

# An Exploration of the Periodontal- Orthodontic Alliance



# An Exploration of the Periodontal- Orthodontic Alliance

By

Girish Suragimath,  
Kirti Anil Shetgaonkar,  
A. Siddhartha Varma,  
Sameer Zope  
and Ashwinirani SR

**Cambridge  
Scholars  
Publishing**



An Exploration of the Periodontal-Orthodontic Alliance

By Girish Suragimath, Kirti Anil Shetgaonkar, A. Siddhartha Varma,  
Sameer Zope and Ashwinirani SR

This book first published 2023

Cambridge Scholars Publishing

Lady Stephenson Library, Newcastle upon Tyne, NE6 2PA, UK

British Library Cataloguing in Publication Data

A catalogue record for this book is available from the British Library

Copyright © 2023 by Girish Suragimath, Kirti Anil Shetgaonkar,  
A. Siddhartha Varma, Sameer Zope and Ashwinirani SR

All rights for this book reserved. No part of this book may be reproduced,  
stored in a retrieval system, or transmitted, in any form or by any means,  
electronic, mechanical, photocopying, recording or otherwise, without  
the prior permission of the copyright owner.

ISBN (10): 1-5275-9323-1

ISBN (13): 978-1-5275-9323-7

I dedicate this textbook to my wife, Dr Ashwini Rani and my lovely daughters, Disha and Anusha, for being part of my life and inspiring me to do better in all areas. I also dedicate this work to my students and wish them success in all their life endeavors.

Dr Girish Suragimath

I want to dedicate this textbook to my family, who supported me throughout my journey. Warm gratitude to my parents, Anil and Sarita Shetgaonkar, for raising me to believe anything is possible, and my brother, Anay, and fiancée, Mayuresh Desai, for their endless patience and support. I would like to thank my post-graduate guide Dr Girish Suragimath, for imparting his skills and values and teaching me that determination is nothing without dedication and hard work.

Dr Kirti Anil Shetgaonkar

I wish to dedicate this textbook to my wife, Dr Rashmi Varma, my son, Advait, and my parents, Dr A. S. Raju and A. Uma. I wish to thank them for their love, dedication, and support.

Dr Siddhartha Varma

I want to thank the almighty, dedicate the book to my family, and give warm gratitude to my parents, Dr Anil and Mrs Nilima, my wife, Dr Charushila, and my brother, Dr Rakesh, for their love and support.

Dr Sameer Zope

I dedicate this textbook to my parents, Mrs Gajagowri and Mr C. Renukaradhya, and my children, Disha and Anusha, for supporting me. I thank God for guiding and enlightening me throughout my journey.

Dr Ashwinirani SR



# TABLE OF CONTENTS

List of Figures.....	ix
List of Tables.....	xii
About the Authors .....	xiii
Acknowledgments .....	xv
Foreword .....	xvi
Preface .....	xvii
Introduction .....	xviii
List of Abbreviations .....	xix
Chapter 1 .....	1
Periodontal, orthodontic integration	
Chapter 2 .....	27
Effect of orthodontic forces on the periodontium	
Chapter 3 .....	62
Periodontics as an adjunct to orthodontic therapy	
Chapter 4 .....	90
Orthodontics as an adjunct to periodontal therapy	
Chapter 5 .....	102
Periodontal surgeries aiding accelerated orthodontic therapy	
Chapter 6 .....	134
Functional periodontal surgeries aiding orthodontic treatment retention	
Chapter 7 .....	151
Periodontal surgeries for aesthetics in orthodontic treatment	

Chapter 8 .....	167
Implant surgeries for orthodontic anchorage	
Chapter 9 .....	177
Periodontal considerations in clear aligners	
Chapter 10 .....	184
Orthodontic considerations in periodontally compromised patients	



