Section 1: Basic Considerations

1. Clinical Anatomy of Subaxial Cervical Spine ................................................................. 3
   R Selvan
   - Cervical Spine  3
   - Intervertebral Disc  4
   - Ligaments  4
   - Bony Cervical Spinal Canal  4
   - Spinal Cord  4
   - Nerve Roots  5
   - Vertebral Artery  5
   - Musculature  5
   - Mobility of the Cervical Spine  6
   - Movements in the Cervical Spine  6
   - Flexion/Extension  6
   - Lateral Bending  6
   - Anatomical Considerations of Unco-vertebral Joints  6

   Antonio Figueiredo
   - Important Root Lesions  8
   - Important Spinal Cord Lesion  8
   - MRC Classification  9

3. Clinical Biomechanics Related to Cervical Disc Degeneration and Herniation ............. 11
   Komal Prasad
   - Structural Degradation in the Intervertebral Disc  11
   - Stability  11
   - Segmental Instability  12
   - Ligaments  12
   - Facet Joints  13
   - Pars Interarticularis  14
   - Mobility and Stability  14
   - Effect of Settled Disc Space  15

4. Genetic Susceptibility of Cervical Disc Herniation ....................................................... 17
   SV Rege
   - Understanding of Pathogenesis  17
   - Hereditary Predisposition  17

5. Basic Knowledge of Screws and Plates Used in Anterior Cervical Stabilization Following Excision of Herniated Cervical Disc ................................................................. 19
   Brig Harinder S Bhatoe
   - Uses of Screws in Cervical Spine  19
   - Components of Screw  19
   - Types of Screws  19
   - Advantages  21
Surgical Management of Cervical Disc Herniation

- Indications 21
- Plates 21
- Screws 21
- Procedure 22
- Bicortical Purchase 23

Section 2: Applied Considerations

6. Safe Anterior Approach to Subaxial Cervical Spine ................................................................. 27
   PS Ramani, Sudhendoo Babhulkar
   • Operative Steps 30

7. Safe Posterior Approach to Subaxial Cervical Spine ............................................................... 38
   PS Ramani, Sumeet G Pawar
   • Advantages 38
   • Disadvantages 38
   • Basic Knowledge 38
   • Anesthesia 39
   • Position of the Patient 39
   • Exposure 40
   • Closure 40
   • Controversy 40
   • Complications 41
   • Mobilization 42

8. Technique of Harvesting Bone Grafts from the Anterior and Posterior Iliac Crest ..................... 43
   Yashbir Dewan, Sanjeev Dua
   • Anterior Iliac Crest 43
   • Posterior Iliac Crest 45

9. Evolution of Surgical Management of Cervical Disc Herniation ........................................... 48
   PD Kulkarni
   • Scientific Beginning 48
   • Modern Surgery 49
   • Robinson and Smith (1954) 49
   • RB Cloward (1958) 50
   • Mayfield’s Contribution 50
   • Discectomy without Fusion 51
   • Justification for Anterior Approach 51
   • Universal Support for Anterior Approach 51
   • Minimally Invasive Spinal Surgery (MISS) for Herniated Cervical Discs 52

Section 3: Surgical Techniques

10. Single Level Anterior Cervical Discectomy without Fusion: An Outcome Analysis .................. 57
    Abbas Amiri, Kourosh Karimi Yaran, Kazem Abbasioun
    • Variations in Surgical Technique 58
    • Long-term Outcome of Graftless Fusion 58
    • Different Variables Evaluated as the Outcome Measures 58
    • Outcome Evaluation by Imaging 61
    • Complications 62
    • Improvement and Recurrence 63
    • Comparison between ACD and Fusion Techniques 64
• Adjacent Segment Degeneration  68
• Complications and Morbidities  68

11. Long-term Outcome of Herniated Cervical Disc Excision without Fusion (ACD) ................................. 73
Prakash G Modha, Kartik S Modha
• Historical Background  73
• Advantages and Disadvantages  73
• Material and Methods  73
• Ideal Patients  74
• Surgical Technique  74
• Revision Surgery  75

