

Contents

List of Contributors *xiii*

Foreword *xv*

Preface *xvii*

Acknowledgments *xix*

1 Introduction to Implant Dentistry *1*

Introduction *1*

Purpose of Textbook *1*

Conventional Dentistry Versus Implant Dentistry *2*

Predictability of Fixed Prosthodontics *2*

Predictability of Implant Prosthodontics *3*

Economics of Implant Dentistry *4*

Prognostic Indicators for Teeth *5*

Periodontal Disease *5*

The Heavily Restored Tooth *6*

The Furcation-Involved Tooth *8*

The Periodontal Prosthesis Patient *9*

Difficult Aesthetic Cases *10*

Classification of Ridge Defects *12*

Treatment Prognosis for the Dentition *15*

Summary *18*

Bibliography *18*

2 Implants and Implant Restorative Components *21*

Introduction *21*

Implants *21*

Implant/Abutment Connections *25*

External Implant/Abutment Connections *25*

Internal Implant/Abutment Connections *27*

Healing Abutments *30*

Conventional, Stock Healing Abutments *30*

CAD/CAM Healing Abutments *32*

Custom Healing Abutments *34*

Impression Copings *35*

Implant Impression Copings *35*

Pickup Impression Copings (Open Tray) *36*

Transfer Impression Copings (Closed Tray) *37*

Low-Profile Conical Abutment Impression Copings *38*

Scan Bodies	38
Abutments	39
Low-Profile Conical Abutments (LPCA)	40
LOCATOR Overdenture Abutments	41
Stock Abutments	42
UCLA Abutments	44
CAD/CAM Abutments	47
Milled Titanium	47
Milled Zirconia	50
Multiunit Abutments	54
Screws (Clinical)	54
Abutment/Retaining Screws	55
Preload Screw Mechanics	56
Cylinders	57
Definitive Cylinders	57
Interim Cylinders	57
Drivers and Placement Instruments	58
Drivers/Driver Tips	58
Laboratory Components	60
Implant Analogs/Replicas	61
Abutment Analogs/Replicas	62
Try-In Screws	63
Abutment Holders	63
Polishing Protectors	64
Bibliography	65

3 Diagnosis and Treatment Planning in Implant Restorative Dentistry 69

Patient Selection	69
Medical History	69
Diagnostic Procedures	70
Radiographs	70
CBCT (Cone Beam Computed Tomography) Scans	72
Scanning Appliances/Surgical Guides	74
Diagnostic Casts	75
Laboratory-Generated Surgical Guides	75
Physical Examination	78
Extraoral Examination	78
Intraoral Examination	78
Diagnostic Articulator Mounting	79
Diagnostic Wax Patterns	79
Implant Bone Volume	80
Implant Restorative Volume	83
Treatment Planning	85
Edentulous Patients	86
Overdentures	87
Restorative Volume	87
Fixed Implant-Retained, Full-Arch Prostheses-Edentulous Jaws	89
Milled Titanium Frameworks	92
Milled Zirconia Frameworks	94
High-Performance Polymers (HPP)	95
Crown-and-Bridge Type Prostheses	95

Partially Edentulous Patients	96
Screw-Retained Restorations	96
Treatment Goals	96
Benefits	96
Limitations	97
Cement-Retained Restorations	98
Benefits	98
Limitations	99
Angled Screw Channel Abutments	99
Peri-Implant Disease	99
Implant Loading Protocols	101
Unloaded Healing, Two-Stage Surgical Protocol	101
Unloaded Healing, Single-Stage Surgical Protocol	102
Early Loading	102
Immediate Occlusal Loading	103
Immediate Non-Occlusal Loading	103
Patient Consultation	104
Principles of Treatment Planning	104
Informed Consent	104
Summary	105
Bibliography	105
4 Treatment of Edentulous Mandibular Patients: (1) Implant-Retained Framework Overdenture and Resilient Attachments; (2) Resilient Attachments and Two Interforaminal Implants	111
Literature Review	111
Clinical Case Presentation Mandibular Implant-Supported Overdenture with CAD/CAM Framework and Resilient Attachments	117
Clinical Case Presentation Implant-Supported Overdenture with Resilient Attachments and Two Interforaminal Implants	142
Bibliography	156
5 Replacement of Single Teeth with CAD/CAM Implant Restorations: Implant-Level Impressions, Intraoral Scanning, Cement and Screw-Retained Crowns	159
Literature Review	159
Replacement of Individual Teeth	159
Single-Unit Implant Restorations	161
Computer-Assisted Design/Computer-Assisted Machining (CAD/CAM) Healing Abutments/Scan Bodies	162
Intraoral Scanning	167
Models from Digital Impressions	169
Clinical Case Presentation Posterior, Cement-Retained Single-Implant Restoration	170
Clinical Case Presentation Anterior, Screw-Retained Single-Implant Restoration (Angled Screw Channel)	185
Bibliography	197
6 Fixed Dental Prostheses: Retreatment of a Patient with a Fractured Implant-Retained Fixed Dental Prosthesis; CAD/CAM Abutments and a Cement-Retained Fixed Dental Prosthesis; Intraoral Scanning and Screw-Retained Fixed Dental Prosthesis (Atlantis™ Bridge Patient-Specific Suprastructures)	199
Literature Review	199
Clinical Case Presentation Implant-Level Impression/Screw-Retained Fixed Dental Prosthesis	204
Clinical Case Presentation Intraoral Scanning/Screw-Retained Fixed Dental Prosthesis (Atlantis™ Bridge Patient-Specific Suprastructure)	219
Bibliography	235

