Contents

Section 1: General

1. **The 'Dilemma' of Modern Skull Base Surgery: Selecting the Correct Approach** **3**
   Nasser K Yaghi, Shaan M Raza
   - Historical Perspective *3*
   - Evolution of Modern Skull Base Techniques *3*
   - Understanding the Goals of Surgery *4*
   - Understanding the Extent of Skull Base Involvement *5*
   - QOL Expectations *5*

2. **Imaging of the Skull Base** **8**
   Mehmet E Adin, Ari M Blitz, Nafi Aygün
   - Imaging Techniques *8*
   - Anterior Skull Base *11*
   - Central Skull Base *18*

3. **Surgical Pathology of the Skull Base** **27**
   William Robert Bell, Fausto J Rodriguez
   - Specific Entities *27*

4. **Anesthetic Requirements and Pearls for Skull Base Surgery** **43**
   Jaymarc Iloreta, James Evans, Marc Rosen
   - Basic Pharmacology and Pharmacokinetics *43*

Section 2: Transorbital and Supraorbital Approaches

5. **Surgical Anatomy of the Orbit for Transorbital Approaches to Anterior Skull Base Lesions** **55**
   Jordina Rincon-Torroella, Ahmed Abd Elazim, Alfredo Quiñones-Hinojosa, Prem Subramanian
   - Review of the Orbital Anatomy and Surgical Correlation *56*
   - Patient Selection *58*
   - Indications for the Transorbital Approach *58*
   - Technical Aspects *58*
   - Postoperative Management *58*
   - Illustrative Case *59*

6. **Transorbital Approaches: Minimally Invasive Access to the Anterior Skull Base** **62**
   Holger G Gassner, Franziska Schwan, Karl-Michael Schebesch
   - Anatomy *62*
   - Technique *63*
   - Principles of Therapeutic Management *65*
   - Indications *66*
   - Clinical Studies/Literature Review *69*
   - Discussion *71*

7. **Transpalpebral Orbitofrontal Approaches to Intracranial Lesions** **73**
   Arnau Benet, Jordina Rincon-Torroella, Monirah Albathi, Prem Subramanian, Kofi Boahene, Alfredo Quiñones-Hinojosa
   - Indications *73*

- Preoperative Evaluation *74*
- Operative Technique *74*
- Postoperative Care *77*
- Illustrative Case *78*

8. Supraorbital Craniotomy Keyhole Technique **79**
Varun Puvanesarajah, Eric W Sankey, Sheng-fu Larry Lo, Jason A Liauw, Michael Lim
- Indications *79*
- Preoperative Evaluation *80*
- Technical Notes *80*
- Postoperative Management *83*
- Illustrative Case *83*

9. Endoscopic Decompression of the Orbital Apex **85**
Josef Shargorodsky, Andrew Lane
- Indications *85*
- Preoperative Evaluation *86*
- Technical Notes *86*
- Postoperative Management *87*
- Illustrative Case *87*

Section 3: Transnasal Approaches

10. Surgical Anatomy for Endoscopic Endonasal Skull Base Surgery **91**
Arnau Benet, Kofi Boahene
- EEA Modules to the Ventral Skull Base *97*

11. Transnasal Endoscopic Assisted Transcribriform Approach to Skull Base Lesions **98**
Thomas Kühnel
- Indications *98*
- Preoperative Evaluation *100*
- Technical Notes *100*
- Case Illustration *102*
- Management of Complications *103*
- Postoperative Management *104*
- Illustrative Cases *104*

12. Endoscopic Endonasal Transsphenoidal and Transplanum Approach **105**
Timothy R DeKlotz, Eric W Wang, Carl H Snyderman, Juan C Fernandez-Miranda, Paul A Gardner
- Indications *105*
- Preoperative Evaluation *105*
- Technical Notes *106*
- Postoperative Management *110*
- Illustrative Case *111*

13. Endoscopic Endonasal Transpterygoid Approaches **113**
Ali Jamshidi, Edward Kerr, Daniel M Prevedello, Bradley A Otto, Leo Ditzel Filho, Ricardo L Carrau
- Indications *113*
- Preoperative Evaluation *114*
- Surgical Technique *115*
- Postoperative Management *119*
- Illustrative Cases *120*

14. Transnasal Endoscopic Assisted Approach to the Mid-Cranial Base and Infratemporal Fossa **124**
Carl H Snyderman, Paul A Gardner, Eric W Wang , Juan C Fernandez-Miranda
- Indications *125*
- Preoperative Evaluation *126*
- Technical Notes *126*
- Postoperative Management *129*
- Illustrative Case *129*

15. Endoscopic Approaches to Lesions in the Cavernous Sinus **131**
Shaan M Raza, Theodore H Schwartz
- Anatomic Considerations *131*
- Considerations for Approach Selection *132*
- Endoscopic Transsphenoidal Approach to the Cavernous Sinus *132*
- Endoscopic Transpterygoidal Approach *133*
- Reconstruction *134*
- Vascular Considerations *135*
- Illustrative Cases *135*

16. Endoscopic Management of Petrous Apex Lesions **138**
Sergei Terterov, Jasvinder Nangiana, Garni Barkhoudarian, Isaac Yang
- Indications *138*
- Preoperative Evaluation *139*
- Technical Notes *139*
- Postoperative Management *140*

17. Transnasal Endoscopic Assisted Approach to the Clivus and Craniocervical Junction **143**
Eric W Wang, Paul A Gardner, Juan C Fernandez-Miranda, Carl H Snyderman
- Indications *144*
- Preoperative Evaluation *145*
- Technical Notes *145*
- Postoperative Management *150*
- Illustrative Case *150*

