

Contents

Foreword xxv

Acknowledgements xxix

1 History of Orthodontics 1

- 1.1 Orthodontics before the Twenty-First Century 1
- 1.2 Standard Edgewise Appliance 2
- 1.3 Begg Appliance 4
- 1.4 Preadjusted Edgewise Appliance 5
- 1.5 Tip Edge Appliance 7
- 1.6 Self-ligating Appliance 7
- 1.7 Advantages and Disadvantages of all Types of Buccal Appliances 8
- 1.8 Lingual Appliances 9

2 Patient Assessment 11

- 2.1 The Three Planes of Space 11
- 2.2 Extra-Oral Assessment 11
 - 2.2.1 Antero-posterior Plane 12
 - 2.2.2 Vertical Plane 12
 - 2.2.3 Transverse Plane 13
 - 2.2.4 Profile Pattern 14
- 2.3 Intra-Oral Assessment 14
 - 2.3.1 Anterio-posterior Plane 14
 - 2.3.2 Vertical Plane 15
 - 2.3.3 Transverse Plane 15
 - 2.3.4 Crowding 15
 - 2.3.5 Spacing 16
 - 2.3.6 Path of Closure 16
 - 2.3.7 Teeth Present/Missing 16
 - 2.3.8 Habits 16
 - 2.3.9 PPP – Presence, Position, Pathology 17
 - 2.3.10 SSC – Size, Shape, Colour 17
 - 2.3.11 Temporal Mandibular Joint 17

3 Classification of Malocclusion 19

- 3.1 Angle's Classification 19
- 3.2 British Standards Institute Classification 20
- 3.3 Canine Relationship 21
- 3.4 Andrew's Six Keys 23

4 Aetiology of Malocclusion 25

- 4.1 Skeletal Factors 25
 - 4.1.1 Anteroposterior Plane (AP) 25
 - 4.1.2 Vertical Plane 25
 - 4.1.3 Transverse Plane 25
- 4.2 Soft Tissue Factors 26
 - 4.2.1 Fullness and Tone of the Lips 26
 - 4.2.2 Lip Competency 26
 - 4.2.3 Macroglossia (Large Tongue) 26
 - 4.2.4 Enlarged Adenoids 26
 - 4.2.5 Generalised Pathology of Muscles 27
- 4.3 Local Factors 27
 - 4.3.1 Variation in Tooth Number 27
 - 4.3.1.1 Hypodontia 27
 - 4.3.1.2 Supernumerary 27
 - 4.3.1.3 Early Loss of Deciduous Teeth 27
 - 4.3.1.4 Extraction of Permanent Tooth 27
 - 4.3.2 Variation in Tooth Size 28
 - 4.3.2.1 Macrodon 28
 - 4.3.2.2 Microdon 28
 - 4.3.2.3 Dento-alveolar Disproportion 28
 - 4.3.2.4 Bolton Discrepancy 28
 - 4.3.3 Variation in Tooth Position 28
 - 4.3.3.1 Infraocclusion (Ankylosis) 28
 - 4.3.3.2 Ectopic Tooth 29
 - 4.3.3.3 Impacted Teeth 29
 - 4.3.3.4 Transposition 29
 - 4.3.3.5 Primary Failure of Eruption 29
- 4.4 Habit 29
- 4.5 Fraenal Attachments 29
 - 4.5.1 Upper Labial Fraenum 29
 - 4.5.2 Lower Labial Fraenum 30

5 Class I Malocclusion 31

- 5.1 Definition 31
- 5.2 Prevalence 31
- 5.3 Aetiology of Class I 31
 - 5.3.1 Skeletal Factors 31
 - 5.3.2 Soft Tissue Factors 31
 - 5.3.3 Local Factors 32

- 5.4 Treatment of Class I 32
 - 5.4.1 No Treatment 32
 - 5.4.2 Removable Appliance 32
 - 5.4.3 Fixed Appliance 33
 - 5.4.4 Headgear 33
 - 5.4.5 Surgery 33

6 Class II Div I Malocclusion 35

- 6.1 Definition 35
- 6.2 Prevalence 35
- 6.3 Aetiology of Class II Div I 35
 - 6.3.1 Skeletal Factors 35
 - 6.3.2 Soft Tissue Factors 35
 - 6.3.3 Local Factors 36
 - 6.3.4 Habit 36
- 6.4 Treatment of a Class II Div I 36
 - 6.4.1 No Treatment 37
 - 6.4.2 Removable Appliance 37
 - 6.4.3 Functional Appliance 37
 - 6.4.4 Fixed Appliances 37
 - 6.4.5 Headgear 39
 - 6.4.6 Surgery 39

