background Data: Malnutrition is common among older patients undergoing ASD surgery and is linked to postoperative infection, delayed recovery, and increased morbidity. Laboratory-based nutritional markers have limitations related to inflammation and slow response. The MNA-SF is a simple, noninvasive screening tool; however, its clinical value and postoperative course in ASD surgery remain unclear.

Objective: To evaluate perioperative changes in nutritional status using the Mini Nutritional Assessment–Short Form (MNA-SF) and analyze its association with clinical and mechanical complications after adult spinal deformity (ASD) surgery.

Methods: 100 patients over 60 years old who underwent ASD correction and completed MNA-SF assessments preoperatively and at 1 year postoperatively were included. Radiographic parameters, bone mineral density, and biochemical indices were collected. Associations between preoperative MNA-SF,

postoperative MNA-SF, change in MNA-SF (ΔMNA-SF), and postoperative complications—including early and late surgical site infection (SSI), rod breakage, and proximal junctional failure (PJF)—were analyzed.

Results: The mean MNA-SF score improved significantly from 11.1 preoperatively to 11.9 at 1 year (p = 0.0035). Preoperative MNA-SF correlated positively with YAM (r = 0.338) and HbA1c (r = 0.344) but not with albumin or vitamin D. Neither preoperative nor postoperative MNA-SF scores were associated with postoperative complications. A smaller ΔMNA-SF was linked to late SSI (p = 0.011), whereas a greater ΔMNA-SF was associated with rod breakage (p = 0.018). No relationship was found between ΔMNA-SF and early SSI or PJF.

Conclusion: Nutritional status assessed using the MNA-SF significantly improved 1 year after ASD surgery. Although baseline and postoperative MNA-SF scores did not predict complications, postoperative nutritional improvement was associated with reduced late infection risk and increased rod fracture incidence. The MNA-SF may serve as a simple perioperative screening tool for patients with ASD.

[FPDY174] **Perioperative Outcome and Complications in Adolescent Idiopathic Scoliosis (Ais): Propensity Score Matching (PSM) Study Based on World Health Organization (WHO) Body Mass Index (BMI)**

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Adolescent idiopathic scoliosis (AIS) is a common spinal deformity in adolescents requiring surgical correction in progressive cases. Body mass index (BMI) may influence perioperative outcomes; however, the impact of low BMI, as classified by World Health Organization (WHO) criteria, remains unclear. BMI is an important factor influencing perioperative outcomes in AIS surgery. A total of 328 scoliosis patients who underwent posterior spinal fusion (PSF) surgery. PSM was performed with a match tolerance of 0.05. Patients were classified into two groups: Group 1 [Thinness/Underweight (Below 5th percentile)] and Group 2 [Normal weight (5th to <85th percentile)]. Forty-three matched patient pairs were analyzed. Patient demographics and perioperative outcomes were compared. The primary outcome measures included the number of screws used, duration of surgery, postoperative haemoglobin levels, intraoperative blood loss, blood transfusion requirements, length of hospital stay, total patient-controlled analgesia (PCA) usage, and complication rates. The cohort consisted of 80.2% female and 19.8% male patients, with a mean age of 14.5±1.8 years. Majority had Lenke 1 curves (39.5% in Group 1 and 48.8% in Group 2, p=0.761). There was no significant difference observed for preoperative Major Cobb angle (67.0±19.9° and 67.7±19.0°, p=0.882), correction rates (72.7±10.2% and 70.4±9.8%, p= 0.281), screw density (1.3±0.1 and 1.4±0.2, p=0.508) and length of hospital stay (3.3±1.0 and 3.0±0.3, p=0.062). Surgery duration was comparable between groups (134.3±33.8 minutes vs. 147.6±45.4 minutes, p=0.076). Intraoperative blood loss was higher in Group 1 (771.1±300.0 mL) compared to Group 2 755.7±295.6 mL) (p=0.751), however the difference was not statistically significant. The overall complication rate was 3.5% (p=1.000), with two complications in Group 1 (4.7% -Anterior perforation and surgical site infection) and one complication in Group 1 (2.3% -Ulnar nerve Neuropraxia due to positioning), however it was not statistically significant. Previous literature suggests that patients with low BMI face increased perioperative risks compared to those with normal BMI. Our study found a higher risk of perioperative complication rate, but the difference was not statistically significant.

[FPDY044] **A Novel Surgical Strategy–Oriented Classification for Severe Dynamic Sagittal Imbalance**

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Object: This study aimed to develop a surgical strategy–oriented classification system for patients with severe dynamic sagittal imbalance (DSI) through detailed radiological assessment. Methods: A total of 193 patients who underwent reconstructive surgery for severe DSI from 2016 to 2023 were retrospectively reviewed. Classification was based on

three radiographic criteria: (1) apex location (Type I: T12–L2; Type II: L3–L5), (2) apical segment angle (Type I: 45°; Type II: 20°, classified as A or B), and (3) apical segment rigidity (segmental motion ≥5°: –; <5°: +). According to surgical strategy, patients were divided into group A (ACR with PSF) and group B (ACR with PSF plus PSO). Radiographic parameters, clinical outcomes, and complications were compared. Results: All patients were classified into eight subtypes (IA–, IA+, IB–, IB+, IIA–, IIA+, IIB–, IIB+). Patients with mild apical segment kyphotic deformity (Types IA, IIA) achieved satisfactory correction with ACR and PSF. In contrast, those with severe and rigid apical segment kyphotic deformity (Types IB+, IIB+) required additional PSO. Both groups showed significant postoperative improvement in radiographic parameters and clinical outcomes, but the group B had a higher rate of perioperative complications (p< 0.05). Conclusions: This classification effectively stratifies severe DSI based on morphologic and structural features and provides practical guidance for selecting appropriate surgical strategies. Additional PSO is recommended for Type IB and Type IIB deformities.