Section 4: Transoral Approaches

18. Endoscopic Assisted Transoral Approach to the Parapharyngeal Space **155**
Iacopo Dallan, Mario Turri-Zanoni, Paolo Battaglia, Veronica Seccia, Augusto Pietro Casani, Stefano Sellari-Franceschini
- Indication and Preoperative Evaluation *155*
- Technical Notes *156*
- Drawbacks and Possible Limitations *157*
- Review of Literature *158*
- Illustrative Case *160*

19. Endoscopic Assisted Paramandibular Approach to Infratemporal Fossa and Parapharyngeal Spaces **163**
Monirah Albathi, Kofi Boahene
- Indications *163*
- Preoperative Evaluation and Consideration *163*
- Technical Notes *165*
- Postoperative Management *169*
- Illustrative Case *169*

20. Evolution of Transoral Robotic-Assisted Approaches to the Skull Base 172
Jeremy D Richmon
- Evolution from Open to Robotic Techniques *172*
- Approaches to the Skull Base *173*
- Challenges and Future Directions *178*
- Illustrative Case *179*

Section 5: Management of Selected Skull Base Lesions

21. Endoscopic Transsphenoidal Approach to Pituitary Lesions 185
Peter Valentin Tomazic, Hannes Braun
- Special Anatomy of the Sphenoid Sinus and Sella *185*
- Indications *186*
- Preoperative Evaluation *186*
- Technical Notes *186*
- Postoperative Management *189*
- Illustrative Case *189*

22. Endoscopic Assisted Miniorbitofrontal Craniotomy in the Management of Frontal Sinus Inverting Papilloma 192
Gabriel F Santiago, Kofi Boahene, Murugappan Ramanathan Jr
- Patient Presentation and Clinical Evaluation *192*
- Surgical Management *193*
- Postoperative Management *194*
- Illustrative Case *194*

23. Transpalpebral Orbitocranial Approach to Olfactory Groove Meningiomas 197
Arnau Benet, Jordina Rincon-Torroella, Kofi Boahene, Monirah Albathi, Alfredo Quiñones-Hinojosa
- Indications *197*
- Preoperative Evaluation *198*
- Technical Notes *198*
- Postoperative Management *199*
- Illustrative Case *199*

24. Transpalpebral Orbitocranial Approach to Sellar and Suprasellar Pituitary Adenoma 203
Jordina Rincon-Torroella, Arnau Benet, Monirah Albathi, Prem Subramanian, Kofi Boahene, Alfredo Quiñones-Hinojosa
- Indications *203*
- Preoperative Evaluation *204*
- Technical Notes *204*
- Postoperative Management *205*
- Case Illustration *205*

25. Endoscopic Assisted Resection of Juvenile Nasal Angiofibroma 209
Marc Rosen, Jaymarc Iloreta, Alexander A Farag, James Evans
- Preoperative Evaluation *211*
- Treatment *214*
- Surgical Approaches *214*
- Postoperative Management/Complications *220*
- Morbidity *221*

26. Transnasal Endoscopic Assisted Management of Cerebrospinal Fluid Leak and Meningocele **223**
James Evans, Marc Otten, Mindy R Rabinowitz, Marc Rosen
- Preoperative Evaluation *225*
- Indications for Surgical Repair *228*
- Technical Notes *230*
- Postoperative Management *234*

27. Transorbital Endoscopic Assisted Management of Cerebrospinal Fluid Leak **237**
Ignacio Jusué-Torres, Kaisorn L Chaichana, Kofi Boahene, Alfredo Quiñones-Hinojosa
- Indications *238*
- Preoperative Evaluation *238*
- Technical Notes *238*
- Tips to Prevent Approach-Related Complications *239*
- Postoperative Management *240*
- Illustrative Case *240*

28. Endoscopic Management of Clival Chordoma **243**
Jasvinder Nangiana, Sergei Terterov, Garni Barkhoudarian, Isaac Yang
- Preoperative Evaluation *243*
- Technical Notes *243*
- Postoperative Evaluation *248*
- Clinical Studies *248*

29. Minicraniotomy Management of Superior Canal Dehiscence **250**
Matthew Miller, John Carey
- Presentation and Clinical Evaluation *250*
- Surgical Management *251*
- Surgical Technique *252*
- Postoperative Management *257*
- Outcomes *257*
- Illustrative Case *258*

Section 6: Skull Base Reconstruction and Postoperative Management

30. Skull Base Reconstruction **263**
Thomas S Lee, Andrew Johnson, Lenka Stankova, Yadranko Ducic
- Preoperative Evaluation and Indications *263*
- Treatment Algorithm *264*
- Endoscopic Skull Base Reconstruction *265*
- Microvascular Flap Reconstruction for Complex Skull Base Defects *279*
- Illustrative Case *286*

31. Management of Complications Associated with Endoscopic Assisted Skull Base Surgery **289**
Ignacio Jusué-Torres, Kaisorn L Chaichana, Kofi Boahene, Alfredo Quiñones-Hinojosa
- History and Advances in Endoscopic Approaches *289*
- Intracranial Complications *290*
- Endocrinologic Complications *292*
- Intranasal Complications *293*
- Intraorbital Complications *294*

Index *299*

Video Legends

Video 5.1: Supraorbital approach for resection of squamous cell carcinoma

Video 7.1: Transpalpebral orbitofrontal approach to suprasellar and other anterior cranial base lesions.

Video 11.1: Endonasal transcribiform resection of a recurrent meningioma.

Video 11.2: Endonasal repair of an encephalocele of the cribriform plate.

Video 11.3: Endonasal decompression and repair of traumatic optic neuropathy.

Video 15.1: Endonasal transpterygoid resection of a mass in the cavernous sinus.

Video 20.1: Robotic-assisted resection of a right parapharyngeal mass.