7 Class II Div II Malocclusion 41

- 7.1 Definition 41
- 7.2 Prevalence 41
- 7.3 Aetiology of Class II Div II 41
 - 7.3.1 Skeletal Factors 41
 - 7.3.2 Soft Tissue Factors 41
 - 7.3.3 Local Factors 42
- 7.4 Treatment of Class II Div II 42
 - 7.4.1 No Treatment 43
 - 7.4.2 Removable Appliance 43
 - 7.4.3 Functional Appliance 43
 - 7.4.4 Fixed Appliances 43
 - 7.4.5 Headgear 44
 - 7.4.6 Surgery 45

8 Class III Malocclusion 47

- 8.1 Definition 47
- 8.2 Prevalence 47
- 8.3 Aetiology of Class III 47
 - 8.3.1 Skeletal Factors 47
 - 8.3.2 Soft Tissue Factors 47
 - 8.3.3 Local Factors 48

- 8.4 Treatment 48
 - 8.4.1 No Treatment 48
 - 8.4.2 Removable Appliance 48
 - 8.4.3 Functional Appliances 49
 - 8.4.4 Fixed Appliances 49
 - 8.4.5 Headgear 50
 - 8.4.6 Surgery 51

9 Prevalences 53

10 Hypodontia 55

- 10.1 Definition 55
- 10.2 Commonly Missing Teeth 55
- 10.3 Prevalence of Hypodontia 55
- 10.4 Prevalence of Missing Teeth 55
- 10.5 Classifying Hypodontia 56
- 10.6 Classifying Missing Teeth as a Whole 56
- 10.7 Aetiology of Hypodontia 56
- 10.8 Medical Conditions Associated with Hypodontia 56
- 10.9 Factors Associated with Hypodontia 56
- 10.10 Treatment of Hypodontia in Deciduous Teeth 59
- 10.11 Treatment of Hypodontia in Permanent Teeth 59
- 10.12 Implant Space Required 61
- 10.13 Kesling Set-up 61

11 Supernumeraries 63

- 11.1 Definition 63
- 11.2 Prevalence of Supernumeraries 63
- 11.3 Aetiology of Supernumeraries 63
- 11.4 Types of Supernumeraries 63
- 11.5 Factors Caused by Supernumerary Teeth 63
- 11.6 Clinical Features of Supernumeraries 64
- 11.7 Medical Conditions Associated with Supernumeraries 64
- 11.8 Management of a Supernumerary 64
- 11.9 Types of Supernumeraries 64

12 Impacted Canines 69

- 12.1 Definition 69
- 12.2 Prevalence of Maxillary Canines 69
- 12.3 Prevalence of Congenitally Missing Upper and Lower Canines 69
- 12.4 Development of the Maxillary Canine 69
- 12.5 Eruption of Upper and Lower Canines 70
- 12.6 Aetiology of Impacted Canine 70
- 12.7 Clinical Signs of an Impacted Canine 70
- 12.8 Radiographic Signs of an Impacted Canine 70

- 12.9 Parallax Technique for Radiographic Assessment of a Canine's Position 71
 - 12.9.1 Horizontal Parallax 71
 - 12.9.2 Vertical Parallax 71
- 12.10 Management of Lingual/Palatal and Buccal Canines 71
 - 12.10.1 Lingual/Palatal Canines: Surgical Exposure 71
 - 12.10.2 Buccal Canines 73
 - 12.10.3 Surgical Removal 73
 - 12.10.4 Auto Transplantation 74
- 12.11 Dressings for Open Exposure 74
- 12.12 Risks of Impacted Canines 74
 - 12.12.1 Resorption 74
 - 12.12.2 Transposition 74
- 12.13 Position of Impacted Canines 74
- 12.14 Ankylosis 74

13 Impacted Teeth 77

- 13.1 Definition 77
- 13.2 Common Impacted Teeth 77
 - 13.2.1 Impacted Mandibular Canines 77
 - 13.2.2 Impacted Maxillary Central Incisors 77
 - 13.2.3 Impacted Premolars 78
 - 13.2.4 Impacted First Permanent Molars 78
 - 13.2.5 Impacted Third Permanent Molars 79