# LIST OF FIGURES

Figure 1.1: Different branches of Dentistry.....	5
Figure 1.2: Procedures included in Periodontology.....	6
Figure 1.3: Periodontal treatment plan by Carranza .....	8
Figure 1.4: Periodontal treatment plan by Lindhe .....	9
Figure 1.5: The Trimeric Model of periodontal treatment planning.....	10
Figure 1.6: Schematic representation of Jackson's triad .....	12
Figure 1.7: Phases of orthodontic treatment according to Profitt .....	15
Figure 1.8: Phases of orthodontic treatment according to Burstone .....	16
Figure 1.9: Phases of orthodontic treatment by Pilon et al. ....	16
Figure 1.10: Orthodontic periodontic interrelationship .....	22
Figure 2.1: Effects of orthodontic force application on mineralized and non-mineralized paradental tissues .....	31
Figure 2.2: Effect of biological control of tooth movement .....	33
Figure 2.3: Sequence of events during orthodontic force application .....	34
Figure 2.4: Biological basis of tooth movement.....	36
Figure 2.5: Three stages of pressure and tension on the PDL space.....	39
Figure 2.6: Effect of pressure and tension during orthodontic forces.....	40
Figure 3.1 Periodontal procedures carried out prior to orthodontic therapy .....	63
Figure 3.2: Illustration depicting the benefits of orthodontic treatment on periodontal health.....	64
Figure 3.3 Periodontal procedures before orthodontic therapy.....	67
Figure 3.4: Clinical exposure of impacted teeth .....	68
Figure 3.5: Schematic representation of the Orthodontic Plaque Index (OPI) .....	69
Figure 3.6: Schematic representation of the modified Plaque Index for Orthodontic Patients (PIOP).....	71
Figure 3.7: Classification of toothbrushes .....	72
Figure 3.8: Modes of mechanical plaque control. Viz. toothbrush, tongue cleaner, dental floss.....	75
Figure 3.9: Parts of a laser toothbrush .....	76
Figure 3.10: Modes of chemical plaque control (chlorhexidine mouthwash).....	78
Figure 3.11. Steps of guided biofilm therapy .....	81
Figure 3.12 Periodontal procedures post orthodontic therapy .....	82

Figure 4.1: Illustration depicting orthodontic correction of the black triangle .....	93
Figure 5.1: Dr William Wilcko and Dr Thomas Wilcko .....	104
Figure 5.2 (A): Full-thickness flap reflection on buccal aspects beyond the apices of the teeth.....	108
Figure 5.2 (B): Full-thickness flap reflection on lingual aspects beyond the apices of the teeth.....	109
Figure 5.3: Vertical corticotomy performed on the buccal surface .....	110
Figure 5.4: Vertical corticotomy with grooving .....	110
Figure 5.5: Different corticotomy patterns .....	111
Figure 5.6: Particulate grafting on the labial side after corticotomy.....	112
Figure 5.7: Bone graft material placement over the decorticated areas on the buccal side.....	113
Figure 5.8: Bone graft material placement over the decorticated areas along the palatal side.....	113
Figure 5.9: (A) Piezocision procedure; vertical incisions on the buccal surface.....	115
Figure 5.9: (B) Piezocision procedure; full-thickness flap elevated through the vertical incisions .....	116
Figure 5.9: (C) Piezocision procedure; bone grafting after corticotomy ..	116
Figure 5.9: (D) Piezocision procedure; bone grafting after corticotomy...	117
Figure 5.10: Soft tissue graft (acellular dermal matrix allograft) used simultaneously with corticotomy to treat gingival recession .....	118
Figure 5.11: Modified corticotomy technique .....	119
Figure 5.12 (A): Soft-tissue perforations performed using the Er:YAG laser fiber tip .....	120
Figure 5.12 (B): Hard-tissue perforations performed using the Er:YAG laser fiber tip .....	121
Figure 5.13: Low-Level Laser Therapy performed on patients undergoing orthodontic therapy .....	125
Figure 5.14: Illustration of techniques for accelerated tooth movement...	127
Figure 6.1: Collagen fiber bundles .....	136
Figure 6.2: (A) Surgical procedure of frenectomy; preoperative view ...	143
Figure 6.2: (B) Excision of the frenum along with its bony insertion ....	143
Figure 6.2: (C) Primary closure .....	144
Figure 6.2: (D) One-month postoperative photograph .....	144
Figure 7.1: Gingival cleft between the maxillary canine and first premolar.....	152
Figure 7.2: Uneven gingival margin with maxillary central incisors.....	154
Figure 7.3: (A) Preoperative photograph of uneven gingival margin.....	155