[FPDY133] **Postoperative Coronal Imbalance Predicts Late Mechanical Failure and Revision Surgery After Adult Spinal Deformity Correction with Pelvic Fixation: A 5-Year Follow-Up Study in Elderly Patients**

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Hamamatsu University School of Medicine

Purpose: Postoperative coronal imbalance (CIB) is a persistent concern following adult spinal deformity (ASD) surgery. This study aimed to determine whether postoperative CIB independently increases the risk of mechanical complications and revision surgery, and to investigate whether the side of rod fracture correlates with the direction of coronal shift.

Methods: We retrospectively reviewed 241 patients aged ≥65 years who underwent long-segment ASD correction with pelvic fixation between 2010 and 2020. A total of 169 patients (70.1%) completed a minimum 5-year follow-up. Postoperative CIB was defined as C7CSVL >3 cm. Mechanical complications included proximal junctional kyphosis (PJK), proximal junctional failure (PJF), and rod fracture. Revision surgery was recorded when reoperation was required for painful PJF or rod fracture. Revision-free survival was performed using Kaplan–Meier and Cox proportional-hazard models.

Results: Thirty-four patients (20.1%) exhibited postoperative CIB. Compared with patients without CIB, these patients had greater preoperative coronal deviation (p<0.001) and longer fusion constructs (9.9 ± 2.3 vs 9.2 ± 2.2 levels; p=0.007), whereas sagittal vertical axis was comparable (p=0.876). The incidence of rod fracture (35.3% vs 17.0%; p=0.034) and revision surgery (35.3% vs 17.8%; p=0.035) was significantly higher in the CIB group. In multivariable logistic regression, postoperative CIB independently predicted rod fracture (OR 4.04; 95% CI 1.45–11.25; p=0.007), whereas satellite-rod use was independently protective (OR 0.16; 95% CI 0.06–0.39; p<0.001). Kaplan–Meier analysis showed reduced 5-year revision-free survival (HR = 2.0; 95% CI 1.0–4.0; log-rank p = 0.046), with divergence of survival curves evident after 2 years. Rod fractures occurred more frequently on the contralateral side to the direction of coronal shift (61.0%).

Conclusions: Postoperative coronal imbalance is an independent predictor of late mechanical failure and revision after ASD correction with pelvic fixation in elderly patients. The novel association between coronal shift direction and rod-fracture laterality provides clinical validation of asymmetric mechanical loading, underscoring the importance of precise coronal alignment and construct reinforcement to improve long-term construct durability.

[FPDY130] **Domino assisted Dual Rod Cantilever Correction in Complex Rigid Triplanar Kyphoscoliosis Deformities – A Retrospective Study**

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Ganga Medical Centre and Hospital

Background: Surgical correction and reduction of osteotomy site in complex rigid kyphoscoliosis remains a formidable challenge, the use of domino assisted dual rod cantilever correction in patients with rigid kyphoscoliosis has not been specifically studied.

Methods: Between January 2018 and December 2022, data from consecutive cases involving 25 patients who underwent posterior-only approach, dual-rod cantilever correction with domino connectors for osteotomy reduction, and anterior column support using cages with a minimum follow-up of 2 years were obtained. All surgical procedures were performed by the same author. Radiographic parameters were assessed preoperatively and postoperatively. Complications were documented.

Results: Patients had a mean age of 19 years, Male: female ratio was 14:11. Etiology of 25 kyphoscoliosis were congenital (18), Dystrophic (5), Neuromuscular (1) and Idiopathic (1). Preoperative major curve Cobb angles (99.30° ± 9.24°) improved significantly to 56.4° ± 8.94° at final follow-up (mean correction: 42.9°, 43.13%; p<0.001). Similarly, kyphotic angles decreased significantly from 103.15° ± 20.28° to 62.10° ± 14.92° (mean correction: 41.05°; p<0.001). Significant improvements were observed in sagittal vertical axis (p<0.001), and coronal balance (p<0.001). Four complications were documented: one dural tear, two transient neurological deficits, and one asymptomatic rod breakage. No pseudarthrosis or infections were recorded.

Conclusion: Dual-rod cantilever correction with domino connectors is effective for the reduction of osteotomy site and deformity correction achieving satisfactory radiological outcome with acceptable complication rates.