14 Deepbites 81

- 14.1 Definition 81
- 14.2 Classifying Overbites 81
- 14.3 Aetiology of a Deepbite 81
 - 14.3.1 Skeletal Factors 81
 - 14.3.2 Soft Tissue Factor 83
 - 14.3.3 Local Factor 83
- 14.4 Treating Deepbites 84
 - 14.4.1 Removable Appliance 84
 - 14.4.2 Functional Appliance 84
 - 14.4.3 Fixed Appliance 84
 - 14.4.4 Headgear 84
 - 14.4.5 Surgery 84
- 14.5 Stability of a Deepbite 85

15 Openbites: Anterior and Posterior 87

- 15.1 Definition of an AOB 87
- 15.2 Prevalence of AOBs 87
- 15.3 Classification of AOBs 87

- 15.4 Aetiology of an AOB 87
 - 15.4.1 Skeletal Factors 88
 - 15.4.2 Soft Tissue Factors 88
 - 15.4.3 Local Factor 89
 - 15.4.4 Habit 89
- 15.5 Treatment of an AOB 89
 - 15.5.1 Removable Appliance 89
 - 15.5.2 Fixed Appliances 89
 - 15.5.3 Headgear 90
 - 15.5.4 Surgery 90
- 15.6 Factors That May Make Stability of an AOB Poor 90
- 15.7 Definition of a POB 90
- 15.8 Facts about POBs 90
- 15.9 Aetiology of an POB 91
 - 15.9.1 Primary Failure of Eruption 91
 - 15.9.2 Arrest of Eruption 91
 - 15.9.3 Infraoccluded or Ankylosed Deciduous Teeth 91
 - 15.9.4 POBs Occurring from Twin Blocks 91
- 15.10 Treatment of POBs 92
 - 15.10.1 Fixed Appliances 92

16 Crossbites 93

- 16.1 Definition 93
- 16.2 Types of Crossbites 93
- 16.3 Prevalence of Crossbites 93
- 16.4 Crossbites That Can Occur 93
- 16.5 Aetiology of a Crossbite 94
 - 16.5.1 Skeletal Factors 94
 - 16.5.2 Soft Tissue Factor 95
 - 16.5.3 Local Factors 95
 - 16.5.4 Habit 95
- 16.6 Treatment of Crossbites 95
 - 16.6.1 Interceptive (Early) Treatment 95
 - 16.6.2 Removable Appliances 97
 - 16.6.3 Functional Appliances 97
 - 16.6.4 Fixed Appliances 97
 - 16.6.5 Headgear 98
 - 16.6.6 Surgery 98
- 16.7 Stability of a Crossbite 99

17 Centreline 101

- 17.1 Treatment Options 101
 - 17.1.1 Removable Appliance 101
 - 17.1.2 Functional Appliance 101
 - 17.1.3 Fixed Appliances 101
 - 17.1.4 Surgery 102

18 Overjets 103

- 18.1 Treatment Options 103
 - 18.1.1 Removable Appliance 103
 - 18.1.2 Functional Appliance 103
 - 18.1.3 Fixed Appliance 103
 - 18.1.4 Surgery 105

19 Bimaxillary Proclination 107

- 19.1 Definition 107
- 19.2 Aetiology 107
- 19.3 Relapse 107
- 19.4 Retention 107

20 Growth Rotations 109**21 Tooth Movement 111**

- 21.1 Biomechanics of Tooth Movement 111
 - 21.1.1 Centre of Resistance 111
 - 21.1.2 Force Moment 112
 - 21.1.3 Force Couple 113
 - 21.1.4 Force Couple and Moment 113
- 21.2 Types of Tooth Movement 114
 - 21.2.1 Tipping 114
 - 21.2.2 Bodily Movement 114
 - 21.2.3 Torque 115
 - 21.2.4 Rotation 115
 - 21.2.5 Extrusion 116
 - 21.2.6 Intrusion 116
- 21.3 Biology of Tooth Movement 116
 - 21.3.1 Facts of Tooth Movement 116
 - 21.3.2 Forces Applied to a Tooth 117
 - 21.3.3 Pressure/Tension Theory 117
 - 21.3.4 Cellular Responses 118
 - 21.3.5 Resorption 119
 - 21.3.6 Factors to Consider for Rate of Tooth Movement 120
 - 21.3.7 Compression and Tension Areas for Individual Tooth Movements 120

22 Impressions 123

- 22.1 Materials Used for Impression Taking 123
 - 22.1.1 Constituents of Alginate 124
 - 22.1.2 Advantages and Disadvantages of Alginate 124
 - 22.1.3 PVS 124
 - 22.1.4 Ideal Impression Material 125
- 22.2 Technique for Taking an Impression 125
- 22.3 Technique for Disinfecting an Impression 126

