

18th Annual International Congress on Early Onset Scoliosis and the Growing Spine

November 13–15, 2024 | Scottsdale, Arizona

Wednesday, November 13

2:00–5:00 pm ICEOS 2024 General Registration Opens Maricopa/Papago Hall

Session 1 ICEOS Opening Session – The Past Maricopa Room

Moderators: L. Blakemore, G. Redding

4:40 pm Welcome R. El-Hawary

4:45 The Past - Introduction G. Redding

4:47 The History of Early Onset Scoliosis Treatment B. Akbarnia

4:55 My Experience with Traditional Growing Rods G. Thompson

5:03 My Experience with VEPTTR J. Emans

5:11 European Experience with Growth Friendly Treatment R. Castelein

5:19 Asian Experience with Early Onset Scoliosis T. Zhang

5:27 Round Table Discussion

Moderators: R. Murphy, G. Hogue

Panel: B. Akbarnia, G. Thompson, J. Emans, C. Johnston, D. Brockmeyer,
R. Betz, J. Smith, R. Castelein

6:05 Corporate Recognition and Thank-You to Top Supporters P. Sponseller

6:10 Introduction to Smith Family Lecture J. Smith, MD

6:15 Smith Family Lecture | Stephen Murphy

6:30 Adjourn

6:30 pm Welcome Reception Apache Room

Thursday, November 14

6:45 am Registration Maricopa/Papago Hall

7:00 Continental Breakfast and Exhibit Viewing Apache Room

Session 2 EOS—The Present (Best Evidence) Maricopa Room

Moderators: B. Yaszay, D. Sucato

7:30 am Welcome R. El-Hawary

7:35 Tethered Spinal Cords V. Ravindra

7:42 Spinal Tumor Classification (Intramedullary and Extramedullary) M. Groves

7:49 Managing the Cervical Spine in Young Children A. Jea

7:56 Discussion

8:05 Better Together – Neurosurgery and Orthopaedic Surgery (Spondy) R. Anderson, M. Vitale

8:12 Better Together – Intra-Operative Mentorship B. Ramo, C. Johnston

8:19	Discussion	
8:26	Genetics Primer on Bone Dysplasias	K. White
8:35	Genetics of Scoliosis and Personalized Medicine	N. Miller
8:42	Discussion	
8:49	Genetics of Early Onset Scoliosis	C. Wise
8:56	Disc Biomechanics as an Etiology of Scoliosis	R. Castelein
9:03	Biologic Solutions and Tissue Engineering	C. Johnston
9:10	Discussion	

9:15 am Refreshment Break and Exhibit Viewing Apache Room

Session 3 Scientific Papers #1–21 Maricopa Room

Moderators: F. Pellise, J. Gomez

9:45 am	Paper #1 Longitudinal Pulmonary Function after Surgery in Early Onset Scoliosis: We Need to Do Better	S. Yang
9:49	Paper #2 Increases in Three-Dimensional Spine Length during Growth Friendly Treatment for Early Onset Scoliosis are Moderately Correlated with Improved Pulmonary Function	A. Mishreky
9:53	Paper #3 Dynamic 4D Computed Tomography can Measure Increased Ventilation Heterogeneity in Thoracic Insufficiency Syndrome Rabbit Model	J. Jordan
9:57	Discussion	
10:03	Paper #4 Serial Changes in Respiratory Muscle Function among Children with EOS	G. Redding
10:07	Paper #5 Relevant Basic Science Supporting Extraspinal Fixation for Severe Pediatric Spinal Deformity	R. Gross
10:11	Paper #6 The Biological Responses to Titanium Alloy Debris Using a Pediatric Animal Model	B. Henry
10:15	Discussion	
10:21	Paper #7 Flexion/Extension MR is Safe in Infants and Children	B. Shannon
10:25	Paper #8 Safety of Traditional Growing Rods in Patients with Early-Onset Congenital Scoliosis Associated with Type-I Split Cord Malformation	H. Sun
10:29	Paper #9 Tethered Cord Release Either Prevents or Slows Scoliosis Progression	S. Lee
10:33	Discussion	
10:39	Paper #10 Clinical Outcomes of One-stage Posterior Hemivertebra Resection and Mono-segment Fusion for Growing Children at the End of Spinal Growth: A Mean 10-year Follow-up Study	Y. Zhao
10:43	Paper #11 Clinical and Radiological Outcomes of Posterior-Only Hemivertebra Resection and Short-Segment Fusion with Pedicle Screw Fixation in Children Under the Age of 5, Followed Until Skeletal Maturity	M. Enercan