[FPDY160] **The Effect of Exoscopic Minimally Invasive Cervical Open-door Laminoplasty on Reducing Postoperative Axial Pain and Cervical Kyphotic Deformity**

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Open-door cervical laminoplasty is widely used for cervical compressive myelopathy; however, postoperative axial neck pain and cervical kyphotic deformity remain major concerns due to posterior soft-tissue injury. We developed an exoscopic minimally invasive open-door laminoplasty (ExLAP) using an exoscope and mini plates. This study aimed to compare one-year postoperative outcomes of ExLAP with those of the conventional open technique.

Ninety patients who underwent open-door cervical laminoplasty were retrospectively reviewed. Forty patients were treated using ExLAP (E group), and 50 patients underwent the conventional Hirabayashi open-door technique (C group). ExLAP was performed through a small midline skin incision of approximately 35 mm using an exoscope, with complete preservation of the C2 and C7 semispinalis muscles. The conventional technique required an approximately 10-cm incision with partial or complete detachment of the C2 semispinalis muscle. Cervical lordosis was evaluated using plain radiographs preoperatively and at one year postoperatively. Postoperative axial neck pain and Japanese Orthopaedic Association (JOA) scores were also assessed. Mean cervical lordosis changed from 11.6° preoperatively to 12.1° at one year in the E group and from 7.8° to 1.7° in the C group, with mean changes of 0.5° and −6.1°, respectively ($P < 0.001$). Postoperative axial neck pain was observed in 11% of patients in the E group and 66% in the C group ($P < 0.01$). Mean JOA scores improved from 10.7 to 13.4 in the E group and from 10.4 to 12.7 in the C group, with recovery rates of 45% and 37%, respectively ($P = 0.10$).

ExLAP significantly reduces postoperative axial neck pain and better preserves cervical lordosis compared with the conventional technique. By minimizing posterior soft-tissue injury and fully preserving the C2 semispinalis muscle, ExLAP represents an effective minimally invasive alternative for cervical laminoplasty.

[FPDY088] **Effectiveness of Dual Rod Translation in Thoracic Kyphosis Restoration for AIS: A Comparison with the Conventional Technique**

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Purpose: To compare radiographic and clinical outcomes between dual rod translation (DRT) and traditional rod rotation (RR) techniques in thoracic adolescent idiopathic scoliosis (AIS), with a focus on thoracic kyphosis (TK) restoration.

Methods: This retrospective cohort study included 239 patients with thoracic AIS (Lenke type 1 or 2) who underwent posterior spinal fusion between 2010

and 2024. RR was used as the standard correction technique in earlier cases, whereas DRT was adopted as the primary strategy in more recent cases. Patients were treated with DRT (n = 90) or RR (n = 149). Standing whole-spine radiographs were obtained preoperatively, at 1 week postoperatively, and at final follow-up. Coronal and sagittal alignment parameters were evaluated. Changes from preoperative values were analyzed using mixed-effects models, and intergroup differences were assessed using group-by-time interaction terms. Patient-reported outcomes were assessed using the SRS-22 questionnaire.

Results: Coronal correction of the main thoracic curve was comparable between groups, with both techniques achieving approximately 75% correction at final follow-up. In contrast, sagittal alignment differed significantly between techniques. TK increased by 16° in the DRT group compared with 6° in the RR group ($p < 0.001$). The DRT group also demonstrated significantly greater improvements in cervical and lumbar lordosis over time. Improvements in SRS-22 domain and subtotal scores at 2 years were comparable between groups.

Conclusions: DRT achieved coronal correction equivalent to RR while providing substantially greater restoration of thoracic kyphosis and more favorable reciprocal sagittal alignment changes. Although short-term patient-reported outcomes were comparable, the enhanced sagittal restoration achieved with DRT may have important implications for long-term spinal and thoracic function in patients with thoracic AIS.

[FPDY093] **Lateral interbody release technique improves the bone union at L5/S1 in posterior lumbar interbody fusion for adult spinal deformity surgery**

Takahiro Kozaki[1], Takuhei Kozaki[1], ·Ryo Taiji[2], Hiroshi Hashizume[1], Hiroshi Iwasaki[1], Shunji Tsutsui[1], Masanari Takami[1], Yuyu Ishimoto[1], Keiji Nagata[1] , Masatoshi Teraguchi[1], Shizumasa Murata[1], Ryuichiro Nakanishi[1], Yuta Yamamoto[1] and Hiroshi Yamada[1]

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This retrospective comparative study investigated whether adding a lateral interbody release technique to L5/S1 posterior lumbar interbody fusion (PLIF) enhances sagittal alignment, intervertebral restoration, and reliable interbody fusion in adult spinal deformity (ASD) surgery. A total of 110 consecutive patients who underwent long-segment fusion extending from the thoracic spine to the pelvis between 2013 and 2021 were included. Patients were allocated to a non-release group (n = 54) or a release group (n = 56) according to the surgical period and operative strategy. Standing radiographs were obtained preoperatively and at 2 years postoperatively to assess lumbar lordosis and sagittal vertical axis. Fusion status and lateral bridging callus (LBC) formation at the L5/S1 level were evaluated using computed tomography and classified according to the Berjano system, with complete or stable union defined as successful fusion.