12. Cervical Interbody Fusion with Bone Graft ............................................................................................. 78
Abdul Hafid Bajamal, Eko Agus Subagio, Muhammad Faris
• Indication for Surgery  78
• Advantages  78
• Preoperative Planning  78
• Positioning the Patient  79
• Surgical Procedure  79
• Graft Source  81
• Graft Donor Site Preparation  81
• Postoperative Care  82
• Complications  82

13. Use of Autograft for Interbody Fusion Following Anterior Cervical Discectomy .................................. 84
JKBC Parthiban
• Autologous Bone Graft and Spinal Fusion  84
• Alternate Choices  84
• Radiological Evaluation  85
• Comparison of Results of Auto- and Allografts in ACDF  86
• Complications of Donor Site  87
• Technique of Harvesting Tricortical Iliac Crest Graft  88
• Graft Placement  88

14. Advantages and Disadvantages of the Use of Plate for Anterior Cervical Fusion ................................. 91
Sushil V Patkar
• Evolution of Implants  91
• Technique of Anterior Cervical Plating  93
• Personal Series 1996-2010  94
• Literature Evidence  97

15. Surgical Outcome of Cervical Anterior Fusion Using Hybrid Cage ...................................................... 101
G Kusaka, M Shoda, H Kamochi, M Ishikawa, Y Tanaka, S Kuno, T Inoue
• Material and Methods  101
• Cervical Hybrid Cage System  101
• Experimental Evaluation  102
• Operative Technique  102
• Clinical Results and Discussion  102
• Complications  104

16. Long-term Outcome in Patients with Herniated Cervical Disc Treated with Anterior Cervical
  Discoidectomy and Fusion Using Dr Ramani’s Titanium Fuzer Cages .................................................... 106
Shradha Maheshwari, PS Ramani
• Fuzer Cages  106
• Surgical Technique  106
• Materials and Methods  107
• Results  107
Surgical Management of Cervical Disc Herniation

- Complications 108
- Advantages of Fuzer Cages 108

17. Use of Cage and Plate in the Management of Herniated Cervical Disc Prolapse: Its Advantages and Disadvantages
   Rahmi Kemal Koç
   - Anterior Approach in Cervical Degenerative Disc Diseases 112
   - Surgical Technique 112
   - Complications 118
   - Results 118

18. Median Corpectomy for Cervical Disc Disease
   K Sridhar
   - Indications 120
   - Imaging 121
   - Surgical Technique 121
   - Fusion 125
   - Stabilization 127
   - Closure 128
   - Functional Outcome 130
   - Personal Experience 130
   - Results 131

19. Role of Corpectomy in the Surgical Management of Cervical Disc Herniation
   Marcos Masini
   - Material and Methods 135
   - Corpectomy 136

20. Oblique Corpectomy in the Management of Cervical Disc Disease and Degeneration in the Cervical Spine
   Cumhur Kilincer, Mehmet Zileli
   - Description 140
   - History 140
   - Indications 141
   - Operative Technique 141
   - Problems/Pitfalls 143
   - Illustrative Cases 143
   - Results 143
   - Complications 143

21. Endoscopic Cervical Discectomy
   Shibayama Motohide, Ito Fujio, Miura Yasushi, Nakamura Shu, Ikeda Sigeji, Taguchi Mitsuto
   - Patients and Methods 148
   - Surgical Technique 148
   - Results 149
   - Illustrative Case 149

22. Anterior Endoscopic Assisted Microdecompression of Cervical Disc and Foramen
   John C Chiu, Ali M Mazid
   - Material 152
   - Method 153
   - Surgical Indications 153
   - Contraindications 153
   - Surgical Procedure 153
   - Postoperative Care 155
23. Endoscopic Cervical Discectomy with Laser or Radiofrequency ........................................................ 162  
   Enrique Osorio-Fonseca, Nicolas Prada, Juan Manuel Sierra  
   • Indications for Endoscopic Cervical Discectomy  162  
   • Contraindications  162  
   • Surgical Technique  163  
   • Postoperative Care  165  
   • Complications  168

