PERIODONTAL-RESTORATIVE INTERRELATIONSHIPS

ENSURING CLINICAL SUCCESS

Chapter 1

Examination and Diagnosis

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The periodontal prerequisites for maximization of long-term oral health are well established. Effective home-care efforts, maintainable probing depths (defined as 3 mm or less), no evidence of furcation involvements, and adequate bands of attached keratinized tissue to provide a stable fiber barrier in various clinical scenaria are well-accepted periodontal endpoints of therapy. Combined with appropriate management of carious and endodontic lesions, replacement of missing teeth, control of parafunctional habits, and establishment of a healthy, stable occlusion, such a periodontal milieu will help ensure maximization of patient comfort, function, and aesthetics in both the short and long terms.

It has become popular to speak of paradigm shifts in clinical dentistry. However, these shifts represent nothing more than alterations in the treatment approaches utilized to attain the aforementioned therapeutic goals. In addition, efforts must be made to utilize the least-involved and least-expensive therapies possible for ensuring these treatment outcomes.

Maximizing oral health and ameliorating patient concerns remain essential to ethical practice. When considering the utilization of various treatment approaches, it is important to listen to patient desires, determine patient needs, and ensure that the therapy to be employed is truly in the best interest of the patient. A thorough understanding of the predictability of appropriately performed therapies around natural teeth is crucial to the formulation of an ideal treatment plan for a given patient. This treatment plan is based upon a precise diagnosis of the patient's condition and recognition of all contributing etiologies. Such a diagnosis takes into consideration the patient's overall health and the entire dentition, treating each site as both an individual entity and as a component of the masticatory unit.

Establishment of such oral health is dependent upon first carrying out a thorough examination, so as to establish a comprehensive diagnosis of patient etiologies, needs, and required therapies.

Establishing an Appropriate Treatment Plan

A high-quality full series of radiographs must be taken. All full series of radiographs must employ two film/sensor sizes: a #2 film/sensor in posterior regions and a #1 film/sensor in anterior areas. Attempts at utilizing either a #1- or #2-size film/sensor in all areas of the mouth will result in an inability to properly position the film/sensor in the anterior regions, and lead to poorly angulated, nondiagnostic radiographs. Digital radiographs are preferable, due to the ability to manipulate the images and thus gain additional information, and the lesser radiation exposure to the patient. When necessary, three-dimensional images are utilized. Panorex films are not used, since their accuracy is not sufficient for providing useful information for constructing a comprehensive diagnosis.

The components of a thorough clinical examination include periodontal probing depths, assessment of clinical attachment levels, hard- and soft-tissue examination, models, and face-bow records. However, it is important to realize that a thorough examination begins with an open discussion with the individual patient, as a step in determining the patient's needs and desires. In this way, treatment plans may be formulated that are in the best interest of the patient and represent a greater value for the patient.

Prior to formulating a comprehensive treatment plan, all potential etiologies must be

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identified and assessed. In addition to systemic factors, these etiologies include, but are not limited to, periodontal disease, parafunction, caries, endodontic lesions, and trauma.

The treating clinician should always formulate an "ideal" treatment plan and present it to every patient. Appropriate and predictable treatment alternatives must be offered to the patient as well, to allow the patient to choose the treatment option to which he or she is best suited physically, financially, and psychologically.

In many situations, initial therapies, such as plaque control instruction, debridement, caries control, and endodontic assessment, must be carried out prior to establishment of the final treatment options.

While it is true that clinicians who fail to incorporate regenerative and implant therapies into their treatment armamentaria are depriving their patients of predictable therapeutic possibilities that afford unique treatment outcomes in a variety of situations, other proven therapies should not be abandoned too quickly.

Teeth that can be predictably restored to health through reasonable means should be maintained, if their retention is advantageous to the final treatment plan. Clinicians who claim to be implantologists, performing only implant therapy while ignoring periodontal and other pathologies, do patients a disservice. Such clinicians include practitioners who either perform inadequate periodontal therapy to predictably halt the disease process, or remove teeth that could be treated through predictable periodontal techniques.

It is inconceivable that any clinician would see only patients who require implant therapy, and demonstrate periodontal, endodontic, restorative, and occlusal health around all remaining teeth that are not to be extracted. Such a clinical outlook is at the expense of ethical, comprehensive care, and must be avoided at all times.

Clinical presentations of different patients may appear similar, despite dramatic differences in etiology and individual patient needs. It is crucial that the conscientious clinician utilize all tools at his or her disposal to differentiate between various clinical entities.

It is also imperative that the periodontal restorative dynamic be understood in its complexity, and managed comprehensively, to maximize treatment endpoints. All periodontal therapies have restorative ramifications. Similarly, all restorative therapies have periodontal ramifications. One of the goals of the conscientious clinician must be to determine the relative influence of each discipline on the treatment considered in a given clinical scenario, and manage all aspects of this interrelationship appropriately.

Most if not all clinicians would agree that reconstructive therapy must be grounded in sound periodontal prosthetic principles. It is important to realize the same is true for a single restoration.

Periodontal procedures cannot be considered without understanding their far-reaching restorative ramifications. All therapies succeed or fail depending upon how periodontal and restorative concerns are managed, both individually and as interdependent entities.

The introduction by Amsterdam and Cohen (1) of the concept of periodontal prosthesis almost 50 years ago helped to define this interrelationship. While complex, state of the art therapies were presented and the results were documented over decades, such execution was not the greatest contribution the concepts of periodontal prosthesis have made to modern clinical practice. Rather, periodontal prosthesis afforded clinicians something even more important. A system was presented by which comprehensive record taking, diagnosis, and treatment planning could be carried out with specific treatment endpoints in mind, resulting in long-term therapeutic success. The advent of implant therapy has done nothing to change this concept. Comprehensive care mandates thorough examination and record taking, a multifactorial diagnosis, and interdisciplinary treatment planning to maximize therapeutic outcomes. Case types may be categorized as follows.