23 Study Models 127

- 23.1 Production of Study Models 127
- 23.2 What Are Study Models Used For? 127
- 23.3 Technique for Production of Study Models 128

24 Radiographs 129

- 24.1 When Are Radiographs Taken? 129
- 24.2 Types of Radiographs 129
- 24.3 Why Do We Take Radiographs? 129
- 24.4 Panoramic Radiographs 130
 - 24.4.1 What Is a DPT? 130
 - 24.4.2 Why Do We Take a DPT? 130
 - 24.4.3 How Does a DPT Help Us? 130
 - 24.4.4 When Do We Take a DPT? 131
 - 24.4.5 Locating the Position of Impacted Canines on a DPT 131
- 24.5 Upper Standard Occlusal (USO) 131
 - 24.5.1 What Is a USO? 131
 - 24.5.2 Why Do We Take a USO? 131
 - 24.5.3 How Does a USO Help Us? 131
 - 24.5.4 When Do We Take a USO? 132
- 24.6 Parallax Technique 132
 - 24.6.1 Assessing the Position of the Canine 132
 - 24.6.2 Horizontal Parallax 133
 - 24.6.3 Vertical Parallax 133
- 24.7 Periapical Radiographs 133
- 24.8 Reasons for Taking Radiographs 133
- 24.9 Clinical Justification for Taking Radiographs 134
 - 24.9.1 Ionising Radiation Regulations 134
 - 24.9.2 Ionising Radiation Medical Exposure Regulations 134
- 24.10 General Principles of Radiation 135

25 Cephalometrics 137

- 25.1 The Cephalostat 137
- 25.2 Why Do We Take Cephalometrics? 137
- 25.3 When Do We Take a Cephalometric Radiograph? 138
- 25.4 Evaluating a Cephalometric Radiograph 138
 - 25.4.1 Hand Tracing 138
 - 25.4.2 Digitising 139
 - 25.4.3 Cephalometric Tracing Technique 139
 - 25.4.3.1 Draw a Soft Tissue Outline 139
 - 25.4.3.2 Cephalometric Points 139
 - 25.4.3.3 Cephalometric Planes and Lines 140
 - 25.4.3.4 Measuring Angles 140
- 25.5 Eastman Analysis 142
- 25.6 ANB Angle 143

