Contents

Contributors xiii
Preface xv
Acknowledgements xvii

1 The Dental Operating Microscope 1
Frank Setzer
1.1 Benefits of the Operating Microscope 1
1.2 Key Features of Operating Microscopes 1
1.3 Customizing a Microscope 3
1.3.1 Light Source 3
1.3.2 Documentation 5
1.3.3 Individual Microscope Adjustment (Parfocaling) 5
Suggested Readings 7

2 Microsurgical Instruments 9
SeungHo Baek and Syngcuk Kim
2.1 Examination Instruments 9
2.2 Incision and Elevation Instrument 9
2.3 Tissue Retraction Instruments 11
2.4 Osteotomy Instruments 14
2.5 Curettage Instruments 14
2.6 Inspection Instruments 15
2.7 Ultrasonic Units and Tips for Root End Preparation 17
2.8 Microplugger Instruments 20
2.9 Suturing Instruments 20
2.10 Miscellaneous Instruments 22

3 Medication-Related Osteonecrosis of the Jaw and Endodontic Microsurgery 25
Chafic Safi and Bekir Karabucak
Suggested Readings 29

4 Indications and Contraindications 31
Bekir Karabucak and Garrett Guess
4.1 Introduction 31
4.2 Surgical Success Dependent on Ability to Perform Ideal Protocols 31
4.3 Etiology Assessment through Examination and Treatment 31
4.4 Periodontal Considerations and Surgery 33
4.5 Influential Patient Factors 33
4.6 Condition of Previous Endodontic Treatment 37
Suggested Readings 38
Contents

5 Anesthesia and Hemostasis  39
Siva Rethnam-Haug, Aleksander Iofin, and Syngcuk Kim
5.1 Armamentarium  39
5.1.1 Epinephrine  39
5.2 Presurgical Phase  40
5.2.1 Administration of Local Anesthetic  40
5.2.2 Injection Techniques  40
5.2.3 Topical Anesthesia  41
5.2.4 Additional Techniques  41
5.2.5 Maxillary Anesthesia  41
5.2.6 Mandibular Anesthesia  43
5.2.7 Bilateral Mandibular Surgery  43
5.3 Surgical Phase  44
5.3.1 Topical Hemostatic Agents  44
5.3.1.1 Epinephrine Pellets  45
5.3.1.2 Ferric Sulfate  45
5.4 Summary of Hemostatic Techniques in Endodontic Microsurgery  46
5.5 Postsurgical Phase  46
Suggested Readings  48

6 Flap Design in Endodontic Microsurgery  49
Francesco Maggiore and Frank Setzer
6.1 Armamentarium  49
6.1.1 Flap Outline  49
6.1.2 Papilla Management  52
6.1.3 Incision  54
6.1.4 Flap Elevation  54
6.1.5 Flap Retraction  55
Suggested Readings  56

7 Osteotomy  57
Francesco Maggiore and Syngcuk Kim
7.1 Armamentarium  57
7.2 Osteotomy  57
7.2.1 Distinction between Bone and Root Tip  57
7.2.2 Clinical Situations for Endodontic Microsurgery  58
7.3 Intact Cortical Plate without a Radiographic Periapical Lesion  59
7.4 Intact Cortical Plate with a Periapical Lesion  60
7.5 Fenestration through the Cortical Plate Leading to the Apex  60
7.5.1 Optimal Osteotomy Size  61
7.5.2 Key Hole Osteotomy Modification  61
7.5.3 Bone Window Technique  61

8 Root End Resection  67
Spyros Floratos, Fouad Al-Malki, and Syngcuk Kim
8.1 Armamentarium  67
8.2 Root End Resection  67
8.3 Root End Resection: Steep Bevel versus Shallow Bevel  69
Suggested Readings  72

9 Inspection of the Resected Root Surface: Importance of Isthmus  73
Spyros Floratos, Jorge Vera, Fouad Al-Malki, and Syngcuk Kim
9.1 Armamentarium  73
9.1.1 Methylene Blue Staining (MBS)  73
9.1.2 Isthmus 77
9.1.3 Types of Isthmus 77
9.1.4 Incidence 77
9.1.5 Histological Findings of Isthmus 79
9.1.6 Clinical Significance and Management 81
Suggested Readings 82