THE PERIODONTAL RESTORATIVE CASE

A patient presents with significant periodontal concerns, manifesting themselves as hard- and soft-tissue changes, deepening pocket depths, and inflammation. In these situations, restorative therapy may be required to help improve the outcomes of comprehensive periodontal treatment. Restorative therapy often includes splinting of mobile teeth, coverage of sensitive roots, and correction of occlusal abnormalities to improve periodontal prognoses.

It is important to realize that while less mobility is always desirable, increased mobility patterns should not be viewed as a contraindication to periodontal or restorative therapies of various complexities. Increased mobility, if it is not to such a degree as to result in either continued dysfunction or tooth extraction, will not negatively impact long-term prognosis to a significant degree. However, should fixed partial dentures be contemplated to replace a missing tooth or teeth, additional teeth may be required to serve as abutments in the presence of increased tooth mobility, to afford the necessary stability to the fixed partial denture under function. Increasing mobility should be viewed as a highly significant negative factor when determining expected prognoses for various therapies, and may be an absolute contraindication, to performing complex treatments on given teeth rather than removing these teeth and replacing them with implant-supported prosthetics. This type of case will not be discussed in detail, as it is not the purpose of this text.

THE RESTORATIVE PERIODONTAL CASE

Maximization of long-term restorative treatment outcomes is highly dependent upon the periodontal milieu into which restorative therapy is placed. A harmonious occlusion, probing depths of 3 mm or less, no horizontal furcation involvements, stable bands of attached keratinized tissue of at least 3 mm in the apico-occlusal dimension and 2 mm in the buccolingual dimension, and restorative margin positions that are accessible to the patient for predictable home-care efforts are all prerequisites for attainment of successful restorative treatment outcomes.

The methods available to attain these goals will be discussed in detail throughout the text. A restorative periodontal case is one that requires periodontal intervention not to eliminate active periodontal diseases, but rather to appropriately prepare the periodontium for reception of restorative dentistry. Such therapies may include, for example, hard- and/or soft-tissue crown lengthening, soft-tissue augmentation, ondontoplasty, and frenectomy.

INTRODUCTION OF ORTHODONTIC THERAPY INTO EITHER CASE TYPE

Although this is not the format in which to discuss complex full-mouth orthodontic therapy, appropriate utilization of orthodontic treatment approaches in isolated areas will significantly enhance the functional and aesthetic outcomes of therapy in both periodontal restorative cases and restorative periodontal cases. Such orthodontic utilization includes:

- alignment of malpositioned teeth to improve ease of patient home care
- alignment of malpositioned teeth to ameliorate off-angle functional and parafunctional forces
- establishment of more ideal occlusal planes
- establishment of flatter occlusal planes with shallower incisal guidance to help ameliorate forces being placed upon the anterior teeth
- tooth reangulation for ease of prosthetic therapy
- tooth reangulation to assist in patient home-care efforts
- tooth uprighting to help eliminate cemento-enamel junction position induced osseous defects (Figs. 1.1–1.6)
- tooth supereruption in anticipation of crown-lengthening osseous surgery in the aesthetic zone, to allow appropriate restoration and maintenance of a compromised tooth without negatively affecting patient aesthetics and/or allow crown lengthening without compromising the support of the adjacent teeth (Figs. 1.7–1.15)

Fig. 1.1 A mesially tilted second molar demonstrates an infrabony defect due to cementoenamel junction positions.

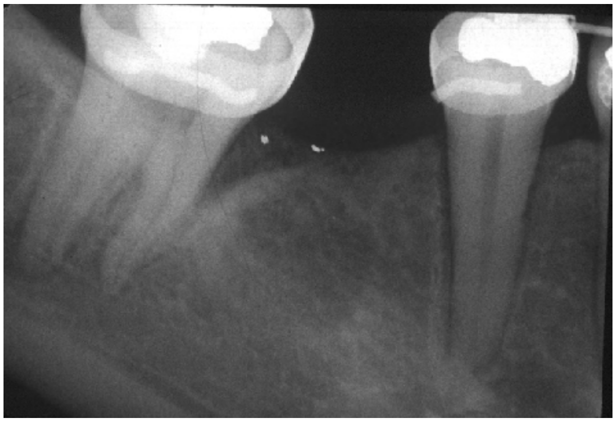

Fig. 1.2 Orthodontic uprighting of the tilted molar is beginning to eliminate the infrabony defect that was present.

Fig. 1.3 The molar has been brought into an appropriate position. No infrabony defect remains. Note the "bone regeneration" on the mesial aspect of the molar.

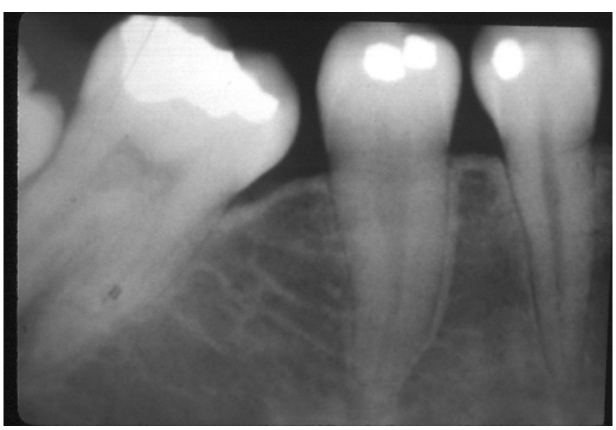

Fig. 1.4 A severely tilted second molar demonstrates an "infrabony defect" on its mesial aspect. Note the positions of the cementoenamel junctions.

Fig. 1.5 Molar uprighting is proceeding. Note the elimination of the defect on the mesial aspect of the molar.