Postoperative lumbar lordosis was significantly greater and sagittal vertical axis was significantly smaller in the release group compared with the non-release group. Segmental lordosis at L5/S1 increased to a greater extent in the release group, accompanied by significantly larger postoperative anterior and posterior disc heights and a greater magnitude of disc height restoration. Endplate injury was observed less frequently in the release group. Furthermore, LBC formation occurred more often, and the overall fusion rate at the lumbosacral junction was significantly higher in patients who underwent the lateral interbody release technique. No neurological, vascular, or approach-related complications attributable to the release maneuver were identified during the follow-up period.

These results indicate that lateral interbody release during L5/S1 PLIF reproduces key biomechanical advantages associated with lateral lumbar interbody fusion, including more complete annular release, improved segmental lordosis, and enhanced peripheral bone formation. This posteriorly applied technique may represent a safe, reproducible, and clinically meaningful strategy for optimizing sagittal alignment and promoting durable fusion at the lumbosacral junction in complex ASD surgery.

FREE PAPER: MIS/ NAVIGATION/ ROBOTICS

[FPMNR170] **Outcomes of Conventional Open Versus Minimally Invasive Posterior Interbody Fusion Surgery: A Meta-Analysis**

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Lumbar interbody fusions are designed to structurally remove pathologic disks to replace it with an interbody spacer. Recent interests in minimally invasive surgeries (MIS) and its reported short-term advantages have led to a paradigm shift towards minimally invasive posterior interbody fusion approaches. Evidence of long-term advantages, however, has been lacking. This review compares long-term outcomes of conventional open versus minimally invasive posterior lumbar interbody fusion.

A Literature search was done in the PubMed gateway of the MEDLINE database and Google Scholar from the time of inception until September 2022. Outcome measures include long-term pain scores, functional outcome scores, complication incidences, and total treatment costs. Review Manager 5.4 was used for data analysis. A total of 10 articles were included for quantitative and qualitative analysis. There were no significant differences in the overall visual analog scale (VAS) scores between minimally invasive surgery (MIS) and open surgery (OS). Subgroup analysis of the back and leg pain also failed to demonstrate a significant difference between the two groups. Consequently, no significant differences were seen in the functional outcomes between the two groups. The incidence of long-term complications was significantly lower in the MIS group compared with the OS group, with an overall risk ratio of 0.59, 95% CI [0.37, 0.94]. Subgroup analysis also showed a significantly lower incidence of adjacent segment pathology (ASP) in the MIS group (Risk ratio 0.47, 95% CI [0.25, 0.87]). However, the two groups had no significant difference in the revision surgery. Lastly, no significant difference was demonstrated in the total costs between the two groups.

The long-term pain, functional, and cost outcomes of conventional OS and MIS posterior lumbar interbody fusion surgery are comparable. However, there is a lower overall complication rate, specifically ASP, in patients undergoing minimally invasive posterior lumbar interbody fusion surgery.

[FPMNR173] **Microendoscopic Decompression for Thoracic Ligamentum Flavum Hematoma: A Rare Case Successfully Treated Using a Minimally Invasive Technique**

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Ligamentum flavum hematoma (LFH) is a rare cause of spinal cord compression and is most frequently reported in the lumbar spine, while thoracic involvement is uncommon. Most previously reported thoracic LFH cases have been treated using conventional open decompression, and minimally invasive surgical techniques have rarely been described.

A 74-year-old female jazz dance instructor presented with severe thoracic back pain that developed after repetitive spinal extension and flexion movements during a dance lesson, followed by progressive numbness in both lower extremities. These symptoms significantly interfered with her professional activities. Neurological examination revealed no motor weakness or bladder dysfunction. Magnetic resonance imaging demonstrated a posterior epidural mass compressing the spinal cord at the T10–11 level, consistent with LFH. Because conservative treatment failed to improve symptoms, surgical decompression was performed using a microendoscopic decompression technique. A tubular retractor with an inner diameter of 16 mm was used to access the surgical site. The ligamentum flavum hematoma was clearly visualized and completely removed under endoscopic magnification. Adhesion between the ligamentum flavum and dura mater was observed but was safely dissected without dural injury. Histopathological examination confirmed ligamentum flavum hematoma. Postoperative imaging demonstrated complete spinal cord decompression, and the patient experienced significant neurological recovery, allowing her to resume normal daily activities.

This case demonstrates that microendoscopic decompression is a safe and effective minimally invasive surgical option for thoracic LFH, even in the presence of dural adhesion. This technique provides excellent visualization while minimizing surgical invasiveness and represents a promising alternative to conventional open surgery.

[FPMNR085] **The Effect of 3D-printed Titanium Cage Used in Atlantoaxial Lateral Mass Joints on Cervical Realignment**

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The Effect of 3D-printed Titanium Cage Used in Atlantoaxial Lateral Mass Joints on Cervical Realignment Introduction: Research on the effect of using 3D-printed cage in the atlantoaxial lateral mass joint on cervical sagittal realignment remains few. The purpose of this study is to investigate the effects of using inter-atlantoaxial lateral mass joint 3D-printed titanium cage on cervical sagittal realignment in atlantoaxial dislocation surgery compared with traditional Harms rod-screw fixation systems without inter-atlantoaxial lateral mass joint cage.