Figure 7.3: (B) Management of uneven gingival margin using a scalpel; bleeding points marked for excision .....	155
Figure 7.3: (C) External bevel gingivoplasty to correct the gingival margin .....	156
Figure 7.3: (D) Seven-day post-operative photograph after correction of the gingival margin.....	156
Figure 7.4: Schematic representation of biological width .....	157
Figure 7.5: (A) Preoperative view of pigmented gingiva .....	161
Figure 7.5: (B) Surgical procedure of depigmentation using dental lasers .....	162
Figure 7.5: (C) Intraoperative view of surgical procedure of depigmentation using dental laser .....	162
Figure 7.5: (D) Seven-day postoperative view after laser depigmentation.....	163
Figure 8.1: Classification of Temporary Anchorage Devices (TADs) ...	170
Figure 8.2: Mini implant between the maxillary first and second premolars .....	173
Figure 9.1: Clear aligners .....	179
Figure 10.1: Gingival recession during orthodontic treatment .....	192
Figure 10.2: Gingival overgrowth on the palatal side due to inadequate maintenance by the patient.....	199

## LIST OF TABLES

Table 3.1: The scoring criteria for the Orthodontic Plaque Index (OPI)....	69
Table 3.2: The scoring criteria for the modified Plaque Index for Orthodontic Patients (PIOP).....	70
Table 3.3: Classification of toothbrushes .....	72
Table 6.1: The historical background of Circumferential Supracrestal Fibrotomy .....	138
Table 6.2: Surgical timing of Circumferential Supracrestal Fibrotomy .	140
Table 8.1: History of dental implants as anchorage devices.....	169

## ABOUT THE AUTHORS

### **Dr Girish Suragimath, MDS**

Dr Girish Suragimath is Professor and Head of the Department of Periodontology in the School of Dental Sciences at Krishna Institute of Medical Sciences, deemed to be University, India. He completed his BDS in 1994 and his MDS in Periodontology in 1999 from KLE Vishwanath Katti Institute of Dental Sciences, India. He has more than 100 national and international publications, four textbooks, and two chapters to his credit.

### **Dr Kirti Anil Shetgaonkar, BDS**

Dr Kirti Anil Shetgaonkar graduated from KLE Vishwanath Katti Institute of Dental Sciences, India, in 2018 and is currently undertaking an MDS in Periodontology at Krishna Institute of Medical Sciences deemed to be University, India. She is the author of several book chapters.

### **Dr Siddhartha Varma, MDS**

Dr A. Siddhartha Varma is an Associate Professor in the School of Dental Sciences at Krishna Institute of Medical Sciences, deemed to be University, India. He has more than 50 national and international publications to his credit and has served as a reviewer for various international and national journals.

### **Dr Sameer Zope, MDS**

Dr Sameer Zope is an Associate Professor in the Department of Periodontology in the School of Dental Sciences at Krishna Institute of Medical Sciences, deemed to be University, India. He has authored more than 60 publications and has served as a reviewer for various international and national journals.

### **Dr Ashwinirani SR, MDS**

Dr Ashwinirani SR is an Assistant Professor in the Department of oral Medicine and Radiology in the School of Dental Sciences at Krishna

Institute of Medical Sciences, deemed to be University, India. She has authored more than 76 publications to her credit.

With valuable support from:

Dr Sushmita Jadhav, Dr Tanuja Sathe, Dr Aiswarya Achari, Dr Shruti Jaiswal, Dr Reema Shah, Dr Shradha Mohite, Dr Fazal Mujawar, and Dr Ibrahim Abuji.

## ACKNOWLEDGMENTS

The authors would like to acknowledge all friends and colleagues who have been mentors and advisors, collaborating to aid current knowledge. We also want to thank all contributors who have made tremendous efforts to make this book reliable. We want to thank the Department of Orthodontics and Dentofacial Orthopedics, School of Dental Sciences, KIMSDU, for sharing the clinical orthodontic photographs. We also thank our university, Krishna Institute of Medical Sciences, deemed to be University (KIMSDU), Karad, Maharashtra, India, for encouraging us to create this textbook.