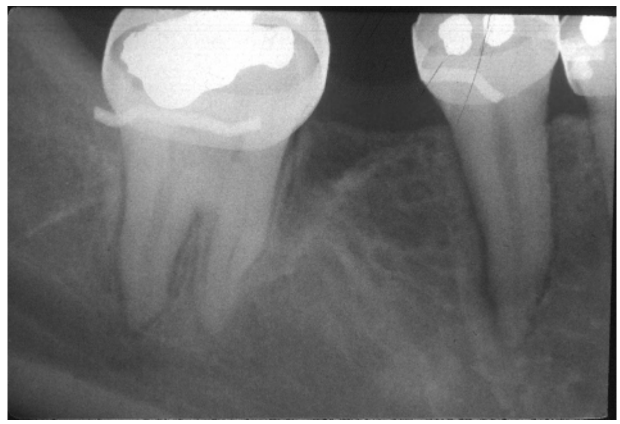

Fig. 1.6 Upon completion of orthodontic uprighting, no infrabony defect remains on the mesial aspect of the second molar.

Fig. 1.7 A 51-year-old female presents with caries on her mandibular right first and second premolars. The caries on the first premolar extends approximately 3 mm apical to the alveolar crest. Attempts at crown-lengthening osseous surgery around the first premolar would require removal of extensive supporting bone from the adjacent teeth.

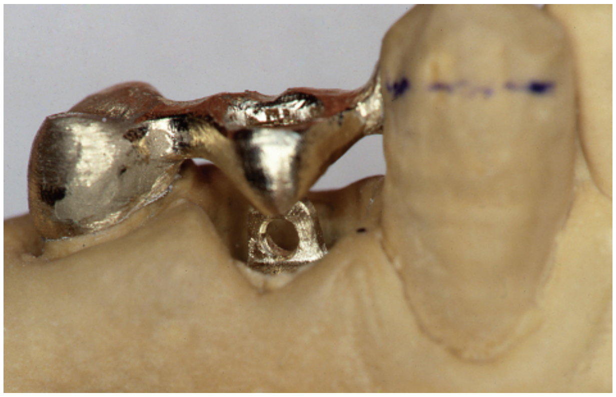

Fig. 1.8 A laboratory view of the fixed orthodontic appliance that will be cemented in place and will engage the root of the mandibular first premolar.

Fig. 1.9 A lingual view of the fabricated orthodontic appliance.

Fig. 1.10 A lingual view of the orthodontic appliance in place. The area is temporized around the appliance to help ameliorate the patient's aesthetic concerns.

Fig. 1.11 A buccal view of the supereruptive appliance and temporary prosthesis in place.

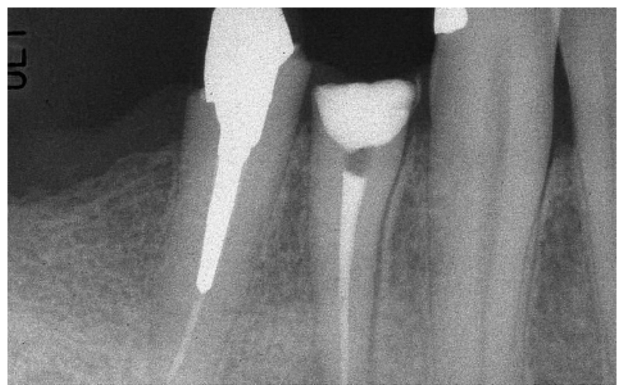

Fig. 1.12 Following supereruption of the root of the mandibular first premolar, crown-lengthening osseous surgery may now be performed without unduly compromising the alveolar support of the adjacent teeth.

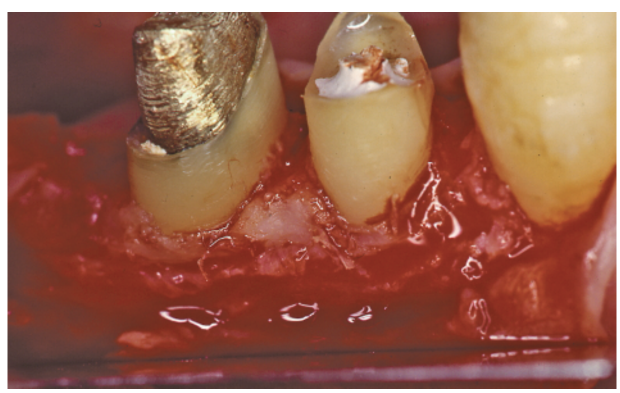

Fig. 1.13 Crown-lengthening osseous surgery has been performed around both mandibular premolars.

Fig. 1.14 Following suturing of the mucoperiosteal flaps at alveolar crest and replacement of the provisional restoration, the extent of crown lengthening that has been attained is evident.

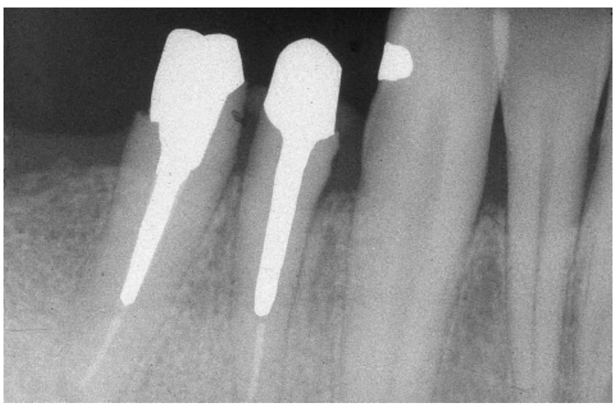

Fig. 1.15 A radiograph taken after post and core fabrication and insertion into the mandibular premolars demonstrates the relationship of the planned restorative margins to the alveolar crests.