10:47	Paper #12 Lessons Learned from Posterior Hemivertebra Resection and Short Segment Fusion for Congenital Early Onset Scoliosis: A Minimally 10-Year Follow-Up Study Until Skeletal Maturity	J. T. Zhang
10:51	Discussion	
10:57	Paper #13 Severe, Focal Early-Onset Congenital Scoliosis Treated with Hemivertebra/3-Column Osteotomy: Outcomes of Growth Guidance vs. Distraction-Based Constructs	A. Martinez Rivera
11:01	Paper #14 Comparative Assessment of 3-Dimensional True Spine Length (3D-TSL) Between Growth-Guidance Surgery (GGS) and Magnetically Controlled Growing Rods (MCGR) for Idiopathic Early Onset Scoliosis (i-EOS)	S. Luhmann
11:05	Paper #15 Growth Guidance Surgery: What Makes it Fail?	W. ElNemer
11:09	Discussion	
11:15	Paper #16 Long-term Neurologic Outcomes, Pseudoarthrosis Rates, and Re-operation Rates in Skeletal Dysplasia Patients Undergoing Cervical Fusion, Occiput-cervical Fusions, and Post-operative Bracing	J. Avendano
11:19	Paper #17 Rod Fracture After MCGR is Related to Rod Diameter but Lower Than TGR	B. Roye
11:23	Paper #18 Complications of Magnetically Controlled Growth Rods (MCGR) Using the Modified Clavien-Dindo-Sink (mCDS) Classification	J. Anari
11:27	Discussion	
11:33	Paper #19 Law of Diminishing Returns Revisited: A 3D Analysis of Spine Growth	R. El-Hawary
11:37	Paper #20 Nearly One out of Four Spondylolysis are Missed by MRI in Pediatric Patients with Low Back Pain	K. Illingworth
11:41	Paper #21 Spinal Fusion Should Be the Definitive End Point of Growth Guidance Surgery	W. ElNemer
11:45	Discussion	
11:55 am	Lunch Served in Exhibit Hall	

Lunch with Non-CME Workshops

12:15 pm	Workshop #1 Sponsored by Globus Medical Decision Making in Vertebral Body Tethering for Progressive Idiopathic Scoliosis: Technique Evolution, Instrumentation, and Considerations for Successful Procedures	Maricopa Room Mod: A. Samdani D. Hoernschemeyer J. Rodriguez-Olaverri
12:15 pm	Workshop #2 Sponsored by OrthoPediatrics From Challenges to Triumphs: A Historical and Technological Journey in Early Onset Scoliosis Treatment	Papago I T. Guillaume, C. Hardesty S. Luhmann, P. Sturm
12:15 pm	Workshop #3 Sponsored by Medtronic Navigating Complex EOS: Innovative Approaches for Challenging Situations	Papago II M. Erikson, A. McIntosh M. Oetgen

1:05 Walking Break

Session 4	Scientific Papers #22–38	Maricopa Room
	<i>Moderators: J. Smith, C. Bonfield</i>	
1:20 PM	Paper #22 Surgical Indications and Outcomes for Upper Cervical Instability in Down Syndrome Patients	J. Pahys
1:24 PM	Paper #23 Safety and Accuracy of Cervical Pedicle Screw Navigation Based on AI-generated, MRI-based Synthetic-CT versus CT	R. Castelein
1:28 PM	Paper #24 Spine MRI in Patients with Arthrogyrosis is Compulsory Due to High Rates of Tethered Cord/low-Lying Conus Medullaris and Scoliosis	A. Hariharan
1:32 PM	Discussion	
1:38 PM	Paper #25 Rib-On-Pelvis Deformity: A Modifiable Driver of Pain and Poor Health-Related Quality of Life in Cerebral Palsy	M. Bowen
1:42 PM	Paper #26 Do Cerebral Palsy Scoliosis Patients with Postoperative Complications have Worse CPCHILD Scores Two Years after Surgery?	P. Cahill
1:46 PM	Paper #27 Outcomes of Spinal Fusion Surgery in Cerebral Palsy: Analysis of Complications, Reoperations, and Clinical and Radiographic Outcomes with Minimum 5-year Follow Up	A. Hariharan
1:50 PM	Discussion	
1:56 PM	Paper #28 Spinal Pathoanatomy of Spinal Muscular Atrophy in the Era of Disease Modifying Therapies	H. Matsumoto
2:00 PM	Paper #29 A Changing EOS Phenotype in SMA: Nusinersen Use is Associated with Increased Curve Magnitude and Kyphosis at the Time of Index Surgery	J. Vorhies
2:04 PM	Paper #30 Risk Model Prediction for Proximal Junctional Kyphosis (PJK) Following Spine Deformity Surgery in Spinal Muscular Atrophy (SMA) Patients with Early Onset Scoliosis (EOS)	H. Matsumoto
2:08 PM	Discussion	
2:14 PM	Paper #31 Growth-friendly Surgery Improves Diaphragm Intrusion and Thoracic Dimensions in Patients with Neuromuscular Scoliosis	Z. Elsabbagh
2:18 PM	Paper #32 Does Spine Fusion Limit Functional Outcomes in Spina Bifida Patients with Severe Spine Deformity?	C. Louer
2:22 PM	Discussion	
2:26 PM	Paper #33 “Cured” Patients with Early Onset Idiopathic Scoliosis After Serial Casting Are at Risk of Recurrence at Intermediate Follow-up	R. Abid
2:30 PM	Paper #34 Can Early Brace Wear Compliance of Patients with Adolescent Idiopathic Scoliosis Predict Future Wear?	M. T. Hresko
2:34 PM	Discussion	
2:38 PM	Paper #35 Spine 2.0: The Tech Revolution in Pediatric Spine Surgery	G. Hogue
2:42 PM	Paper #36 Development of a Machine Learning Tool to Improve Intraoperative Neurophysiological Monitoring: Proof of Concept	V. Arvind