## FOREWORD



The textbook, *An exploration of the Periodontal-orthodontic Alliance*, provides the readers with a comprehensive reference of literature on the multidisciplinary approach to orthodontic and periodontic relationships. The book includes detailed chapters explaining periodontal, orthodontic integration, periodontal tissues and orthodontic forces, periodontics as an adjunct to orthodontic therapy, orthodontics as an adjunct to periodontal treatment, periodontal surgeries aiding in accelerated orthodontic therapy, functional periodontal surgeries helping in orthodontic treatment, periodontal surgeries for aesthetics in orthodontic treatment, implant surgeries for orthodontic anchorage, periodontal considerations in clear aligners, and orthodontic considerations in periodontally compromised patients.

I congratulate all the authors and wish them all the best.

Dr Anil Melath,  
Principal, Professor, and HOD  
Department of Periodontics and Implantology  
Mahe Institute of Dental Sciences and Hospital, Mahe  
Past President of the Indian Society of Periodontology (ISP) 2018-2019  
Vice President State Dental Council, Puducherry.  
President of Indian Society of Prosthodontics – Restorative – Periodontics



## PREFACE

The book *An Exploration of the Periodontal-orthodontic Alliance* aims to provide readers with detailed information regarding the interdisciplinary approach to orthodontic and periodontic relationships. The book will help dental students, practitioners, and researchers to gain insight into the interdisciplinary approach to orthodontics and periodontics and support dental patients.

In this context, this book was planned and designed to focus on the periodontal-orthodontic interrelationship approach. The book provides information on skills that are mandatory to explain the procedures, reasons, and goals for each step. According to this approach, students and professionals can understand the rationale and work with specific strategies and aims.

Dr Girish Suragimath

# INTRODUCTION

Periodontics and orthodontics have an interdependent relationship. The periodontium is the basis for the tooth movements achieved in orthodontic therapy; they are the resilient structures through which tooth movement can be achieved. Periodontics provides the necessary treatment, which aids in the retention of the orthodontic tooth movement. Periodontal surgical procedures aid in flap reflection and the exposure of impacted teeth for orthodontic tooth movements. Periodontal plastic surgeries are needed for the maintenance of an adequate attached gingiva and for aesthetics to give a better smile to the patients. Periodontal surgery, like Periodontally Accelerated Osteogenic Orthodontics (PAOO), accelerates orthodontic tooth movement. Orthodontics adjuncts periodontology by vertical repositioning the tooth which can help to correct certain osseous defects. In the case of open gingival embrasures, orthodontic therapy can help to regain the lost papilla if the causative agent is defective angulation of the tooth or divergent roots. For patients who exhibit drifted adjacent teeth to an edentulous site, orthodontic therapy can be done as a pre-implant placement procedure to correct the same. Orthodontic therapy benefits the correction of crowded teeth, which helps to maintain oral hygiene. Thus, both branches, periodontology and orthodontics, are interrelated whilst achieving their individual goals.

## LIST OF ABBREVIATIONS

CAD/CAM	Computer-Aided Design/Computer-Aided Manufacturing
TMJ	Temporomandibular Joint
CSF	Circumferential Supracrestal Fibrotomy
TMD	Temporomandibular Disorders
PAOO	Periodontally Accelerated Osteogenic Orthodontics
PDL	Periodontal Ligament
OTM	Orthodontic Tooth Movement
GO	Gingival Overgrowth
GI	Gingival Ingrowth
MMP	Matrix Metalloproteinase
GR	Gingival Recession
GBR	Guided Bone Regeneration
RANK	Receptor Activator of Nuclear Factor-Kappa
RANKL	Receptor Activator of Nuclear Factor-Kappa-B Ligand
OPG	Osteoprotegerin
3D	3-dimensional
ATP	Adenosine Triphosphate
NSPT	Nonsurgical Periodontal Therapy
OPI	Orthodontic Plaque Index
PIOP	Plaque Index for Orthodontic Patients
RAP	Regional Acceleratory Phenomenon
PTH	Parathyroid Hormone
DO	Distraction Osteogenesis
AAO	Accelerated Osteogenic Orthodontics
OPG	Orthopantomogram
IOPA	Intra Oral Peri Apical
Er, Cr:YSGG	Erbium, chromium-doped yttrium, scandium, gallium, and garnet
LAFC	Laser-Assisted Flapless Corticotomy
LLLT	Low-Level Laser Therapy
NdYAG	Neodymium-doped Yttrium Aluminum Garnet