25.7 Wits Analysis and Ballard Conversion 143

25.7.1 Wits Analysis 143

25.7.2 Ballard Conversion 144

25.8 Vertical Skeletal Pattern 145

25.9 Angulation of the Incisors 145

25.10 Prognosis Tracing 146

25.11 A-Pogonion Line (Apog) 146

25.12 Cephalometric Errors 146

26 Removable Appliances 149

26.1 Indications 149

26.2 Components 149

26.3 Active Components 150

26.3.1 Springs 150

26.3.1.1 Equation for Springs 152

26.3.2 Screws 152

26.3.3 Active Bows 153

26.3.4 Elastics 154

26.3.5 Headgear 155

26.4 Retentive Components 156

26.5 Anchorage 159

26.6 Baseplate 159

26.7 Advantages and Disadvantages of Removable Appliances 162

26.8 Stages of Removable Appliances 162

26.9 Instruments Used on a Removable Appliance 163

26.10 Fitting of a Removable Appliance 163

27 Functional Appliances 165

27.1 Timing of Treatment 165

27.2 Malocclusion Types 165

27.2.1 Class II Div I 165

27.2.2 Class II Div II 166

27.2.3 Class III 166

27.3 The End Point 166

27.4 Ten Key Points of Functional Appliances 167

27.5 Indications for Treatment 167

27.6 Mode of Action 167

27.7 Advantages and Disadvantages of Functionals 168

27.8 Types of Functional Appliances 168

27.8.1 Clark's Twin Block 168

27.8.1.1 How Does It Work? 168

27.8.1.2 Effects of Clark's Twin Blocks 169

27.8.1.3 Advantages 170

27.8.1.4 Disadvantages 170

- 27.8.2 Herbst Appliance 171
 - 27.8.2.1 How Does It Work? 171
 - 27.8.2.2 Advantages 171
 - 27.8.2.3 Disadvantages 171
- 27.8.3 Medium Opening Activator 172
 - 27.8.3.1 How Does It Work? 172
 - 27.8.3.2 Advantages 173
 - 27.8.3.3 Disadvantages 173
- 27.8.4 Bionator Appliance 173
 - 27.8.4.1 How Does It Work? 173
 - 27.8.4.2 Advantages 174
 - 27.8.4.3 Disadvantages 174
- 27.8.5 Frankel Appliance 174
 - 27.8.5.1 How Does It Work? 174
 - 27.8.5.2 Advantages 175
 - 27.8.5.3 Disadvantages 175
- 27.8.6 Clip-on Fixed Functional Appliance 175
 - 27.8.6.1 How Does It Work? 175
 - 27.8.6.2 Advantages 176
 - 27.8.6.3 Disadvantages 176
- 27.9 Designing a Functional Appliance 176
- 27.10 Appointments 176
 - 27.10.1 Records Appointment 176
 - 27.10.2 Fit and Instructions Appointment 176
 - 27.10.3 Review Appointments 177
- 28 Fixed Appliances 179**
 - 28.1 Definition 179
 - 28.2 Indications for Fixed Appliances 179
 - 28.3 Advantages and Disadvantages 179
 - 28.4 Tooth Movement Achieved with Fixed Appliances 180
 - 28.5 Mode of Action 180
 - 28.6 Components of Fixed Appliances 181
 - 28.6.1 Bands 181
 - 28.6.1.1 What Are Bands? 181
 - 28.6.1.2 Where Are Bands Used? 181
 - 28.6.1.3 When Can Bands Be Used? 181
 - 28.6.1.4 Why Are Bands Used? 181
 - 28.6.1.5 How Are Bands Placed/Bonded? 182
 - 28.6.1.6 Advantages of Bands 182
 - 28.6.1.7 Disadvantages of Bands 182
 - 28.6.1.8 Cementing Bands 182
 - 28.6.1.9 Failure Rate of Bands 183
 - 28.6.2 Brackets 183
 - 28.6.2.1 What Is a Bracket? 183
 - 28.6.2.2 Where Are Brackets Used? 183
 - 28.6.2.3 When Are Brackets Used? 183

28.6.2.4	Types of Bracket	183
28.6.2.5	Bracket Materials	185
28.6.2.6	Aesthetic Brackets	185
28.6.2.7	Bracket Manufacturing	186
28.6.2.8	Bonding Brackets	186
28.6.2.9	Bracket Orientation	186
28.6.2.10	Bracket Rules	187
28.6.3	Archwires	187
28.6.3.1	What Are Archwires?	187
28.6.3.2	What Are Archwires Used For?	188
28.6.3.3	What Are Archwires Used?	188
28.6.3.4	Archwire Properties	188
28.6.3.5	Archwire Materials	189
28.6.3.6	Archwire Archforms	191
28.6.3.7	Archwire Shapes and Sizes	192
28.6.3.8	Degree of Slop	193
28.6.3.9	Archwire Sequence	193
28.6.4	Auxiliaries	196
28.6.5	What Are Auxiliaries?	196
28.6.6	When Do We Use Auxiliaries?	206
28.6.7	Placing Auxiliaries	206
29	Headgear	207
29.1	Definition	207
29.2	Extra-Oral Anchorage	207
29.3	Extra-Oral Traction	207
29.4	Biomechanics of Headgear	208
29.5	Types of Headgear	208
29.6	Components of Headgear	210
29.7	Headgear Injuries and Preventative Measures	211
29.8	Reverse Headgear	213
29.9	Assessment of Wear	213
29.10	Measuring Force	214
30	Instructions for all Appliances	215
30.1	Removable Appliances	215
30.2	Functional Appliances	215
30.3	Fixed Appliances	216
30.4	Cleaning Instructions for the Patient	216
30.5	Headgear	217
30.6	Retainers	217
30.7	Bonded Retainers	218
31	Uncommon Removable Appliances	219
31.1	Nudger Appliance	219
31.2	En Masse Appliance	220