2:46 PM	Paper #37 Predicting Unplanned Return to the Operating Room in Early-Onset Scoliosis Patients Using Machine Learning Techniques: A Multicenter Model	B. Lullo
2:50 PM	Paper #38 MRI-Based Synthetic CT in Pediatric Spine Patients: A Case Series	K. Illingworth
2:54 PM	Discussion	
3:05 pm	Refreshment Break and Exhibit Viewing	Apache Room
3:35–5:10 pm	Concurrent Breakout Sessions	
Breakout One	Pediatric Back Pain / Spondylolisthesis <i>Moderators: J. Murphy, P. Sponseller</i> Faculty: C. Bonfield, S. Garg, D. Sucato, M. Vitale, M. Kelly, S. Upasani	Papago I+II
Breakout Two	Cervical Spine Trauma <i>Moderators: D. Hedequist, R. Anderson</i> Faculty: R. Iyer, B. Yaszay, J. Pahys, S. Parent	Pueblo I+II
5:10	Adjourn	
5:30 pm	PSSG New Member Reception – By Invitation Only	Garden Court

Friday, November 15

7:00 am	Registration	Maricopa/Papago Hall
	Continental Breakfast and Exhibit Viewing	Apache Room
Session 5	Master Techniques – How I Do It from A to Z <i>Moderators: Y. Li, S. Luhmann</i>	Maricopa Room Non-CME Session
7:25 am	Welcome	R. El-Hawary
7:30	How I Treat a Severe Congenital EOS Patient	P. Grabala
7:37	How I Treat an EOS Traditional Growing Rods Graduate	C. Hardesty
7:44	How I Treat an EOS VEPTR Graduate	P. Cahill
7:51	Discussion	
8:00	Traction for Cervical Spine Deformity	D. Bauer
8:07	Traction for Thoracolumbar Spine Deformity	J. Brooks
8:14	How to Set Up a Home Traction Program	K. Smit
8:21	Discussion	
8:30	Percutaneous Robotic Treatment for Spondylolisthesis	D. Skaggs
8:37	Robotic Assisted PSFI	D. Hedequist
8:44	Intra-operative Education with the Use Enabling Technologies	J. Flynn
8:51	Discussion	

Session 6	The Future of Pediatric Spine Surgery – An Industry Perspective	Maricopa Room
	<i>Moderators: G. Hogue</i>	<i>Non-CME Session</i>
9:00 am	Round Table Question and Answer	
9:23 am	Refreshment Break and Exhibit Viewing	Apache Room
Session 7	Scientific Papers, Akbarnia Award, Presidential Address, Keynote	Maricopa Room
	<i>Moderators: M. Oetgen, C. Nnadi</i>	
	Free Papers #39–52	
9:53 am	Paper #39 Time to First Reoperation: Modern Luque Trolley vs. Other Fusionless Surgery for EOS: A Prospective Cohort Study with Matched Historical Control Group	J. Ouellet
9:57	Paper #40 Effect of The Spring Distraction System on Different Etiologies in Early Onset Scoliosis	R. Castelein
10:01	Paper #41 Research and Development of a Novel Growth Guidance System	Y. Du
10:05	Paper #42 Complications of the Nemost Growth Rod	K. Lundine
10:09	Discussion	
10:15	Paper #43 Anterior Scoliosis Correction for the Treatment of Patients 5 to 10 Years of Age with Early Onset Scoliosis	R. Betz
10:19	Paper #44 Addressing the Curve: A Comparative Analysis of Vertebral Body Tethering and Posterior Spinal Fusion Outcomes in Older Early Onset Scoliosis Patients	J. Rodriguez Olaverri
10:23	Paper #45 Matched Comparison of Non-Fusion Surgeries for Adolescent Idiopathic Scoliosis: Posterior Dynamic Distraction Device and Vertebral Body Tethering	J. Todderud
10:27	Paper #46 Early Outcomes in Hybrid Spine Fixation for Adolescent/Juvenile Idiopathic Scoliosis: Posterior Spinal Fusion with Combined Anterior Vertebral Body Tethering	A. Samdani
10:31	Discussion	
10:37	Paper #47 Bilateral Anterior Lumbar Vertebral Body Tethering: A Feasibility Cohort Study	A. Samdani
10:41	Paper #48 Single-Row vs. Double-Row Anterior Vertebral Body Tethering: Which Offers Better Clinical and Radiographic Outcomes for AIS Patients?	J. Rodriguez Olaverri
10:45	Paper #49 Early Tether Rupture Compromises 3D Growth Modulation by Failing to Impede Convex Growth	C. Louer
10:49	Paper #50 Thoracic Anterior Vertebral Body Tethering for Adolescent Idiopathic Scoliosis: Long-Term Outcomes with Minimum 5-Year Follow-Up	T. Oh
10:53	Discussion	