Er:YAG	Erbium: yttrium-aluminum-garnet
CO <sub>2</sub>	Carbon Dioxide
TAD	Temporary Anchorage Devices
MGJ	Mucogingival Junction
AG	Attached Gingiva

# CHAPTER 1

## PERIODONTAL, ORTHODONTIC INTEGRATION

DR GIRISH SURAGIMATH  
DR KIRTI ANIL SHETGAONKAR  
DR SIDDHARTHA VARMA

- 1.1 Field of dentistry
  - 1.1.1 Dentistry and its branches
- 1.2 Periodontology
  - 1.2.1 Definition
  - 1.2.2 Aims and objectives
  - 1.2.3 Periodontal treatment phases
    - 1.2.3.1 Treatment plan by Carranza
    - 1.2.3.2 Treatment plan by Lindhe
    - 1.2.3.3 Trimeric model of the treatment plan
  - 1.2.4 Prevalence of periodontitis
- 1.3 Orthodontics and dentofacial orthopedics
  - 1.3.1 Definition
  - 1.3.2 Aim and objectives
  - 1.3.3 Orthodontic treatment phases
    - 1.3.3.1 Treatment plan by Proffit
    - 1.3.3.2 Treatment plan by Burstone
    - 1.3.3.3 Treatment plan by Pilon
  - 1.3.4 Prevalence of malocclusion
- 1.4 Need for periodontal therapy
  - 1.4.1 Prior to orthodontic treatment
  - 1.4.2 During orthodontic treatment
  - 1.4.3 Post orthodontic treatment
- 1.5 Need for orthodontic therapy
  - 1.5.1 Prior to periodontal therapy
  - 1.5.2 During periodontal therapy
  - 1.5.3 Post periodontal therapy

## **Introduction**

This chapter independently introduces the periodontics and orthodontics branches and then describes the adjunctive relationship. The periodontal aspect aids in the retention of the orthodontically treated teeth; it aids in accessibility to the underlying malposed teeth by raising a full-thickness flap and subsequent orthodontic extrusion. The periodontal aspect provides various mucogingival surgeries that help to maintain the width of the attached gingiva. The benefit of orthodontic forces on periodontal tissue is commendable. The vertical repositioning of the tooth can help to correct certain osseous defects. In the case of open gingival embrasures, orthodontic therapy can help to regain the lost papilla if the causative agent is a defect in the angulation of the tooth or divergent roots. For cases that exhibit drifted adjacent teeth to an edentulous site, orthodontic therapy can be carried out as a pre-implant placement procedure to correct the same. Orthodontic therapy benefits the correction of crowded teeth, which helps to maintain oral hygiene. The current chapter intends to highlight the effect of orthodontic forces on periodontal tissues, the protective role of orthodontic treatment against periodontal breakdown, periodontics as an adjunct to orthodontic therapy, periodontal surgery intended to accelerate the orthodontic tooth movement, orthodontics as an adjunct to periodontal therapy, gingival discrepancies which can be treated by orthodontic therapy, osseous defects which can be treated by orthodontic therapy, periodontal surgery to retain the orthodontic tooth movement, and the relationship between orthodontic treatment and oral hygiene.

## **1.1 Field of dentistry**

Dentistry is a branch of medicine that involves the study, diagnosis, prevention, and treatment of conditions, diseases, and disorders of the oral and maxillofacial region, including the adjacent associated structures. It consists of nine branches: Prosthodontics, Crown and Bridge, Periodontology, Oral and Maxillofacial Surgery, Conservative Dentistry and Endodontics, Orthodontics and Dentofacial Orthopedics, Oral and Maxillofacial Pathology and Oral Microbiology, Public Health Dentistry, Pediatric and Preventive Dentistry, Oral Medicine and Radiology.