31.3 ACCO Appliance 220

31.4 ELSAA 220

32 Anchorage 221

32.1 Intra-oral Anchorage 221

32.1.1 Simple Anchorage 221

32.1.2 Compound Anchorage 221

32.1.3 Stationary Anchorage 222

32.1.4 Reciprocal Anchorage 222

32.2 Extra-Oral Anchorage 223

32.3 What Does Anchorage Depend On? 223

32.4 Reinforcing Anchorage 224

32.5 Sources of Anchorage 227

32.6 Anchorage Loss 227

33 Index of Orthodontic Treatment Need (IOTN) 229

33.1 Dental Health Component 229

33.1.1 Grade 5 230

33.1.2 Grade 4 230

33.1.3 Grade 3 230

33.1.4 Grade 2 231

33.1.5 Grade 1 231

33.1.6 RCP and ICP 231

33.2 Aesthetic Component 231

34 Peer Assessment Rating (PAR) 233

34.1 Components of PAR 233

34.1.1 Upper and Lower Anterior Segments 233

34.1.2 Right and Left Buccal Segments 234

34.1.3 Overjet and Reversed Overjet 236

34.1.4 Overbite and Openbite 236

34.1.5 Centreline 237

34.2 Assessment of Improvement in PAR 237

34.3 Who Uses PAR? 237

35 Space Analysis 239

35.1 Crowding 239

35.2 Incisor Antero-posterior Change 240

35.3 Levelling Occlusal Curves 240

35.4 Arch Expansion 241

35.5 Creating Space 241

35.5.1 Extractions 241

35.5.1.1 Incisors 241

35.5.1.2 Canines 242

35.5.1.3 First Premolars 242

35.5.1.4 Second Premolars 242

35.5.1.5 First Permanent Molars 242

35.5.1.6	Second Permanent Molars	242
35.5.1.7	Third Permanent Molars	242
35.5.2	Distal Movement of Molars	242
35.5.3	Enamel Stripping	242
35.5.3.1	Interproximal Reduction	242
35.5.3.2	Air-Rotor Stripping	243
35.5.4	Expansion	243
35.5.5	Proclination of Incisors	243
36	Cleft Lip and Palate	245
36.1	Prevalence of Cleft Lip With or Without Cleft Palate	245
36.2	Prevalence of Isolated Cleft Palate	245
36.3	Syndromes Associated with Isolated Cleft Palate	245
36.4	Aetiology	246
36.5	Development of CLP	246
36.6	Classifications of CLP	246
36.7	Clinical Problems in CLP	247
36.8	CLP Team	248
36.9	Management of CLP	248
36.10	Orthodontic Implications of CLP	248
37	Orthognathic Surgery	251
37.1	Definitions	251
37.2	Indications for Treatment	251
37.3	Radiographs	251
37.4	Surgical Procedures	252
37.4.1	Maxillary Procedures	252
37.4.1.1	Segmental Procedures	252
37.4.1.2	Le Fort I	252
37.4.1.3	Le Fort II	253
37.4.1.4	Le Fort III	253
37.4.1.5	Surgical Assisted Rapid Palatal Expansion	253
37.4.2	Mandibular Procedures	254
37.4.2.1	Segmental Procedures	254
37.4.2.2	Vertical Subsigmoid Osteotomy	254
37.4.2.3	Bilateral Sagittal Split Osteotomy	254
37.4.2.4	Body Osteotomy	255
37.4.2.5	Genioplasty	256
37.4.2.6	Post-Condylar Cartilage Graft	256
37.4.3	Bimaxillary Surgery	256
37.4.4	Distraction Osteogenesis	256
37.5	Sequence of Treatment	257
37.5.1	Extractions	257
37.5.2	Pre-surgical Orthodontics	257
37.5.3	Surgery	257
37.5.4	Post-surgical Orthodontics	258
37.6	Risks and Benefits	258

38 Retention and Stability 259

- 38.1 Definitions 259
- 38.2 Aetiology of Relapse 259
 - 38.2.1 Gingival and Periodontal Fibres 259
 - 38.2.2 Occlusal Factors 260
 - 38.2.3 Soft Tissue Factors 260
 - 38.2.4 Growth Factors 261
- 38.3 How Common Is Relapse? 261
- 38.4 Informed Consent for Retention 262
- 38.5 Retainers 262
 - 38.5.1 Removable Retainers 262
 - 38.5.2 Fixed Retainers 262
- 38.6 Removable Retainers 263
 - 38.6.1 Hawley Retainer 263
 - 38.6.2 Vacuum-Formed Retainer 264
 - 38.6.3 Begg Retainer 265
 - 38.6.4 Barrier Retainer 265
- 38.7 Fixed Retainers 265
- 38.8 Care of Removable and Fixed Retainers 268
- 38.9 Enhancing Stability 268
- 38.10 Types of Tooth Movement to Be Retained 269
- 38.11 General Advice on Retention 269
- 38.12 Five Key Points 269
- 38.13 Outcome and Follow-Up After Debonding 269