Methods: Seventeen atlantoaxial dislocation patients treated with atlantoaxial lateral mass joint 3D-printed cage (Cage group) with a 1:1 matched patient without cage (non-cage group) were collected during the same period. Preoperative, last follow-up cervical upright lateral radiographs were collected. Cervical sagittal parameters including slope of Frankfort horizontal line (sFH), orbital tilt (OrT), occipital incidence (OI), occipital slope (OS), cervical sagittal vertical axis (cSVA), occiput-C1 Cobb angle (O-C1 CA), occiput-C2 Cobb angle (O-C2 CA), C1-C2 Cobb angle (C1-C2 CA), C2-7 Cobb angle (C2-7 CA), T1 slope (T1s), thoracic inlet angle (TIA), and neck tilt (NT) were measured. Finally, the cervical sagittal parameters were compared between cage group and non-cage group. A t-tests was used to analyze these parameters.

Results: The average operative time and blood loss were more in cage group but with no significant difference. The gender, age, hospital stay, all cervical alignment parameters and intraoperative complications were not significant different between two groups. Solid bone fusion could be observed in all inter-atlantoaxial lateral mass joints in 3 mons after surgery. Cervical alignments were improved in all Pts at two groups after surgery, However, OrT, O-C1 CA, O-C2 CA, C2-7 CA and T1S were improved significantly in cage group. The values of ΔsFH, ΔOrT, ΔO-C1 CA, ΔO-C2 CA, ΔC2-7 CA reflecting the postoperative improvement of cervical alignments compared with the preoperative also significantly changed in cage group.

Conclusion: In the surgical treatment of atlantoaxial dislocation, the placement of a 3D-printed titanium cage between the atlantoaxial lateral mass joints did not increase the surgery related complications. However, it did significantly realign the cervical spine better compared to the traditional Harm screw-rod system without cage through improving the value of atlantoaxial regional alignment.

[FPMNR057] **Delayed Massive Spinal Subarachnoid Hemorrhage Following T12 Balloon Kyphoplasty: A Case Report and Literature**

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Background: Balloon kyphoplasty (BKP) is widely established as a minimally invasive and effective treatment for osteoporotic vertebral fractures (OVFs). While complications such as cement leakage are well-documented, spinal intradural hematomas-specifically subarachnoid hemorrhage (SSAH)-are exceedingly rare. We report a significant case of extensive SSAH causing delayed paraplegia following BKP, supplemented by a review of relevant literature to elucidate potential mechanisms and management strategies.

Case Description: A 76-year-old female underwent BKP at a local hospital for a T12 OVF. The immediate postoperative course appeared uneventful; however, late at night on the following day, she developed sudden, progressive paralysis in both lower extremities. She was emergently transferred to our university hospital for higher-level care. Spinal magnetic resonance imaging (MRI) revealed a massive hematoma extending longitudinally from

T5 to L4, exerting severe compression on the spinal cord. Given the rapid neurological deterioration, emergency decompressive surgery was performed. Intraoperative findings confirmed the presence of a subarachnoid hemorrhage. The hematoma was successfully evacuated, and the spinal cord was decompressed. This case is notable for the extensive range of the hematoma compared to previously reported cases.

Discussion and Conclusions: A review of the literature suggests that intradural hemorrhages following vertebral augmentation are often associated with medial pedicle wall breaches or direct needle trauma to the dural sac and radicular vessels. The "delayed" onset of symptoms, as observed in this patient, is a critical clinical feature, potentially attributable to slow venous bleeding or a tamponade effect that eventually decompensates. This case underscores that despite the minimally invasive nature of BKP, catastrophic neurological complications can occur. Clinicians must maintain a high index of suspicion for spinal hematoma if a patient presents with new neurological deficits days after surgery. Rapid transfer to a tertiary center and immediate surgical decompression are essential for neurological salvage.

[FPMNR163] **Percutaneous Endoscopic Decompression for Lumbar Radiculopathy with Radiographic Instability: A Non-Fusion Strategy Balancing Clinical Efficacy and Spinal Stability**

Jiahui He, Xiaobing Jiang
The Second Affiliated Hospital of Guangzhou Medical University

Background and Objectives: For patients with lumbar radiculopathy (LR) with or without radiographic lumbar instability (RLI), it is controversial whether to choose percutaneous endoscopic lumbar discectomy (PELD) treatment. We have previously admitted a large number of patients who recovered from LR treated with PELD, some of whom had RLI and achieved satisfactory outcomes after treatment. The purpose of this study was to investigate the surgical outcomes of patients with LR combined with RLI treated with PELD for decompression only.

Methods: A retrospective analysis included 579 LR patients undergoing PELD. We compared surgical outcomes with imaging changes in LR patients with and without RLI who were matched for age, sex, surgical segmentation, and surgical approach. Outcomes included Oswestry Disability Index (ODI), Japanese Orthopaedic Association (JOA), and visual analog scale (VAS) scores.