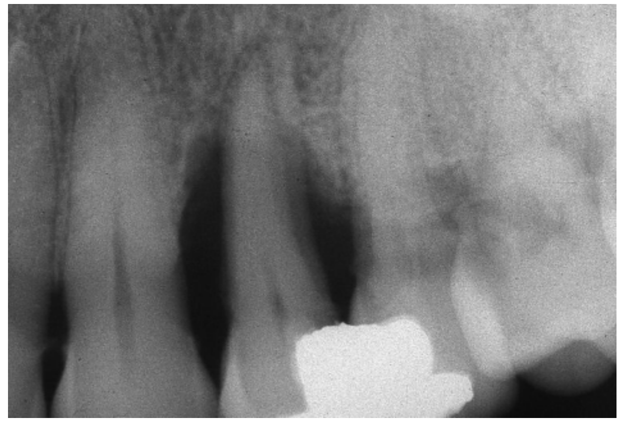

Fig. 1.16 A 62-year-old male presents with a hopeless prognosis for his maxillary left first premolar. Note the extensive bone loss around this tooth, which is affecting the support of the adjacent teeth.

Fig. 1.17 Following orthodontic supereruption of the hopeless maxillary left first premolar, the osseous defects that were present have been resolved, with no loss of alveolar bone on the facing surfaces of the adjacent teeth. The patient now presents with an ideal alveolar crest for implant placement, and maximization of the periodontal health of the adjacent teeth.

- supereruption prior to tooth extraction to extrude hard and soft tissues, improve aesthetics in the papillary and/or marginal areas, and afford site preparation in anticipation of either pontic or implant crown placement (Figs. 1.16–1.20)

CLINICAL EXAMPLE ONE

A 51-year-old female presents with extensive caries on her mandibular right first and second premolars. The caries on the first premolar extends approximately 3 mm apical to the osseous crest. Attempts at crown-lengthening osseous surgery would result in removal of extensive and significant supporting alveolar bone from the distal aspect of the cuspid and the mesial aspect of the second premolar (Fig. 1.7).

Following caries excavation on both mandibular premolars, an impression is taken and a fixed orthodontic appliance is fabricated, which will be utilized to supererupt the root of the first premolar. This orthodontic appliance will be fixed to the cuspid and second premolar, and will engage a

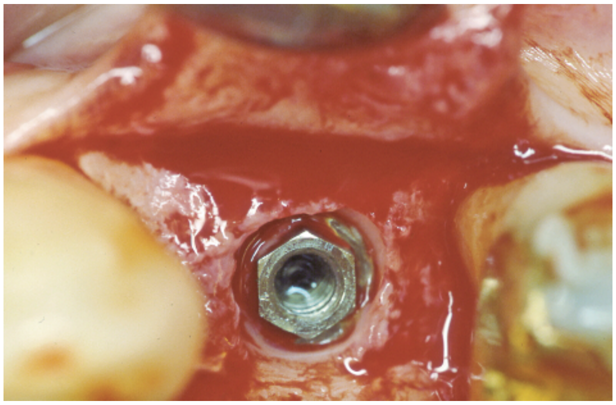

Fig. 1.18 The alveolar bone crest, which has been repositioned through orthodontic supereruption, is evident following implant placement in the maxillary left first premolar position.

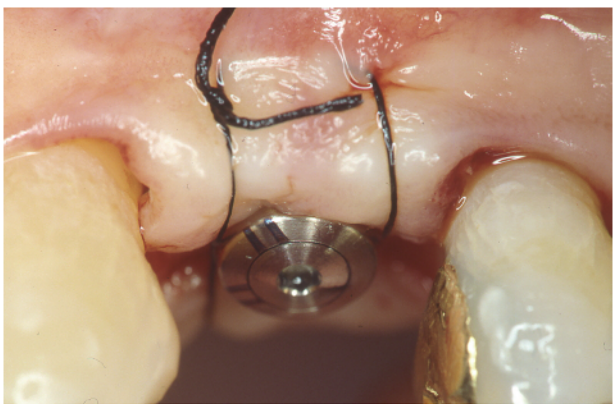

Fig. 1.19 The mucoperiosteal flaps are sutured in the desired positions with interrupted silk sutures.

Fig. 1.20 A radiograph taken after implant placement demonstrates the ideal contour and position of the alveolar crest, which was rebuilt utilizing orthodontic supereruptive techniques.

specifically designed post in the root of the first premolar (Figs. 1.8, 1.9). Once the orthodontic appliance is inserted, a temporary provisional restoration is placed over both the first and second premolars to help satisfy the patient's aesthetic concerns (Figs. 1.10, 1.11). Following supereruption of the root of the first premolar, the orthodontic appliance and the orthodontic post in the root of the first premolar are removed. A radiograph taken at this time demonstrates that the supererupted mandibular first premolar can now be safely crown lengthened without compromising the prognoses of the adjacent teeth (Fig. 1.12).

Crown-lengthening osseous surgery is carried out (Fig. 1.13). The technical aspects of this therapy will be described in detail in Chapter 2. Following suturing of the buccal and lingual mucoperiosteal flaps at osseous crest with interrupted silk sutures, the provisional restorations are replaced on the crown-lengthened first and second mandibular premolars (Fig. 1.14). The extent of crown lengthening that has been attained is evident. A radiograph taken following post and core buildup and preparation of the mandibular right first and second premolars demonstrates that adequate dimensions are present between the planned restorative margins and the osseous crest to allow development of a healthy periodontal attachment apparatus. Neither the cuspid nor second premolar have been compromised by the crown-lengthening therapy that has been carried out (Fig. 1.15).

CLINICAL EXAMPLE TWO

A 62-year-old patient presents with a periodontally hopeless maxillary left first premolar. Radiographically, extensive osseous loss is present around this tooth. In addition, the thin nature of the remaining supporting alveolar bone on the distal aspect of the maxillary cuspid and the mesial aspect of the maxillary second premolar is evident (Fig. 1.16). Extraction of the first premolar and performance of simultaneous regenerative therapy, with or without implant placement, would place this thin supporting alveolar bone at risk, and potentially compromise the long-term prognoses of the cuspid and second premolar.

