Contents

Section 1: General Topics

1. **Relevant Surgical Anatomy** 3
   Graham C Calvert, Michael J Beebe, Darrel S Brodke

2. **Clinical Biomechanics of the Spine: The Nuts and Bolts of Spinal Instrumentation** 21
   Fernando Techy, Edward C Benzel

3. **Bone and Intervertebral Disk Physiology** 40
   Shah-Nawaz M Dodwad, Sohrab S Virk, Safdar N Khan, Tom D Cha, Howard S An

4. **Preoperative Bone Health Assessment and the Potential use of Systemic Osteoporosis Drugs in Select Patients Undergoing Elective Spine Fusion Surgery** 53
   Kelly Krohn

5. **Inflammatory Diseases of the Spine** 63
   Yu-Po Lee

6. **Principles of Spine Trauma and Spinal Cord Injury** 76
   Melissa Nadeau, Brian K Kwon

7. **Principles of Spine Fusion** 97
   S Tim Yoon, Colin G Crosby

8. **Spinal Infections** 106
   Scott D Daffner, Vincent J Miele

9. **Intradural Spinal Tumors** 117
   Yonatan G Keschner, Daniel Lubelski, Gregory R Trost, Edward C Benzel

Section 2: Pediatric Spine

10. **Evaluation of Back Pain in Children** 135
    Hillard T Spencer, Anthony A Scaduto

11. **Congenital Scoliosis** 145
    Kaine C Onwuzulike

12. **Idiopathic Scoliosis** 158
    Richard E Bowen, Natalie L Leong

13. **Neuromuscular Scoliosis** 186
    David Gurd, Siddharth A Badve

14. **Juvenile Kyphosis (Scheuermann's Disease)** 214
Luiz Roberto Vialle, Emiliano Vialle, Orlando Colina

15. **Pediatric Trauma** 224
Theodore J Choma, Daniel G Hoernschemeyer, Sumit K Gupta

16. **Pediatric Spinal Column: Congenital Anomalies** 241
Juliann Kwak Lee, Mauricio Silva

17. **Spondylolysis and Spondylolisthesis** 253
Haariss Ilyas, Keith Bachmann, Joel Kolmodin, Siddharth A Badve, Ryan Goodwin

18. **Spinal Conditions Associated with Congenital Disorders** 279
Vikram Mehta, Daniel Lubelski, David T Anderson, Edward C Benzel

19. **Biologics used in Spine Surgery for Fusion** 302
Wellington K Hsu

20. **Imaging of the Spine: Types, Strengths and Limitations** 323
Todd M Emch, Michael T Modic

21. **Navigation and Robotics in Spine Surgery** 381
Xiaobang Hu, Christopher Bonsignore, Isador H Lieberma

22. **Evidence in Spinal Surgery** 392
Daniel K Resnick

Section 3: Cervical

23. **Cervical Spine: History and Physical Examination** 405
Marzena Buzanowska

24. **Spine Surgery: Current Concepts and Evidence Neck Pain** 411
Zachary L Gordon, James D Kang

25. **Spine Surgery: Current Concepts and Evidence Cervical Radiculopathy** 429
Abhishek Ray, Michael P Steinmetz

26. **Cervical Spondylotic Myelopathy** 455
Sean Barry, Michael G Fehlings

27. **Revision Cervical Spine Surgery** 471
Justin K Scheer, Jessica A Tang, Christopher P Ames, Robert A Hart

28. **Current Concepts and Evidence in Cervical Spinal Deformities** 486
Michael P Kelly, Adam L Wollowick, K Daniel Riew

29. **Cervical Tumors** 500
Mari L Groves, Ziya L Gokaslan, Jean Paul Wolinsky

30. **Trauma of the Cervical Spine** 526
George Rymarczuk, Geoffrey Stricsek, James S Harrop

Section 4: Thoracic

31. Thoracic Spine: History and Physical Examination 537
Alexandra Paraskos, Marzena Buzanowska, Michael P Steinmetz

32. Thoracic Radiculopathy and Myelopathy 541
Karthikeyan E Ponnusamy, Emmanuel Menga, A Jay Khanna

33. Classification and Management of Thoracic Spine Trauma 553
Sajeel R Khan, Ankit I Mehta

Section 5: Lumbosacral

34. Lumbosacral Spine: History and Physical Examination 565
Alexandra Paraskos, Marzena Buzanowska, Michael P Steinmetz

35. Low Back Pain Spine Surgery: Current Concepts and Evidence 573
David E Fish, Jason D Berk, Casey Fisher, Stephen Dechter

36. Lumbar Disk Herniation 594
Perry Dhaliwal, Ajit A Krishnaney

37. Spinal Stenosis 605
Sandeep N Gidvani, Michael D Daubs

38. Degenerative Spondylolisthesis 615
Gabriel Widi, Faiz Ahmad, Jason I Liounakos, Yi Lu, Michael Y Wang

39. Spine Surgery: Current Concepts and Evidence Isthmic Spondylolisthesis 628
Douglas Orr, Perry Dhaliwal

40. Spine Surgery: Current Concepts and Evidence Adult Scoliosis 641
Caglar Yilgor, Ahmet Alanay

41. Revision Lumbar Surgery 659
Michael J Lee, Jens R Chapman

42. Trauma of the Thoracolumbar Junction, Lumbar, and Sacral Spine 667
George Rymarczuk, Geoffrey Stricsek, Kevin Hines, James S Harrop

43. Thoracic, Lumbar, and Sacral Tumors 676
Paul E Kaloostian, Jean Paul Wolinsky, Ziya L Gokaslan

Section 6: Future Trends in Spine Surgery

44. Future of Spine Surgery 689
Shaleen Vira, Jacob Enders, Ghaith Habboub, Michael P Steinmetz, Edward C Benzel

Index 697