Results" A total of 486 patients (83.9%) with complete data were considered eligible for this study. PTED and PEID were performed on 252 and 234 patients, respectively. A total of 73 patients (15.0%) with a combined RLI in lesion segment were treated with percutaneous transforaminal endoscopic discectomy (PTED) in 50 cases and percutaneous endoscopic interlaminar discectomy (PEID) in 23 cases. Comparing the outcomes of the 73 with RLI to the 73 matched patients without RLI, there were no significant differences in preoperative or postoperative outcomes between the two groups, and patients showed improvement in ODI, JOA, and VAS postoperatively during a mean follow-up period of 48.5-month. Radiographic instability persisted in most patients (>78%) postoperatively, with higher rates in older patients with lumbar segmental translational instability (LSTI) and in those with combined LSTI and lumbar segmental rotational instability (LSRI).

Conclusion PELD showed acceptable surgical outcomes regardless of the presence of RLI. In patients of LR with RLI, fusion surgery may not always be necessary.

[FPMNR223] **Robotic-Assisted vs Navigation-Guided vs Freehand Pedicle Screw Placement: A Systematic Review and Meta-Analysis of Accuracy, Complications, and Cost-Effectiveness**

Rafell Tantyo, I Gusti Lanang NA Artha Wiguna*
Specialist Study Program of Orthopaedics and Traumatology, Faculty of Medicine University Udayana/ RSUP Prof. dr. I.G.N.G. Ngoerah

Pedicle screw fixation is central to modern spinal stabilization, but the optimal technique for accurate and safe placement remains debated. We systematically compared robotic-assisted (RA), navigation-guided (NV), and conventional freehand (FH) techniques for pedicle screw placement across radiographic accuracy, perioperative metrics, complications, radiation exposure, and cost considerations. A PRISMA-informed search of major electronic sources identified comparative studies up to August 2024 evaluating at

least two of the three techniques. Risk of bias was assessed using design-appropriate tools, and random-effects models were used to pool dichotomous and continuous outcomes where feasible. Across pooled analyses, RA showed the highest probability of achieving "perfect" screw placement (Gertzbein–Robbins Grade A), with significantly greater odds than NV and FH. When accuracy was defined as "clinically acceptable" (Grade A+B), technology-assisted approaches (RA/NV) remained superior to FH. Safety signals favored technology assistance: RA/NV demonstrated markedly lower rates of facet joint violation and a lower risk of major complications compared with FH, while neurological injury rates were low across techniques and did not consistently differ. The principal trade-off was operative efficiency: RA was associated with longer operative time than FH, likely reflecting setup and workflow factors. Radiation exposure metrics generally favored RA/NV, particularly for the surgical team. Economic implications were context-dependent; substantial capital and per-case costs may be offset by avoided revisions, reduced length of stay, and improved throughput in high-volume centers, whereas low-volume settings may not reach break-even thresholds. Overall, RA provides the highest radiographic accuracy and may reduce select complications, but adoption should be individualized based on case complexity, institutional volume, and value considerations.

[FPMNR152] **Robot-assisted Percutaneous Kyphoplasty for Severely Collapsed Osteoporotic Burst Fracture: Operative Technique and Feasibility**

Joshua Song, Logheswaren Suppiah, Stephanie Paige Cruz Abellera, Jacob Oh, Yoong Leong
Tan Tock Seng Hospital

Introduction: Robot-assisted spine surgeries have gained traction in recent years, offering the advantage of minimally invasive techniques which not only improve precision in preoperative planning and intraoperative execution, while reducing bone cement leakage and minimizing radiation exposure to both patients and operating staff but also result in better pain relief and faster return to function for patients.

Methods: We present a case series of 2 patients who had undergone robot-guided percutaneous balloon kyphoplasty (rPBK). Both patients had sustained fragility fractures. Case 1 is a 77-year-old female who fell from standing height and sustained a severe T12 burst fracture with intact neurology in bilateral lower limbs. She also had multiple previous lumbar spine surgeries cumulating in an L2-S1 decompression, fusion and instrumentation in 2022. We had utilized the Mazor X robotic guidance system to aid with a minimally invasive segment rPBK. Case 2 is a 75-year-old female with a background of system lupus erythematosus, and osteoporosis who sustained a T11 burst fracture with severe vertebral collapse and bilateral lower limb radicular pain with L2 bilateral grade 4 power. Similarly, she had a rPBK done. The robotic workflow involves utilizing a pre-operative computer tomography (CT) scan for planning which is integrated into the Mazor robot to allow for more accurate pre-set trajectories for pedicle entries for injection of deployment of the balloons and subsequent cementing whilst minimizing the risks of complications.

Results: Both patients reported significant pain reduction post-operatively and were allowed for weight bearing with spinal orthoses post operatively. Patient 1 was able to ambulate 40m without aid post operation and was discharge the next day. Patient 2 reported marked improvement in her radicular pain and ambulated 10m post-operation day 1.

Conclusion: Robotic-guided kyphoplasty offers a viable, minimally invasive, and safe option for patients with severely collapsed fractures where the margin for error is small. This allows for precise pre-operative planning with CT scans and only requires intraoperative confirmatory image intensifier shots. The greater precision also allows more accurate delivery of bone cement and reduces the chance of cement leakage or endplate injury.