- 7 Accelerated Treatment Protocol of a Patient with Edentulous Jaws and CAD/CAM Titanium Framework/
Fixed Hybrid Prostheses 237**
 - Literature Review 237
 - Original Treatment Protocol 239
 - Accelerated Treatment Protocol 242
 - Clinical Case Presentation Four Months Post Implant Placement and Immediate Occlusal Loading 243
 - Bibliography 275

- 8 Treatment of Edentulous Patients with Immediate Occlusal Loading: Conventional Surgical
and Computer-Generated Surgical Guides 279**
 - Literature Review 279
 - Introduction 279
 - The Preosseointegration Era 280
 - The Osseointegration Era 281
 - Immediate Occlusal Loading in the Edentulous Mandible 282
 - Immediate Occlusal Loading in Edentulous Maxillae 285
 - Clinical Case Presentation Mandibular Immediate Occlusal Loading with Clinical Conversion of Mandibular
Immediate Denture 286
 - Clinical Case Presentation Maxillary Immediate Occlusal Loading Using Computer-Generated Surgical Guide
with Clinical Conversion of Maxillary Immediate Denture 312
 - Bibliography 324

- 9 Treatment of Edentulous Patients with Immediate Occlusal Loading: Conventional Surgical/
Prosthetic Protocols 327**
 - Literature Review 327
 - Immediate Occlusal Loading 327
 - Computer-Guided Surgery 328
 - Clinical Case Presentation Conventional Surgical and Restorative Protocols 332
 - Bibliography 367

- 10 Treatment of Partially Edentulous Patients with Immediate Non-Occlusal Loading Protocols
(Intraoral Scanning, CAD/CAM Abutment, and Definitive Maxillary Central Incisor Restoration;
Co-Axis Implant and Restoration) 371**
 - Literature Review 371
 - Clinical Case Presentation INOL Protocol and Intraoral Scanning 375
 - Clinical Case Presentation INOL Protocol with Co-Axis Implant 396
 - Bibliography 408

- 11 Computed Tomography (CT) Guided Surgery/Immediate Occlusal Loading with Full-Arch Prostheses in
Edentulous Patients 411**
 - Literature Review 411
 - Immediate Occlusal Loading 411
 - Tilted Implants 412
 - Diagnostic Imaging 413
 - Computed Tomography (CT) 415
 - Interactive Computed Tomography (ICT) 417
 - Interactive Computer Software 418
 - Computer-Guided Surgery 418
 - Overview of CT Guided Surgical and Prosthetic Protocols 419
 - Surgical Guides 419
 - Master Tubes 419
 - Prosthetic Laboratory Kit-Implant Analog Mounts 420

Surgical Kit Components	420
Fabrication of Master Cast for Immediate, Fixed Provisional Prosthesis	421
Abutment Selection for Fixed, Screw-Retained Provisional Prostheses	422
Fabrication of a Screw-Retained Provisional Prosthesis	424
Clinical Patient Presentation Ill-Fitting Maxillary Denture; Mandibular Implant-Supported Overdenture	425
Clinical Patient Presentation Maxillary and Mandibular Terminal Dentitions; Computer-Guided Surgery with Metal Surgical Guides	448
Bibliography	463

12 Guidelines and Maintenance Procedures for Fixed, Full-Arch, Implant-Retained Prostheses 465

Introduction	465
Full-Arch Hybrid Prostheses	465
Historical Perspectives	466
Original Protocol	466
Immediate Occlusal Loading for Full-Arch Prostheses	466
Clinical Complications	467
Mechanical	467
Biologic: Peri-Implant Mucositis/Peri-Implantitis	470
Treatment (Peri-Implant Mucositis)	472
Treatment (Peri-Implantitis)	473
Innovations in Full-Arch Designs	475
Prosthesis Design/Materials	476
Hygiene/Maintenance Protocol for Immediately Loaded Full-Arch Prostheses	477
Hygiene/Maintenance Protocol for Definitive Full-Arch Prostheses	478
At-Home Hygiene	478
Plaque Control–Dentifrice	478
Plaque Control–Mechanical	478
Recall Appointments	479
Recall Interval/Schedule	479
Examination	480
Radiographs	481
Professional Maintenance	485
Prosthesis Removal	487
Cleaning the Removed Prosthesis	488
Conclusions	488
Bibliography	488

Index 493