24. Cervical Disc Arthroplasty ...................................................................................................................... 170  
   UM Mutter, F Porchet  
   • History  170  
   • Pathophysiology of Degenerative Disc Disease  171  
   • Indications  172  
   • Contraindications  172  
   • Surgical Considerations  173  
   • Technical Considerations  173  
   • Implants Available  173  
   • Surgical Technique  176  
   • Complications  177

25. Cervical Arthroplasty .............................................................................................................................. 181  
   Enrique Kleriga, Jesus C Bustamante, Gerardo F Zambito  
   • Description and History  181  
   • Anatomical and Biomechanical Concepts  183  
   • Indications for Arthroplasty  184  
   • Complications  184  
   • Surgical Technique  185  
   • Results  186

26. Cervical Total Disc Replacement with PCM® Device: Experience from 280 Levels in 162 Patients with up to Five Years Follow-up ................................................................................................................ 189  
   Luiz Pimenta, Leonardo Oliveira, Luis Marchi, Etevaldo Coutinho  
   • Material and Methods  189  
   • Surgical Technique  190  
   • Device Description  190  
   • Statistical Analysis  191  
   • Results  191  
   • Clinical Assessment  191

27. Management of Multiple Cervical Disc Prolapses ................................................................................ 197  
   Tin Fung David Sun, Wai Sang Poon  
   • Initial Management  197  
   • Indication for Operative Treatment  198  
   • Surgical Options  199  
   • Role of Percutaneous Neuroradiological Intervention  202  
   • Comparison between Different Approaches  203  
   • Selection of Treatment Option  203

28. Long-term Effect of Single Level Cervical Fusion on Development of Disc Disease in the Adjacent Levels ........................................................................................................................ 211  
   Abbas Amirjamshidi, Hooshang Saberi, Kazem Abbassioun  
   • Background  211  
   • Pathophysiology  211

29. Posterior Cervical Microdiscectomy ..................................................................................................... 218  
   PS Ramani, Sameer Parekh  
   • Surgical Technique  218
30. Posterior Cervical Microforaminotomy (Using Minimally Invasive Tube Retractors) ...................... 223
   Mehmet Zileli
   • Indications 223
   • Main Advantage of a Posterior Microforaminotomy 223
   • Disadvantage 223
   • Ideal Patient for Surgery 223
   • Operative Technique 223
   • Complications 225
   • Learning Curve 225
   • Outcome 225

31. Expansive Laminoplasty of the Cervical Spine (For Multilevel Cervical Disc Herniations) .......... 230
   Junichi Mizuno
   • Introduction 230
   • General Principles 230
   • Indications 230
   • Advantages 231
   • Pitfalls 231
   • Surgical Techniques 231
   • Postoperative Patients’ Care 232

32. Laminoplasty for Cervical Disc Herniations .................................................................................. 236
   Ben Roitberg, Adam G Back
   • History of Laminoplasty 236
   • Proposed Advantages of Laminoplasty 237
   • Laminoplasty for Cervical Disc Herniation 237
   • Typical Indications and Procedure 238
   • Contraindications and Limitations 239
   • General Surgical Considerations 239
   • Keeping the Door Open 240
   • Postoperative Management 241

33. Role of Ozone Therapy in Cervical Disc Herniation.................................................................... 246
   Marcos Masini, Rogério Safatle, João Flávio G Madureira
   • Ozone Therapy 246
   • Results 248

34. Long-term Results of Surgery for Cervical Disc Disease: Anterior vs Posterior Approaches ........... 254
   George J Dohrmann, Joseph C Hsieh
   • Anterior vs Posterior Approaches 254
   • Introduction 254
   • Patient Selection 254
   • Results 254

Index ..................................................................................................................................................................... 259