[FPMNR147] **Trans Thoracic Direct Lateral Retropleural Rib Sparing Approach for Thoracic Disc Herniation. A 10-year experience**

Pal, Debashish, Priyank Sinha, Jake Timothy
Leeds Teaching Hospitals NHS Trust

Objective: Calcified thoracic disc herniations (CTDH) represent a challenging pathology. Several surgical techniques have been described with various degrees of success. Aim of this study is to present our experience in treating CTDH via a Minimally Invasive Retropleural rib Sparing Transthoracic direct lateral (MIRST) approach and lessons learnt.

Method: A 10 year retrospective review (2015-2025) of all Anterolateral approaches for thoracic disc herniation was performed at our unit. A total of 31 patients were operated of which 26 had giant calcified disc. Preoperatively CT guided placement of a pedicle marker was used to localise the level. Surgical technique involved the MIRST approach. Patient demographics, clinicopathological presentation, neuromonitoring data, surgical technique and followup outcomes (upto 2 years) are presented.

Results The mean age was 54 years (range 24 to 78 years) with a female predominance. All patients had progressive thoracic myelopathy ongoing for 2 weeks to 1 year. Six patients (20%) presented acutely, 45% were located between T6 - T9 level and 70% centrally based. Four (12%) had intradural extension. Intraop monitoring dropped in 5 of initial 15 patients who were all worse immediately post-surgery. No changes in monitoring occurred in the last 16 consecutive cases which we attribute to technical considerations that included creation of a larger gutter in the vertebral body and the learning curve. Complications occurred in 4 patents with chest infection (n=2), hernia(n=1) and one patient needed to return to theatre for revision discectomy. At discharge, 4 patients were unchanged and the remaining 27 patients were all improved. 23(75%) presented with Nurick grade 4 or worse and at discharge 25(80%) were Nurick 3 or better. All 5 patients with intraop monitoring changes showed improvement at time of discharge as compared to their immediate postop function.

Conclusion: The predominately central anatomical location of CTDH makes the anterior approach ideal enabling minimal retraction of the spinal cord. There is a learning curve and the MIRST approach offers a safe and reliable corridor for anterolateral excision of thoracic disc herniation.

[FPMNR244] **Novel Technique of Assisted Uniportal Interlaminar Percutaneous Endoscopic Lumbar Discectomy to Increase Versatility for Discectomy: Technical Notes**

Yudha Mathan Sakti, Tedjo Rukmoyo, Zikrina Lanodiyu, Deas Makalingga Emiri, Kadek Egadia Calisto
Department of Orthopaedics and Traumatology, Dr Sardjito General Hospital, Yogyakarta, Indonesia

Discectomy was initially performed using a microsurgical interlaminar approach, which later evolved into the widely accepted percutaneous endoscopic lumbar discectomy. However, it requires a single operator to perform both visualization and discectomy. The limitations persist in treating contained disc herniations, where aggressive disc removal and annulotomy are often necessary and requires a stable visualization. Steep learning curve is the challenge in educational setting for young surgeons. To address these challenges, we proposed a novel approach to increase technique's versatility by introducing assisted uniportal for interlaminar PELD. The technique begins with the insertion of a spinal needle using interlaminar approach under fluoroscopic guidance to target the affected disc space. A working cannula is then positioned to create a stable endoscopic access to the intervertebral disc. Primary operator focused on discectomy, while the working channel was stabilized by a secondary operator. The secondary operator performed annular docking by medialization of the dural sac for better visualization of the herniated disc. Discectomy was then performed by the primary operator. This particular technique is indicated in contained disc herniations, where annulus remained intact. Patients were evaluated for postoperative VAS, ODI, and complication rates. Surgeon, fellow and residents were evaluated using semi quantitative questionnaire. We observed similar improvements in VAS and ODI scores in our patients compared to those undergoing traditional PELD. Minor complications were reported, predominantly paresthesia. Semi-quantitative measurements showed a more effective learning process of this technique with the help of the assistants. The technique offered several advantages, such as enhancing visualization

for contained herniated discs, improving safety while increasing operator focus, and addressing the learning curve. Making it a more user-friendly approach for surgeons in any level of expertise. With the assisted technique for educational purposes, young surgeons can focus to learn discectomy and reduce the learning curve. For technical notes on this assisted model, this technique creates an easier medialization of the dural sleeve and annular docking process. Assisted uniportal interlaminar PELD is a safe and valuable option to enhance versatility for discectomy and reduce the learning curve. For educational purposes, this technique gives a better room for knowledge transfer.

[FPMNR227] **Modified Minimally Invasive Transforaminal Lumbar Interbody Fusion for Isthmic Lumbar Spondylolisthesis: A Technical Note and Two Years Clinical Results**

Feng Zhang
The First Affiliated Hospital of the University of Science and Technology of China (USTC)

Objective: The aim of this study was to assess the clinical outcomes of modified MIS-TLIF for the treatment of isthmic lumbar spondylolisthesis.

Methods: Sixty cases diagnosed with Meyerding grade I or isthmic spondylolisthesis were included in this study. Thirty-two patients (group A) were treated with MIS-TLIF, twenty-eight patients (group B) underwent traditional open TLIF. The surgical procedures for MIS-TLIF included the implantation of pedicle screws via the Wiltse approach, under working channel, microscopic decompression, and interbody fusion. The visual analog scale (VAS) for low back pain (LBP), the VAS for leg pain, and the Oswestry disability index (ODI) were used as follow-up clinical outcomes. According to the imaging data, the slip rate, intervertebral space height and slip angle of the two groups before and 12 months (last follow-up) were compared. All statistical analyses were performed with SPSS 22.0, and the results were presented as mean ± standard deviation (SD).