39 Interceptive Treatment 271

- 39.1 Definition 271
- 39.2 Clinical Interceptive Situations: Early Mixed Dentition 271
 - 39.2.1 Increased Overjet 271
 - 39.2.2 Supernumerary Teeth 271
 - 39.2.3 Early Loss of Deciduous Teeth: Space Maintenance 271
 - 39.2.3.1 Removable Appliance 272
 - 39.2.3.2 Partial Denture (Pontic) 272
 - 39.2.3.3 Band and Loop 273
 - 39.2.3.4 Distal Shoe 274
 - 39.2.3.5 Lingual Arch 274
 - 39.2.3.6 Transpalatal Arch (TPA) with Nance Button 275
 - 39.2.3.7 TPA 276
 - 39.2.4 Delayed Eruption of Maxillary Central Incisor 276
 - 39.2.5 Impaction of First Permanent Molars 277
 - 39.2.6 Anterior Crossbite 277
 - 39.2.7 Posterior Crossbite 277
 - 39.2.8 Severe Crowding 278
 - 39.2.9 Digit Sucking Habits 278
- 39.3 Clinical Situations: Late Mixed Dentition 278
 - 39.3.1 Infraocclusion 278
 - 39.3.2 Ectopic Maxillary Canines 279

39.3.3	Hypodontia	279
39.3.4	Traumatic Overbites	279
39.3.5	Increased Overjet	279
39.3.6	Poor-Quality First Permanent Molars	280
39.4	Clinical Situations: Early Permanent Dentition	280
39.4.1	Hypodontia	280
39.4.2	Crowding	280
39.4.3	Impacted Teeth	280
39.5	Serial Extractions	280
40	Adult Orthodontics	283
40.1	Reasons for Adult Orthodontics	283
40.2	Differences in Treating Adult Patients	283
40.3	Aesthetic Appliances	284
41	Orthodontic Materials	287
41.1	Etch	287
41.1.1	Using Etch	287
41.1.2	Acid Etch Technique (37% Phosphoric Acid)	288
41.1.3	Self-Etch Primer	288
41.2	Adhesives	290
41.2.1	Composites	290
41.2.2	Cements	291
41.2.3	Adhesive Pre-coated (APC) Brackets	292
41.3	Bonding onto Fillings, Crowns, and Veneers	292
41.3.1	Amalgam Fillings and Crowns	292
41.3.2	Porcelain Fillings/Crowns	292
42	Archwire Ligation	293
42.1	Definition of Archwire Ligation	293
42.2	Properties of an Ideal Ligation System	293
42.3	Methods of Ligation	293
42.3.1	Stainless-Steel Ligatures	293
42.3.2	Elastomeric Modules	294
43	Risks and Benefits of Orthodontic Treatment	295
43.1	Risks of Orthodontic Treatment	295
43.1.1	Extra-oral Risks	295
43.1.2	Intra-oral Risks	295
43.1.3	General Risks	296
43.2	Benefits of Orthodontic Treatment	296
43.2.1	Psychological Benefits	296
43.2.2	Dental Health Benefits	296
43.2.3	Functional Benefits	297
44	Oral Hygiene	299
44.1	Oral Hygiene: Pre-treatment	299
44.2	Clinical Features for Good and Bad Oral Hygiene	299

44.3	Procedure with Patients Presenting with Bad Oral Hygiene	301
44.4	Procedure with Patients Who Have Improvement in Oral Hygiene	301
44.5	Oral Hygiene Advice Given at the Fit Appointment	301
44.6	Preventing Decalcification	302
44.7	Oral Hygiene Instructions for Appliances	302
44.7.1	Removable Appliance	302
44.7.2	Functional Appliance	302
44.7.3	Fixed Appliance	303
45	Decalcification	305
45.1	Causes of Decalcification	305
45.2	Occurrence of Decalcification	305
45.3	Preventing Decalcification	306
45.4	Treating Decalcification	306
46	Fluorosis	307
46.1	How Can Fluorosis Occur?	307
46.2	Products That Can Cause Fluorosis	307
46.3	Treating Fluorosis	308
46.4	Preventing Fluorosis	308
47	Fluoride	309
47.1	Effects of Fluoride	309
47.2	Toothpaste Ingredients	309
47.3	Dental Products	309
47.4	Fluoride Application	310
47.5	Risks of Fluoride	310
47.6	Other Causes and Conditions Which Can Affect Enamel Development	310
48	Hypoplastic Enamel	311
48.1	Aetiology of Enamel Hypoplasia	312
49	Hyperplastic Enamel	313
49.1	Aetiology of Enamel Hyperplasia	313
50	General Dental Council (GDC)	315
50.1	Roles of the GDC	315
50.2	GDC Principles	316
50.3	Continuing Professional Development	317
50.4	GDC Register	319
50.5	Professional Conduct Committee	319
50.6	Scope of Practice	320
50.6.1	What Orthodontic Therapists Can Do	320
50.6.2	What Orthodontic Therapists Cannot Do	322