### **1.1.1 Dentistry and its branches**

The branch of oral medicine and radiology deals with the diagnosis and nonsurgical management of pathosis arising from the jaws, oral mucosa,

para oral structures, oral manifestations of systemic diseases and management of medically compromised patients, clinical case history recording, radiographic investigation, diagnosing and determining an apt treatment plan. The treatment of restoring carious teeth and root canal treatment of endodontically involved teeth are carried out in the department of Conservative dentistry and Endodontics. Removal and fixed prosthesis are designed and fabricated in Prosthodontics, Crown and bridge departments to rehabilitate the edentulous areas. The department of Pedodontics manages the dentition and oral issues of pediatric patients. The oral and maxillofacial surgery department handles dental infections, pathologies, maxillofacial trauma, and facial pain.

All branches of dentistry are interlinked and interdependent for achieving the optimal treatment goal and rendering the best treatment to the patients. In several cases, this calls for an interdisciplinary approach involving different branches of dentistry. The various branches of dentistry and their descriptions are provided below, and the schematic representation is given in figure 1.1.

(i) Prosthodontics, Crown and Bridge: A branch of dental art and science pertaining to the restoration and maintenance of oral function, health, comfort, and appearance by the replacement of missing or lost natural teeth and associated tissues either by fixed or removable artificial substitutes.<sup>1</sup>

(ii) Periodontology: Periodontology is the science dealing with the health and diseases of the investing and supporting structures of the teeth and oral mucous membrane.<sup>1</sup>

(iii) Oral and Maxillofacial Surgery: Oral and Maxillofacial Surgery deals with the diagnosis and surgical and adjunctive treatment of diseases, injuries, and defects of the human jaw and associated oral and facial structures.<sup>1</sup>

(iv) Conservative Dentistry and Endodontics: Conservative dentistry deals with the prevention and treatment of the diseases and injuries of the hard tissues and the pulp of the tooth and associated periapical lesions, along with restoration of those teeth to normal form, function and aesthetics.<sup>1</sup>

(v) Orthodontics and Dentofacial Orthopedics: Orthodontics and Dentofacial Orthopedics deal with the prevention and correction of oral anomalies and malocclusion and the harmonizing of the structures involved so that the dental mechanisms function in a normal way.<sup>1</sup>

(vi) Oral and Maxillofacial Pathology and Oral Microbiology: Oral and Maxillofacial Pathology and Oral Microbiology deal with the nature of oral diseases, their causes, processes, and effects. They relate the clinical manifestation of oral diseases to the physiologic and anatomic changes associated with these diseases.<sup>1</sup>

(vii) Public Health Dentistry: Public Health Dentistry is the science and art of preventing and controlling dental diseases and promoting dental health through organized community efforts.<sup>1</sup>

(viii) Pediatric and Preventive Dentistry: Pediatric and Preventive Dentistry deals with preventing and treating oral and dental ailments that may occur during childhood.<sup>1</sup>

(ix) Oral Medicine and Radiology: Oral Medicine is a specialty of dentistry concerned with the primary diagnostic procedures and techniques used in recognizing the diseases of the oral tissues of local and constitutional origin and their medical management. Radiology is a science dealing with x-rays and their uses in the diagnosis and treatment of diseases concerning orofacial diseases.<sup>1</sup>

## **1.2 Periodontology or Periodontics**

The term periodontology or periodontics is derived from the Ancient Greek, “περί”, “perí” that means “around”; and “ὀδούς”, “odoús” that means “tooth”. Periodontology is the specialty of dentistry dealing with supporting structures of the teeth, as well as diseases and conditions that affect them.<sup>2</sup>



