Contents

1. Radiation Physics

Definitions 1 History of Dental Radiology 1 Radiation Physics 2 lonization 3 Electromagnetic Radiation 4 X-ray Machine 6 Production of X-rays 11 Properties of X-Rays 12 Factors Controlling X-ray Beam 14 X-Ray Interactions with Matter 16 Dosimetry 18 Units of Measurement 21

2. Radiation Biology

Biological Effects and Risks Associated with X-rays 22 Changes in Biologic Molecules 23 Radiation Effects at the Cellular Level 23 Radiation Effects at the Tissue and Organ Level 24 Modifying Factors for Radiation Injury 26 Radiation Effects on the Oral Cavity 26 Biologic Effects of Whole Body Irradiation 31 Prevention and Management of Radiation Side Effects 33

3. Radiation Safety and Protection Radiation Protection to the Patient 39

Radiation Protection to the Operator 46 Radiation Protection to the Public 49 1

22

39

xiv A Short Textbook of Oral Radiology

| 4. | Quality Assurance in Dental Radiography | 50 |
|----|--|-----|
| | Quality Control Tests 50 | |
| | Dental X-ray Machines 51 | |
| | Dental X-ray Film 54 | |
| | Screens and Cassettes 54 | |
| | Viewing Equipment 54 | |
| | Film Processing 55 | |
| | Developer Strength 57 | |
| | Fixer Strength 58 | |
| 5. | X-ray Films and Techniques | 61 |
| | Intraoral Radiography 62 | |
| | Intraoral Radiographic Techniques 69 | |
| | Object Localization or Clark's Technique 75 | |
| | Bitewing Radiography 76 | |
| | Occlusal Radiography 77 | |
| 6. | X-ray Film Processing | 82 |
| | Developer Solution 84 | |
| | Fixing Solution 85 | |
| | Faulty Radiographs 87 | |
| 7. | Normal Radiographic Anatomy | 96 |
| | Radiolucent Landmarks of Maxilla 96 | |
| | Radiopaque Landmarks of Maxilla 100 | |
| | Radiolucent Landmarks of Mandible 106 | |
| | Radiopaque Landmarks of Mandible 110 | |
| 8. | Extraoral Radiography | 115 |
| | Extraoral X-ray Film or Screen Film (Indirect Exposure Film) 115 | |
| | Intensifying Screens 116 | |
| | | |

Contents XV

| | Grids 117 Extraoral Radiographic Techniques 120 Skull Projections 121 Mandibular Oblique Lateral Projections 128 Temporomandibular Joint Projections 130 | |
|-----|--|-----|
| 9. | Panoramic Radiography | 137 |
| | Principles of Panoramic Radiography 138 | |
| | Faults in Patient Positioning 142 | |
| 10. | Specialized Radiographic Techniques | 145 |
| | Types 145 | |
| | Conventional Tomography 145 | |
| | Stereoscopy 146 | |
| | Scanography 147 | |
| | Digital Imaging 147 | |
| | Computed Tomography 150 | |
| | Magnetic Resonance Imaging 150 | |
| | Nuclear Medicine or Radionuclide Imaging or Scintigraphy 151 | |
| | Ultrasonography or Sonography 152 | |
| | Electronic Thermography 153 | |
| | Arthrography 153 | |
| | Xeroradiography 153 | |
| | Sialography 154 | |
| | Cone Beam Computed Tomography 158 | |
| 11. | Infection Control in Radiography | 162 |
| | Sources of Infection 162 | |
| | Infection Control Procedures | |
| | Employed Before Exposure 163 | |

Infection Control Procedures Used During Exposure 167

| xvi | A Short Textbook of Oral Radiology |
|-----|------------------------------------|
|-----|------------------------------------|

Infection Control Procedures Used after Exposure 168 Infection Control Procedures Used for Processing 169

12. Radiographic Interpretation of Lesions173

Essential Requirements for Interpretation 173 Systematic Analysis of Intraosseous Lesion 177

13. Radiographic Interpretation of Dental Caries 178

Proximal Caries 179 Occlusal Caries 181 Buccal and Lingual Caries 181 Root Surface Caries 183 Secondary or Recurrent Caries 183 Arrested Caries 184 Rampant Caries 184 Radiation/Drug-related Caries 184 Cervical Burnout 185 Mach Band Effect 186 Effectiveness of Radiographs in the Detection and Evaluation of Dental Caries 187

14. Radiographic Interpretation of Periodontal Diseases

188

Value of Periodontal Radiography Limitations of Radiography in Periodontal Diseases Radiographic Techniques Normal Appearance of Periodontal Tissues

| 15. | Infection and Inflammation of the Jaws | 194 |
|-----|--|-----|
| | | |

Periapical Infections 194 Classification 205

| | | | Contents | xvii |
|-----|----------------|--|----------|------|
| 16. | Radiographi | c Features of Jaw Cysts | 205 | |
| | Odontogenic | Cysts 206 | | |
| | Nonodontoge | enic Cysts 211 | | |
| | Pseudocysts | 212 | | |
| 17. | Tumors of th | e Jaws | 216 | |
| | Benign Tumor | rs of the Jaws 216 | | |
| | Malignant Dis | eases of the Jaw 231 | | |
| 18. | Fibro-osseou | us Lesions of the Jaw | 243 | |
| | Fibrous Dyspl | asia 243 | | |
| | Paget's Diseas | e (Osteitis Deformans) 245 | | |
| | Cherubism 2 | 247 | | |
| | Aneurysmal B | one Cyst 248 | | |
| | Central Giant | Cell Granuloma 249 | | |
| | Brown Tumors | s of Hyperparathyroidism 250 | | |
| | Periapical Cen | nental Dysplasia or Cementoma 251 | | |
| | Cemento-Oss | ifying Fibroma 252 | | |
| Арр | pendices | | 253 | |
| | Appendix 1: | List of Radiographic Descriptions (In Alphabetical Order) 253 | | |
| | Appendix 2: | Lamina Dura 255 | | |
| | Appendix 3: | Cementum 256 | | |
| | Appendix 4: | Classification of Radiation 256 | | |
| | Appendix 5: | Bony Lesions of the Jaws 257 | | |
| | Appendix 6: | Benign and Malignant Lesions of the Mandible 259 | | |
| | Appendix 7: | Mandibular Lesions by Location 261 | | |
| | Appendix 8: | Maxillofacial Bony Lesions by Origin of Tissue 262 | | |
| | Appendix 9: | Advanced Imaging Techniques 262 | | |
| | Appendix 10: | Site Specific Jaw Lesions 263 | | |

xviii A Short Textbook of Oral Radiology

| Appendix 11: Classification of Lesions | |
|---|-----|
| Appendix 12: Radiographic Appearance of Maxillary Sinus in Disease 265 | |
| Appendix 13: Diseases Associated with Widened Periodontal Ligament Space 265 | |
| Appendix 14: Radiographic Faults 266 | |
| Appendix 15: Distribution of Jaw Lesions Based on Age | 268 |
| | |

Index

271