Results: The preoperative scores for the ODI, VAS for LBP, and VAS for leg pain were not statistically different between the 2 groups ($P > 0.05$). The estimated blood loss, and 1-day and 7-day incision pain were significantly higher in group B than in group A ($P < 0.05$). The mean operative time were not statistically different between the 2 groups ($P > 0.05$). No differences were found between the 2 groups in ODI, leg pain VAS score. The VAS for back pain was better in group A than in group B ($P < 0.05$). At the last follow-up, the slip rate, slip angle and intervertebral space height were significantly improved in the same group($P<0.05$), but there was no significant difference between two groups($P>0.05$).

Conclusion: Both methods are effective in the treatment of isthmic spondylolisthesis. MIS-TLIF can reduce surgical trauma, facilitate rapid postoperative recovery and reduce the occurrence of injury to the dura and nerve root during decompression and the interbody fusion procedure.

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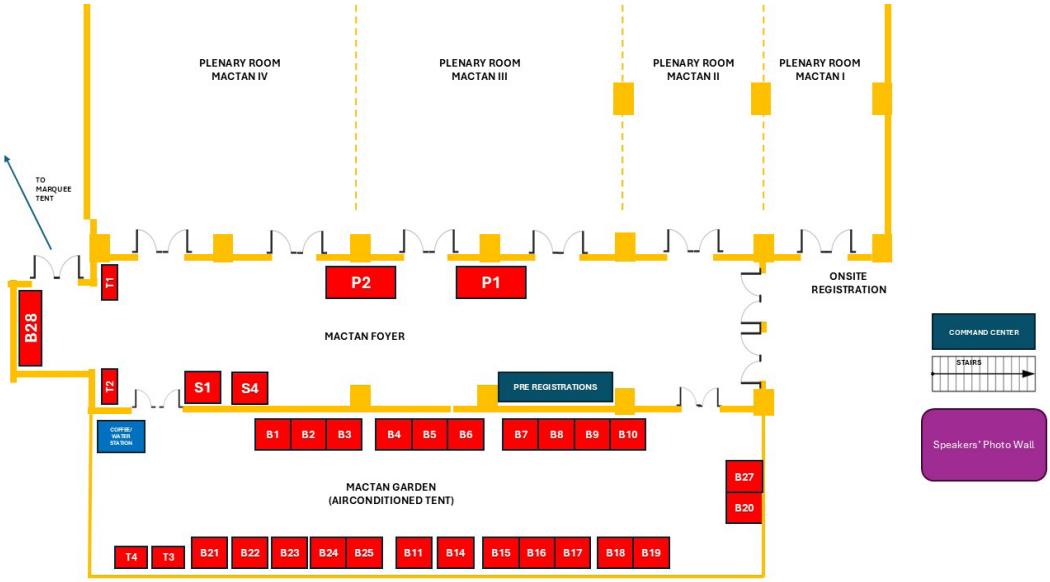

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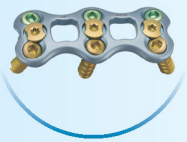

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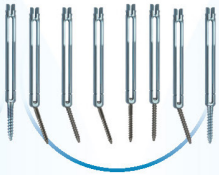

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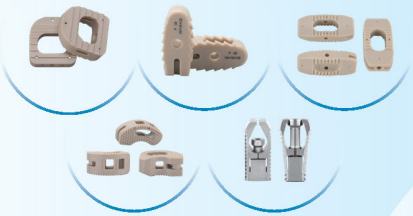

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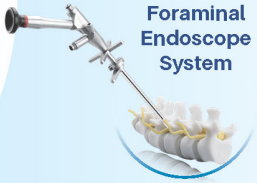

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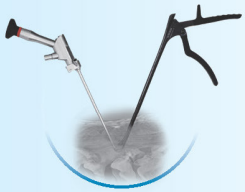

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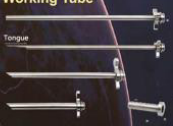

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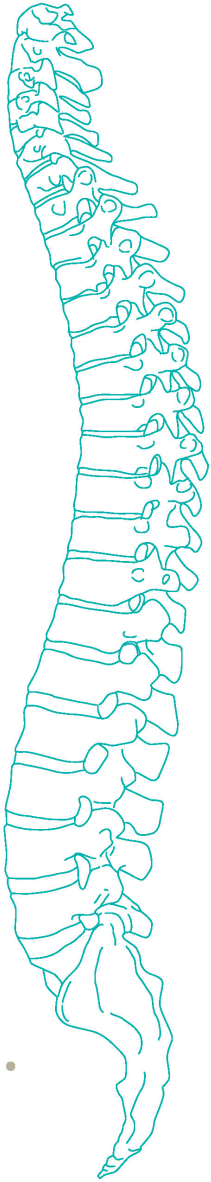

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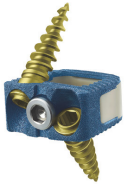

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