Following orthodontic supereruption of the hopeless root of the first premolar, both resolution of the aforementioned periodontal defect and maintenance of all supporting bone on the adjacent teeth are evident (Fig. 1.17). This root may now be extracted and an implant safely placed, without compromising the prognoses of the adjacent teeth.

Following reflection of buccal and palatal mucoperiosteal flaps, an implant is placed in the position of the maxillary left first premolar (Fig. 1.18). The interproximal alveolar bone, which has been maintained and rebuilt through orthodontic supereruption, is evident. The mucoperiosteal flaps are sutured at the desired positions, utilizing interrupted 4-0 silk sutures (Fig. 1.19). A radiograph taken following implant placement demonstrates an ideal alveolar ridge form and the health of the periodontal attachment apparatus on the facing surfaces of the adjacent teeth (Fig. 1.20).

CLINICAL EXAMPLE THREE

A 47-year-old female presents with a fractured maxillary central incisor (Fig. 1.21). A radiograph demonstrates extensive bone loss between the fractured maxillary central incisor and the adjacent lateral incisor (Fig. 1.22). Extraction of this tooth, with or without concomitant regenerative therapy and/or implant placement, would result in significant shrinkage of the soft tissues and loss of the interdental papilla in the region.

Following removal of the fractured portion of the central incisor, the root is supererupted with a fixed orthodontic appliance (Fig. 1.23). A radiograph taken during the supereruptive process demonstrates how the attachment apparatus and alveolar bone have been "brought coronally" along with the retained root of the maxillary central incisor (Fig. 1.24). The retained root is extracted without reflecting a flap, so as to minimize trauma to the hard and soft tissues in the area (Fig. 1.25). Examination of the extracted root

Fig. 1.21 A 47-year-old female presents with a fractured maxillary central incisor.

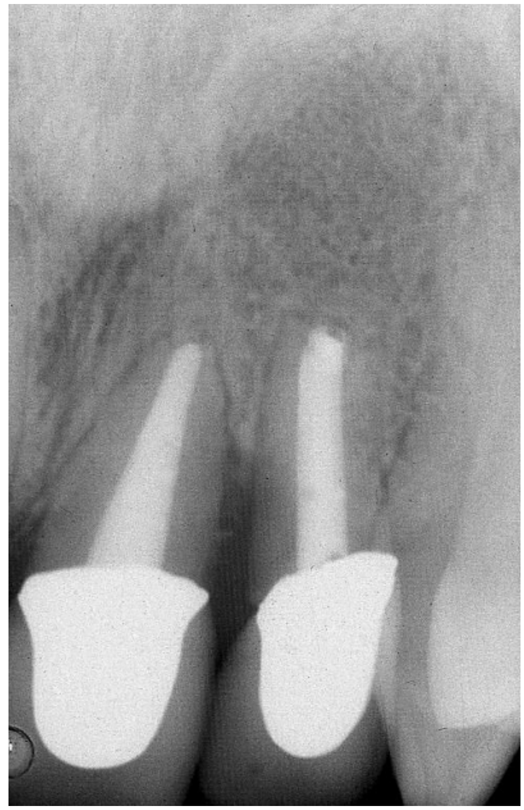

Fig. 1.22 Significant bone loss is evident radiographically between the fractured central incisor and the adjacent lateral incisor.

Fig. 1.23 Following removal of the fractured portion of the central incisor, the retained root is supererupted utilizing a fixed orthodontic appliance.

Fig. 1.24 A radiograph taken during the supereruptive process demonstrates coronal repositioning of the alveolar bone between the central and lateral incisors.

Fig. 1.25 The retained root of the central incisor is removed without reflecting a mucoperiosteal flap, so as to minimize trauma to the hard and soft tissues in the area.

demonstrates the orientation of the periodontal ligament fibers, which results during supereruption (Fig. 1.26). The attachment of these fibers to the surrounding alveolar bone is critical when this bone is to be repositioned coronally.

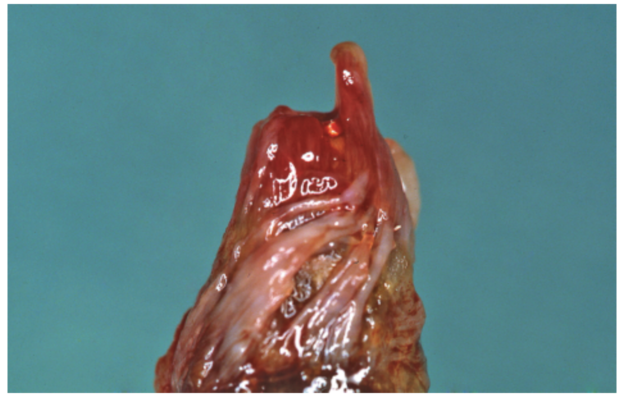

Fig. 1.26 Note the orientation of the periodontal ligament fibers on the root surface, as a result of the supereruptive process.

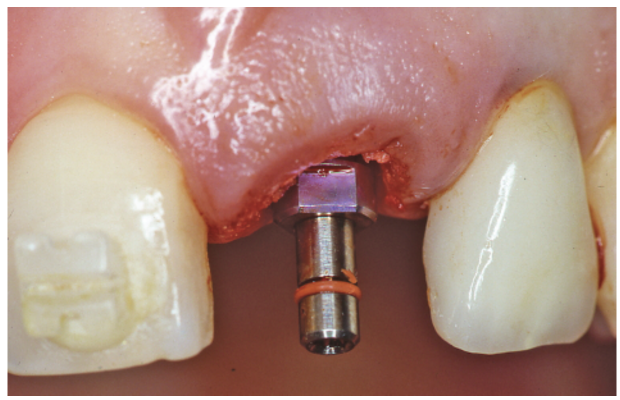

Fig. 1.27 Following implant placement, the soft-tissue papillae have been maintained.