50.7	Equality and Diversity	323
50.7.1	Nine Protected Characteristics	323
50.7.2	Types of Discrimination	323
50.7.3	Strategic Objectives for Equality, Diversity, and Inclusion	324
51	Sharps Injury	325
51.1	Measures to Take Following a Sharps Injury	325
51.2	Investigation of Donor and Recipient	326
52	Health and Safety	327
52.1	Employer's Duty	327
52.2	Employee's Duty	327
52.3	Policies Within the Dental Practice	328
52.4	Clinical Environment	328
53	Control of Substances Hazardous to Health (COSHH)	329
54	Reporting of Injuries, Diseases and Dangerous Occurrences (RIDDOR)	331
55	Consent	333
55.1	Types of Consent	333
55.1.1	Implied Consent	333
55.1.1.1	When?	333
55.1.1.2	How?	333
55.1.2	Expressed Consent	334
55.1.2.1	When?	334
55.1.2.2	How?	334
55.1.3	Informed Consent	334
55.1.3.1	When?	334
55.1.3.2	How?	334
55.2	Why Do We Obtain Consent?	335
55.3	When Do We Obtain Consent?	335
55.4	Who Can Give Consent?	335
55.5	How Can Consent Be Obtained?	336
56	Pain and Anxiety Control	337
56.1	Pain Control	337
56.2	Anxiety Control	338
56.2.1	Role of the Orthodontic Therapist in Anxiety Control	338
56.2.2	Bond-up Appointment	338
56.2.3	Adjustment Appointments	339
57	Emergency Care	341
57.1	Clinical Problems	341
57.1.1	Removable Appliances	341
57.1.2	Functional Appliances	342

57.1.3	Fixed Appliances	342
57.1.3.1	Wires	342
57.1.3.2	Bands	343
57.1.3.3	Allergies	343
57.1.3.4	Nance, Quadhelix, and Transpalatal Arch	343
57.1.3.5	Teeth	343
57.1.3.6	Trauma	344
57.1.3.7	Headgear	345
57.1.3.8	Bonded Retainers	345
58	Orthodontic Instruments	347
58.1	Adams Spring-Forming Pliers	347
58.2	Adams Universal Pliers	347
58.3	Weingart Pliers	347
58.4	Bird Beak Pliers	347
58.5	Distal End Cutters	349
58.6	Ligature Cutter	349
58.7	Posterior Band-Removing Pliers	350
58.8	Band Pusher	350
58.9	Band Seater	350
58.10	Reverse-Action Bonding Tweezers	351
58.11	Torquing Turret	351
58.12	Bracket-Removing Pliers	352
58.13	Nylon Bracket-Removing Pliers	352
58.14	Angled Bracket-Removing Pliers	353
58.15	Dividers	353
58.16	Boon Gauge	354
58.17	Micro Etcher	354
58.18	Flat Plastic	354
58.19	Tweed Loop-Forming Pliers	355
58.20	Mosquitoes	355
58.21	Mathieu Needle Holders	355
58.22	Mauns Heavy-Duty Wire Cutters	356
58.23	Mitchell's Trimmer	356
58.24	Separating Pliers	356
58.25	Cheek Retractors	356
58.26	Stainless-Steel Ruler	357
58.27	Triple-Beak Pliers	357
58.28	Tweeds Straight (Torquing) Pliers	357
58.29	Tucker	359
58.30	Photographic Cheek Retractors	359
58.31	Photo Mirrors	359
58.32	Slow Handpiece	360
58.33	Debond Burs	360
58.34	Moore's Mandrel	361
58.35	Acrylic Bur	362

59	Medical Emergencies	363
59.1	Common Medical Emergencies in the Dental Practice	363
59.2	Choking Patients	363
59.2.1	Adults	363
59.2.2	Children	368
59.2.3	Babies	368
59.3	Cardiac Arrest Patients	369
59.3.1	Adults	369
59.3.2	Children	369
59.3.3	Babies up to 1 Year Old	369
59.3.4	Pregnant Women	370
60	Eruption Dates	371
60.1	Deciduous Teeth	371
61	Extraction Patterns	373
61.1	Class I Cases	373
61.2	Class II Cases	373
61.3	Class III Cases	374
61.4	Balancing and Compensating Extractions	374
62	Tooth Fusion and Gemination	375
62.1	Treatment	376
63	Extra Notes	377
64	Definitions	381
	Index	385