11:00	Akbarnia Award Winner, Paper #51 Complications and Unplanned Return to the Operating Room (UPROR) at 5-Years Postoperative Vertebral Body Tethering for Idiopathic Scoliosis	Flavia Alberghina
11:05	Akbarnia Award Winner, Paper #52 Does Open Triradiate Cartilage Lead to Poor Outcomes Among Cerebral Palsy Patients Undergoing Spinal Fusion?	John S. Vorhies
11:10	Discussion and Akbarnia Award Presentation	R. El-Hawary, B. Akbarnia
11:18	Campbell Award Announcement	R. El-Hawary
11:23	Campbell Award Acceptance	Charles E. Johnston
11:30	PSF Presidential Address	P. Sponseller
11:41	ICEOS 2025	Y. Li
11:45	Keynote Introduction	R. El-Hawary
11:46	Keynote Address: Artificial Intelligence in the Evaluation and Treatment of Spine Deformity	Ferran Pellisé
12:10 pm	Q&A and Discussion	
12:16 pm	Lunch Served Outside of Workshop Space	Maricopa/Papago Hall

Lunch with Non-CME Workshops

12:25 pm	Workshop #4 Sponsored by Highridge Medical Optimal Applications of VBT and PSF for Treating AIS	Maricopa Room L. Blakemore, J. Brooks, A. Harihan, K. Illingworth
12:25 pm	Workshop #5 Sponsored by nView Medical From Routine to Complex Procedures...How We Use Technology to Make Surgeries Safe and Efficient	Papago I S. Luhmann, B. Ramo, D. Sucato
12:25 pm	Workshop #6 Sponsored by ATEC Advancing Early Onset Care: The Future of Treatment with ATEC & EOS	Papago II R. Lark, G. Mundis
1:15	Walking Break	

1:20–2:05 pm Concurrent Breakout Sessions

Breakout Three	The Role of Social Media in the Spine Surgeon’s Practice <i>Moderators: R. Fitzgerald, C. Louer</i> Faculty: J. Brooks, A. McIntosh, M. Welborn, J. Anari	Papago I
Breakout Four	Growth Guidance Surgery <i>Moderators: L. Blakemore, B. Snyder</i> Faculty: S. Luhmann, J. Ouellet, R. Castelein, L. Andras	Maricopa Room
Breakout Five	The Future of Pediatric Spine Deformity Education <i>Moderators: J. Flynn, R. Anderson</i> Faculty: D. Skaggs, S. Parent, M. Glotzbecker, W. Truong	Papago II
2:05 pm	Walking Break	

Session 8	Debates	Maricopa Room
	<i>Moderators: A. Samdani, D. Hoernschemeyer</i>	
	Debate #1 – 100 Years from Now – Casting for EOS	
2:10	2124 – We Will Still Be Casting for EOS	Y. Li
2:17	2124 – We Will Not Still Be Casting for EOS	M. Glotzbecker
2:24	Debate Rebuttals/Final Comments	
	Debate #2 – Vertebral Body Tethering	
2:28	VBT - We Have the Ability to Predict the Results of VBT	C. Aubin
2:35	VBT – It’s a Shot in the Dark	L. Andras
2:42	Debate Rebuttals/Final Comments	
	Debate #3 – 100 Years from Now – Spinal Fusion?	
2:46	2124 – We Will Still Be Performing Spinal Fusion Surgery	M. Vitale
2:53	2124 – We Will Not Still Be Performing Spinal Fusion Surgery	S. Parent
3:00	Debate Rebuttals/Final Comments	
	Debate #4 – Enabling Technologies	
3:04	Enabling Technologies Improve Intra-Operative Education	M. Erickson
3:11	Enabling Technologies Impede Intra-Operative Education	J. Gomez
3:18	Debate Rebuttals/Final Comments	
3:25	Closing Remarks	R. El-Hawary
3:30	18th Annual ICEOS Adjourns	