Following implant placement, retention of the interproximal soft-tissue papillae is evident (Fig. 1.27). The volume of bone that has been brought into position on the mesial aspect of the lateral incisor is highlighted in a radiograph taken following implant placement (Fig. 1.28). This alveolar bone will be crucial to the support and maintenance of the interproximal papilla, and thus the patient's aesthetics following completion of therapy. Retention of the interproximal papillae and acceptable aesthetics are noted following temporization of the implant (Fig. 1.29).

While supereruption offers considerable potential clinical advantages, it is imperative that the possible disadvantages of such therapy be recognized and considered when formulating a comprehensive treatment plan. These disadvantages

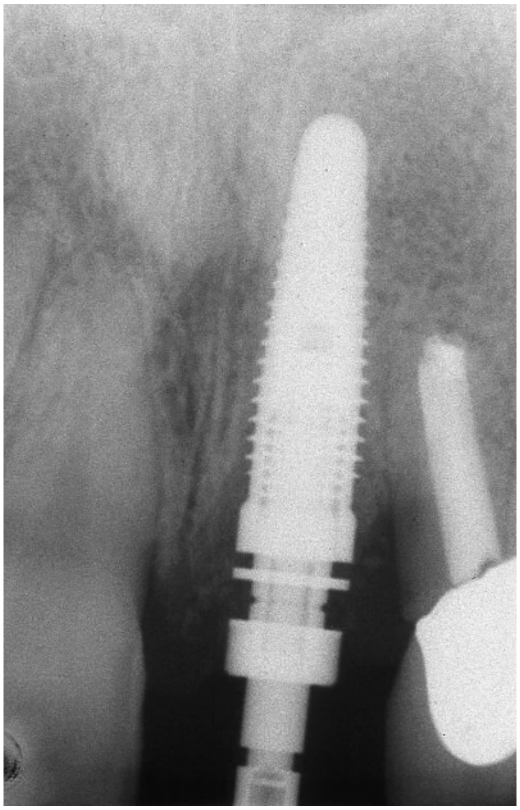

Fig. 1.28 A radiograph taken following implant placement demonstrates the extensive repositioning of the alveolar bone which has taken place on the mesial aspect of the lateral incisor. This bone will be crucial to the support and maintenance of the interproximal soft-tissue papilla.

Fig. 1.29 Following implant temporization, retention of the interproximal papilla between the implant and the lateral incisor is evident.

include the time and expense involved in supereruption. In addition, supererupting a maxillary lateral incisor to the point where it will demonstrate a poor crown-to-root ratio following restoration is not in a patient's best interest. Orthodontic considerations will be discussed in Chapter 6.

INTRODUCTION OF REGENERATIVE AND/OR IMPLANT THERAPIES

Such treatments may impact the partially edentulous patient on a number of levels, including replacement of less-predictable therapies, replacement of more costly therapies, augmentation of existing therapies, introduction of newer therapies, and simplification of therapy. Use of implants is not the topic under consideration in this text. For a detailed discussion, see Fugazzotto (2009) (2).

Regardless of which therapeutic approaches are utilized, maximization of treatment outcomes is dependent upon identification of etiologic factors, a thorough and insightful diagnosis, and formulation of a multidisciplinary, comprehensive treatment plan. The importance of these considerations is highlighted in the two cases presented below.

CLINICAL EXAMPLE FOUR

A 57-year-old male, presented with severe wear of his maxillary and mandibular anterior teeth, caries on many older restorations, and general aesthetic dissatisfaction (Figs. 1.30, 1.31). Prior to formulating a treatment plan and initiating active therapy, a determination must be made as to whether or not this is an example of tooth wear and loss of vertical dimension, or if vertical dimension has been maintained as the anterior teeth have worn due to the presence of a parafunctional habit. Examination of the occlusal surfaces of the maxillary and mandibular posterior teeth (Figs. 1.32, 1.33) demonstrates retention of the anatomy initially developed in the restorations and a lack of occlusal wear. Loss of vertical dimension has not occurred.

The severe anterior wear that has been noted is a result of the patient bringing his lower jaw into a protrusive position and demonstrating a parafunctional habit solely on his anterior teeth. As these teeth have worn down, the maxillary anterior teeth have supererupted. As a result,

Fig. 1.30 A clinical view of a patient at initial presentation. Note the severe wear of the maxillary and mandibular anterior teeth.

Fig. 1.31 Severe wear of the mandibular left cuspid by the opposing full coverage restoration is evident.

crown-lengthening osseous surgery and restoration of the teeth in question will be required to address the patient's aesthetics concerns.

Accurate full arch impressions were taken and diagnostic casts poured. A face-bow transfer was taken. The diagnostic casts were duplicated in the dental laboratory and all of the casts were cross mounted on an Artex Articulator (Jensen Industries, North Haven, CT). Diagnostic waxups were performed on the duplicate casts as follows: The casts were modified to reposition the gingival margins to ideal aesthetic levels. These levels were determined by measuring the full-coverage restoration

Fig. 1.32 An occlusal view of the maxillary teeth. Note the lack of occlusal wear.

Fig. 1.33 An occlusal view of the mandibular teeth. Note the lack of occlusal wear.

of the maxillary lateral incisor. As no wear had occurred to the occlusal surface of this restoration and the mesiodistal dimensions of the teeth were intact, the ideal lengths of the original teeth could be assessed utilizing well-established proportional measurements. Taking the existing maxillary anterior incisal positions as ideal, the casts were modified accordingly to provide the determined ideal tooth lengths (Fig. 1.34).