Figure 1.1: Different branches of Dentistry



### 1.2.1 Definition

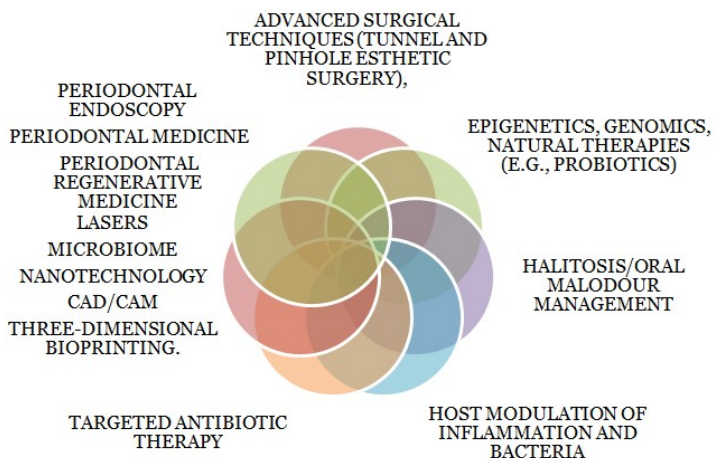
According to the Glossary of Periodontal Terms (2001), periodontics is defined as “That specialty of dentistry which encompasses the prevention, diagnosis, and treatment of diseases of the supporting and surrounding tissues of the teeth or their substitutes; the maintenance of the health, function, and aesthetics of these structures and tissues; and the replacement of lost teeth and supporting structures by grafting or implantation of natural and synthetic devices and materials”.<sup>3</sup>

### 1.2.2 Aim and objectives

The periodontology branch aims to preserve, improve, restore, and maintain the attachment apparatus, the periodontium, the teeth, the dental implants, and the peri-implant tissues to achieve health, functions, and aesthetics. Periodontology encompasses halitosis/oral malodor, host modulation of inflammation and bacteria, host versus pathogens in the pathogenesis of periodontitis, periodontal medicine, periodontal regenerative medicine, personalized (precision) periodontics, advanced surgical techniques (tunnel

and pinhole aesthetic surgery), epigenetics, genome-wide association studies, genomics and other "omics" technology (e.g., proteomics, degradomics, etc.), inflammaging (increased inflammation with age), inflammasome, lasers, microbiome, nanotechnology, CAD/CAM, three-dimensional bioprinting, natural therapies (e.g., probiotics, fish oil, ayurvedic medicine, etc.), periodontal endoscopy, polymicrobial synergy, and microbial dysbiosis: keystone pathogen hypothesis, targeted antibiotic therapy (Figure 1.2).

Figure 1.2: Procedures included in Periodontology



### 1.2.3. Periodontal treatment phases

According to Carranza, the periodontal treatment plan involves the emergency phase, the nonsurgical phase, the evaluation of response to the nonsurgical phase, the surgical phase, restorative phase, and maintenance phase.<sup>4</sup>

### **1.2.3.1 Treatment plan by Carranza (Figure 1.3)**

#### **Emergency phase**

The emergency phase is also called the “preliminary phase”. It includes the treatment of emergencies such as the drainage of periodontal or periapical abscess; and the extraction of hopeless teeth.

#### **Phase I (Nonsurgical)**

This phase is also called the etiophic or cause-related phase. It includes habit cessation counselling, diet control (in patients with rampant caries), removal of calculus and root planing, correction of restorative and prosthetic irritational factors, excavation of caries, and restoration (temporary/final, depending on prognosis and the location of caries), antimicrobial therapy (local/systemic), occlusal therapy, minor orthodontic movement, provisional splinting and prosthesis.

#### **Phase II (Surgical phase)**

Phase II therapy includes surgical phase therapy. The surgical treatment model is employed when the nonsurgical mode of treatment does not improve disease cessation. It includes periodontal therapy, placement of implants, and endodontic therapy.

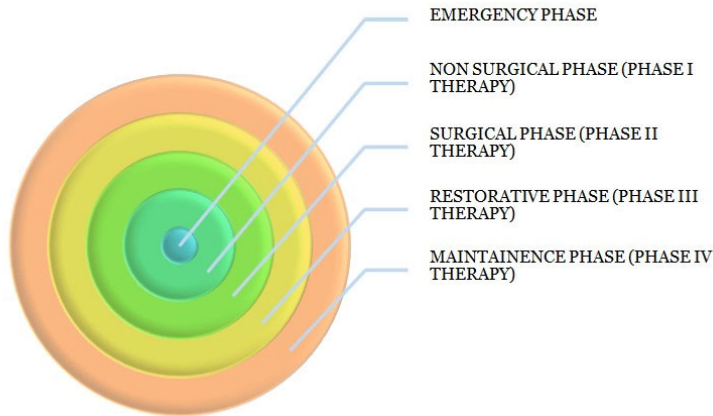
#### **Phase III (Restorative phase)**

This includes final restorations, fixed and removable prosthodontic appliances, evaluation of response to restorative procedures, and periodontal examination.

