

# Contents

|          |                                                                                                                          |           |
|----------|--------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>1</b> | <b>Anatomy of the lumbar spine</b>                                                                                       | <b>4</b>  |
| 1.1      | Osseous structures . . . . .                                                                                             | 4         |
| 1.2      | Ligaments of the lumbar region . . . . .                                                                                 | 12        |
| 1.3      | Lumbar intervertebral disc (IVD) . . . . .                                                                               | 15        |
| 1.4      | Neural structures . . . . .                                                                                              | 20        |
| 1.5      | Blood supply of the lumbar spine . . . . .                                                                               | 22        |
| 1.6      | Neuromuscular control of the lumbar spine . . . . .                                                                      | 23        |
| 1.7      | Muscle distribution at the lumbar region . . . . .                                                                       | 24        |
| <b>2</b> | <b>Biomechanics of the lumbar spine and intervertebral disc</b>                                                          | <b>26</b> |
| 2.1      | Forms of the spinal column . . . . .                                                                                     | 26        |
| 2.2      | Disc biomechanics . . . . .                                                                                              | 27        |
| <b>3</b> | <b>Pathology of intervertebral disc (IVD) degeneration and herniation (pro-lapse)</b>                                    | <b>31</b> |
| 3.1      | Intervertebral disc degeneration . . . . .                                                                               | 31        |
| 3.2      | Pathogenesis of intervertebral disc (IVD) degeneration . . . . .                                                         | 32        |
| 3.3      | Pathology of lumbar disc herniation . . . . .                                                                            | 33        |
| 3.4      | Pathophysiology of disc herniation . . . . .                                                                             | 33        |
| 3.5      | Degenerative lumbar disc disease . . . . .                                                                               | 33        |
| 3.6      | Degenerative changes of the cartilagenous end-plate . . . . .                                                            | 36        |
| 3.7      | Bulging of the annulus fibrosus . . . . .                                                                                | 37        |
| 3.8      | Conventional classifications of lumbar disc lesions . . . . .                                                            | 37        |
| 3.9      | Pathophysiology of radicular pain<br>(Radiculopathy) . . . . .                                                           | 40        |
| <b>4</b> | <b>Epidemiology of low-back pain, sciatica and lumbar disc herniation (pro-lapse)</b>                                    | <b>43</b> |
| 4.1      | Prevalence . . . . .                                                                                                     | 43        |
| 4.2      | Risk factors for low back pain ,sciatica and lumbar disc herniation . . . . .                                            | 45        |
| <b>5</b> | <b>Diagnostic features of lumbar disc herniation (prolapse)<br/>(the clinical presentation of lumbar discs prolapse)</b> | <b>47</b> |
| 5.1      | Diagnostic criteria . . . . .                                                                                            | 47        |
| 5.2      | Clinical history . . . . .                                                                                               | 47        |
| 5.3      | Cardinal symptoms of a symptomatic disc herniation . . . . .                                                             | 48        |
| 5.4      | Physical examination and signs . . . . .                                                                                 | 49        |

|           |                                                                        |            |
|-----------|------------------------------------------------------------------------|------------|
| <b>6</b>  | <b>Investigations</b>                                                  | <b>56</b>  |
| 6.1       | Imaging studies . . . . .                                              | 56         |
| 6.2       | Plain radiography . . . . .                                            | 56         |
| 6.3       | Computed Tomography (CT) . . . . .                                     | 58         |
| 6.4       | Magnetic Resonance Imaging (MRI) . . . . .                             | 59         |
| 6.5       | Upright positional MRI of the lumbar spine . . . . .                   | 64         |
| 6.6       | Provocative discography . . . . .                                      | 69         |
| 6.7       | Neurophysiologic assessment . . . . .                                  | 71         |
| 6.8       | Urologic assessment . . . . .                                          | 71         |
| 6.9       | Laboratory tests . . . . .                                             | 72         |
| <b>7</b>  | <b>Differential diagnosis</b>                                          | <b>73</b>  |
| <b>8</b>  | <b>Treatment of lumbar disc herniation (prolapse)</b>                  | <b>76</b>  |
| 8.1       | Conservative treatment modalities . . . . .                            | 76         |
| 8.2       | Surgical management of lumbar disc herniations . . . . .               | 80         |
| <b>9</b>  | <b>Discectomies</b>                                                    | <b>83</b>  |
| 9.1       | Conventional discectomy . . . . .                                      | 83         |
| 9.2       | Minimally invasive surgical procedures (MIS) . . . . .                 | 86         |
| 9.3       | 1. Intradiscal procedures . . . . .                                    | 91         |
| 9.4       | 2- Microdiscectomy<br>(Microsurgical Discectomy) . . . . .             | 98         |
| 9.5       | 3-Endoscopic lumbar discetomy . . . . .                                | 108        |
| <b>10</b> | <b>Microendoscopic Lumbar Discectomy (MED)</b>                         | <b>116</b> |
| 10.1      | Introduction: . . . . .                                                | 116        |
| 10.2      | Goals and general idea of microendoscopic lumbar discectomy: . . . . . | 119        |
| 10.3      | Surgical technique of microendoscopic lumbar discectomy: . . . . .     | 119        |
| 10.4      | Advantages of MED: . . . . .                                           | 130        |
| 10.5      | Disadvantages and complications of MED: . . . . .                      | 131        |
| 10.6      | Results: . . . . .                                                     | 131        |
| 10.7      | Conclusions: . . . . .                                                 | 132        |