A vacuform shell was fabricated in the laboratory on a modified diagnostic cast, which

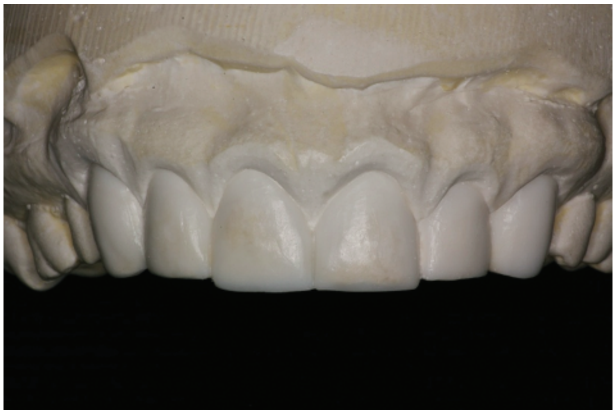

Fig. 1.34 The mounted models have been carved to attain the desired gingival margin positions, and a waxup of the models has been carried out.

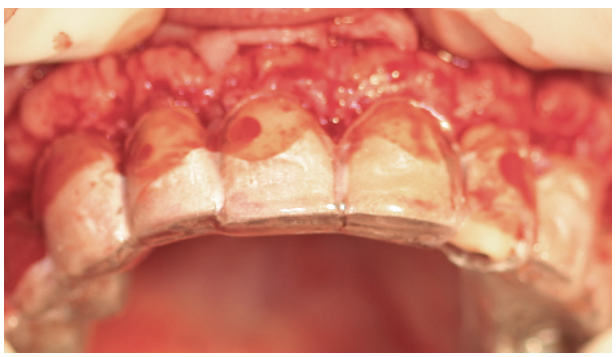

Fig. 1.35 The fabricated guide is placed on the maxillary teeth following flap reflection.

demarcated the desired gingival margin positions. Following full thickness flap reflection, the guide was placed over the maxillary teeth. Osseous resective therapy was performed to ensure a 2.5-mm dimension between the osseous crests and the demarcated gingival margin positions on the guide (Figs. 1.35, 1.36). It is crucial that this dimension be attained, to ensure development of the soft tissues at the appropriate levels following healing. It is also necessary to reduce buccal osseous ledging appropriately. As will be discussed in Chapter 2, failure to do so will result in the soft-tissue margins healing too far coronally, due to the soft tissues having to traverse the buccal osseous ledging and make their way to the tooth surfaces.

Following appropriate periodontal crown-lengthening surgery, with buccal and palatal/lingual reduction being carried out as necessary,

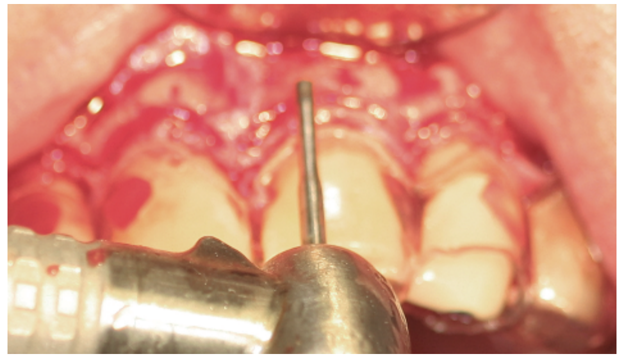

Fig. 1.36 Osseous resection has been carried out to ensure a 2.5-mm dimension between the osseous crest and the desired final gingival margin.

Fig. 1.37 A clinical view of the final restorations in place.

final full-coverage restorations were placed to restore the teeth following caries excavation and to address the patient's aesthetic desires (Fig. 1.37). Two bite appliances were fabricated. The patient wore the maxillary appliance at night, and the mandibular appliance during the day.

CLINICAL EXAMPLE FIVE

A 62-year-old male, presented with severe wear and chipping of his maxillary and mandibular anterior teeth (Figs. 1.38, 1.39). Extensive caries was noted around all abutments of the existing fixed prostheses. Teeth numbers 3, 7, and all remaining mandibular molars, demonstrated poor long-term prognoses due to a combination of caries and periodontal disease. A 15-mm long, 4.1-mm wide IMZ implant had been in place for over 15 years, and demonstrated no peri-implant bone loss, in the position of tooth number 18.

Fig. 1.38 A patient presented with worn and chipped maxillary and mandibular anterior teeth.

Fig. 1.39 The compromised condition of the maxillary and mandibular anterior teeth is evident.

Fig. 1.40 An occlusal view of the maxillary arch demonstrates significant occlusal wear.

Fig. 1.41 An occlusal view of the mandibular arch demonstrates severe occlusal wear.

During the course of diagnosis, a determination had to be made whether this patient demonstrated loss of vertical dimension, or a situation similar to that of the previous patient (no loss of vertical dimension, but wear of the anterior teeth due to an eccentric parafunctional habit). Severe occlusal wear was noted upon examination of the occlusal surfaces of the maxillary and mandibular posterior teeth (Figs. 1.40, 1.41). As a result, it was determined that this patient had lost vertical dimension. Therefore, crown-lengthening osseous surgery was not required. Rather, an appropriate vertical dimension must be reestablished, and the teeth restored to this dimension.

The mounted diagnostic casts were next examined (Fig. 1.42). Because the mesiodistal dimensions of the maxillary anterior teeth had not changed as a result of tooth wear, a determination could be made as to the pretraumatic, ideal lengths of these teeth, utilizing well-established proportions. Following such calculations, it was determined that the patient would have to have his vertical dimension increased by 5 mm in the anterior region (Fig. 1.43), to accommodate reestablishment of appropriate maxillary and mandibular tooth lengths, and acceptable overbite and overjet relationships.