10 Ultrasonic Root End Preparation 83
Spyros Floratos and Syngcuk Kim
10.1 Armamentarium 83
Suggested Readings 89

11 MTA and Bioceramic Root End Filling Materials 91
Sujung Shin, Ian Chen, Bekir Karabucak, Seung Ho Baek, and Syngcuk Kim
11.1 Mineral Trioxide Aggregate (MTA) 92
11.1.1 Advantages of MTA 92
11.1.1.1 Sealing Ability 92
11.1.1.2 Biocompatibility and Bioactivity 92
11.1.2 Drawbacks of MTA 93
11.2 Bioceramics 93
11.3 MTA and Bioceramic Application During Apicoectomy 95
11.4 Other Types of Cements for Root End Filling 96
11.4.1 Intermediate Restorative Material (IRM) 97
11.4.2 Super Ethoxybenzoic Acid (SuperEBA) 97
11.4.3 Geristore and Retroplast 98
11.4.4 New Types of Cements for Root End Filling 98
Suggested Readings 98

12 Flap Reposition and Suturing 101
Francesco Maggiore and Meetu Kohli
12.1 Suture Removal 101
Suggested Readings 111

13 Periapical Wound Healing 113
Ingrida Dapkute, Georges Bandelac, Chafic Safi, and Frank Setzer
13.1 Principles of Wound Healing 113
13.2 Healing after Apical Microsurgery 113
13.3 Incomplete Healing/Scar Formation 113
13.4 Evaluation of Healing after Apical Surgery 114
13.5 Healing Evaluation Using CBCT 115
Suggested Readings 118

14 Cone Beam Computed Tomography 119
Garrett Guess, Fouad Al-Malki, Meetu Kohli, Bekir Karabucak, and Samuel Kratchman
14.1 How CBCT Works 120
14.2 Indications and Clinical Applications 120
Suggested Readings 142

15 Mental Nerve Management 143
Paula Mendez-Montalvo, Fouad Al-Malki, and Syngcuk Kim
15.1 Armamentarium 143
15.1.1 Mental Foramen and Nerve 143
15.1.1.1 Location 143
15.1.1.2 Anterior Loop 143
15.1.1.3 Number of Mental Foramina 144
15.1.2 Mental Foramen Detection on Radiographs 144
15.1.2.1 Periapical Radiograph 144
15.1.2.2 Panoramic Films 145
15.1.2.3 Cone Beam Computed Tomography (CBCT) 145
15.1.3 Neurosensory Alteration 145
15.1.3.1 Surgical Technique to Avoid Iatrogenic Mental Nerve Trauma and Injury 146
15.1.4 Groove Technique Using Piezoelectric Surgery 146
Suggested Readings 150

16 Maxillary Posterior Surgery, the Sinus, and Managing Palatal Access 151
Garrett Guess and Samuel Kratchman
16.1 Maxillary Premolars 151
16.1.1 Access 151
16.1.2 Instrumentation 151
16.2 Sinus Exposure 151
16.3 Maxillary First Molars 153
16.3.1 Access 153
16.3.2 Palatal Approach 155
16.4 Second Molars 159
16.4.1 Periodontal Aspects 161
Suggested Readings 162

17 Surgical Root Perforation Repair 163
Raed Kasem, Samuel Kratchman, and Meetu Kohli
17.1 Possible Challenges to Non-surgical Perforation Repair 163
17.2 Factors that Enhance Positive Long-Term Prognosis for Perforation Repair 164
17.3 Surgical Perforation Repair Techniques 166
17.4 Surgical Treatment for External Root Resorption 168
Suggested Readings 177

18 Intentional Replantation 179
David Li and Samuel Kratchman
18.1 Armamentarium 179
18.1.1 Success Rate 179
18.1.2 Indications 179
18.1.3 Replantation or Apicoectomy 179
18.1.4 Extraction 182
18.1.5 Extraoral Phase 183
18.1.6 Storage Medium 183
18.1.7 Replantation 183
18.1.8 Splinting 185
18.1.9 Postop Instructions 186
18.1.10 Cone Beam CT Scan 186
18.1.11 Repairing Procedural Mishaps 186
Suggested Readings 191

19 Guided Tissue Regeneration in Endodontic Microsurgery 193
Garrett Guess and Samuel Kratchman
Suggested Readings 202

20 Implants versus Endodontic Microsurgery 205
Frank Setzer and Syngcuk Kim
20.1 Historical Perspective 205
20.2 Benefits of Implants 205