#### **Phase IV (Maintenance phase)**

The maintenance phase is also known as supportive periodontal therapy. It consists of periodic rechecking of plaque and calculus, gingival inflammation, pockets, occlusion, tooth mobility, and other pathologic changes.

Figure 1.3: Periodontal treatment plan by Carranza



### 1.2.3.2 Treatment plan by Lindhe (Figure 1.4)

The treatment plan by Lindhe et al. includes the following phases:

- Systemic phase of periodontal therapy:

The systemic phase is the first phase of treatment planning. It consists of habit cessation counselling and medical management of the systemic disease and conditions of the patient. The main goal of the systemic phase is to eliminate or decrease the influence of systemic conditions on the outcome of therapy. It aims to protect patients and dental care providers against infectious hazards.

- Initial phase of periodontal therapy:

This phase is also known as cause-related therapy or the hygiene phase of periodontal treatment. It aims to render the oral cavity clean and infection-free. Its intention is optimal plaque control by scaling root planning and motivating the patients for compliance. This phase includes the re-evaluation and planning of additional and supportive measures.

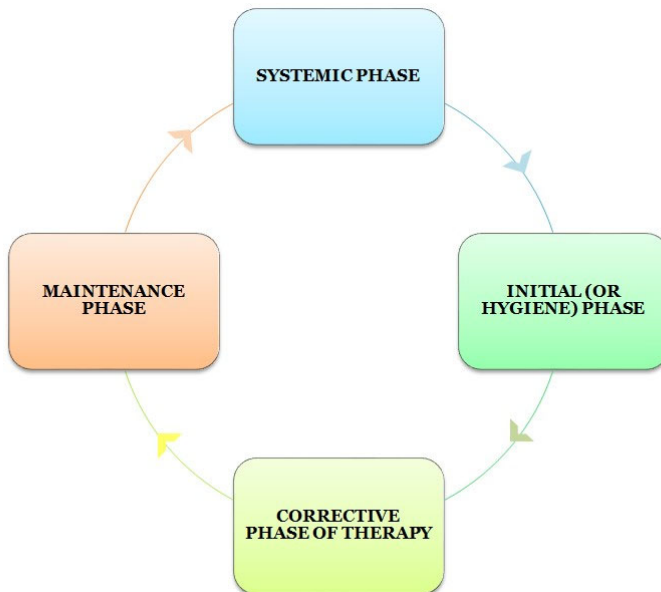
- **Corrective phase of periodontal therapy:**

This phase addresses the sequel of opportunistic infections, including therapeutic measures such as periodontal flap surgery and, implant surgery, or endodontic therapy. The amount of corrective treatment is determined after evaluating the degree of success of cause-related therapy.

- **Maintenance phase (care):**

This phase is supportive periodontal therapy that aims to prevent reinfection and disease recurrence. The recall system for each patient is designed individually according to the assessment of deepened sites with bleeding on probing, instrumentation of such sites, and fluoride application to prevent dental caries.<sup>6</sup>

Figure 1.4: Periodontal treatment plan by Lindhe



### 1.2.3.3 The Trimeric Model of Periodontal Treatment

This model involves the standard phases of treatment representative according to its number. The difference in periodontal treatment is that it is in stages (phases) that are centered and aimed toward the maintenance phase (Phase IV), which is the final aim of periodontal therapy. The phases of periodontal treatment are followed by a re-evaluation phase, in which a decision is arrived at on the next treatment step. Figure 1.5 depicts the Trimeric Model of Periodontal Treatment Planning.

Figure 1.5: The Trimeric Model of periodontal treatment planning