However, a patient's vertical dimension cannot be increased by such an extent without first ensuring that these changes will not induce discomfort or other untoward symptoms. This

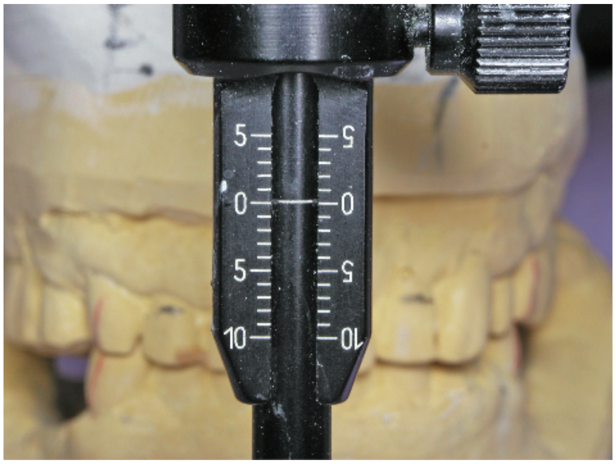

Fig. 1.42 Impressions were taken and the models were mounted with face-bow records.

Fig. 1.44 A view of a mandibular occlusal repositioning appliance, which had been made for another patient.

Fig. 1.43 The patient's vertical dimension was increased by 5 mm in the anterior region.

Fig. 1.45 A view of the metal framework for the planned maxillary provisional restoration.

determination must be made before fixed temporization is carried out. To accomplish this, a mandibular occlusal repositioning appliance (MORA) was fabricated and inserted. This appliance overlays the mandibular teeth, is worn at all times except during mastication, and is wholly reversible (Fig. 1.44). Such an appliance may also be used to help assess planned jaw repositioning. After 6 weeks of appliance use, the patient exhibited no untoward symptoms. It was therefore determined that he could be restored to the desired vertical dimension.

Because of the extensive regenerative and implant therapies required, treatment would last approximately 18 months. This fact, combined with the need to establish a new vertical dimension for the patient, mandated the use of cast-metal-framework provisional restorations. Wire-reinforced provisional restorations are never utilized, due to their relative frailty. All too often wires serve no purpose other than to hold together broken portions of the provisional restorations. Rather, the provisional restorations are reinforced with the cast framework.

Because implants were to be placed following bone regeneration, and retrofitted to the existing prostheses following osseointegration, specific framework designs were employed (Figs. 1.45,

Fig. 1.46 A view of the metal framework for the planned mandibular provisional restoration.

Fig. 1.47 A view of the metal framework reinforced maxillary provisional restoration, and the clear shell of the provisional restoration, which will be relined and will serve as a precise surgical guide.

1.46). The shape of this framework afforded the desired reinforcement of the provisional restoration, while allowing the pontic areas to be hollowed out, so that the provisional restoration could be retrofitted to the osseointegrated implants utilizing abutments and acrylic. Once the osseointegrated implants were incorporated into the provisional restorations, hopeless teeth that had been utilized to support the provisional restorations would be extracted. They would be replaced with implants at the time of tooth extraction with concomitant regenerative therapy, or following regenerative therapy in the extraction socket areas, depending upon the residual extraction socket morphologies and the ability to ideally position implants into the extraction sockets. The maxillary and mandibular full arch provisional restorations were fabricated (Figs. 1.47, 1.48), in the above-described manner.

Therapy proceeded as follows:

Fig. 1.48 A view of the mandibular metal framework reinforced provisional restoration, and the clear shell of the provisional restoration, which will be relined and will serve as a precise surgical guide.

A. The patient's maxillary and mandibular arches were provisionalized in one day (Fig. 1.49). The temporary fixed prostheses were then removed. At the time of provisional restoration fabrication, clear duplicate shell provisional restorations were fabricated. These clear provisional restorations were to be utilized as surgical guides during implant placement. To properly locate the guides during implant placement, the clear provisional restorations were relined with acrylic to the prepared teeth (Fig. 1.50). The pontic areas of planned implant placement had tubes placed into them. The pontics were then filled with acrylic, providing rigid guides for ideal implant placement. The metal frame provisional prostheses were then cemented.
B. The necessary mandibular posterior ridge augmentation therapy was carried out. During this visit, hopeless teeth numbers 3 and 7 were also extracted, and regenerative therapy was performed in the extraction socket areas.

Fig. 1.49 The patient's maxillary and mandibular arches have been provisionalized during one clinical visit.

Fig. 1.50 Clear shells of the provisional restorations are relined and will serve as precise surgical guides.

C. Following maturation of the regenerating hard tissues, implants were placed in the desired maxillary and mandibular positions.
D. Upon completion of osseointegration, impressions were taken and fabrication of the final implant and natural-tooth-supported prostheses began (Fig. 1.51, 1.52).
E. The final restorations were completed and inserted in the patient's mouth (Fig. 1.53).
F. A bite appliance was fabricated to be worn at night indefinitely by the patient.

Disparate etiologies may result in clinical pictures that at first seem similar. However, appropriate patient examination and diagnosis will identify contributing etiologies and direct the formulation of an appropriate interdisciplinary,

Fig. 1.51 A view of mandibular restorations on the implants and natural teeth on the models.

Fig. 1.52 A view of the metal frameworks on the implants and natural teeth in the mandibular arch.

Fig. 1.53 A view of the maxillary and mandibular final restorations in place.

comprehensive treatment plan. Failure to perform such therapy significantly compromises long-term patient outcomes.

Determining Periodontal Treatment Endpoints

Effective patient home care, coupled with regular professional maintenance, are the cornerstones of all successful therapy. A patient who is unwilling or unable to demonstrate the necessary level of plaque removal efficacy and commitment should never be considered a candidate for interdisciplinary therapy. Rather, all efforts must be made through instructional, motivational, technical, and chemical means to help the patient in question control plaque levels and thus provide a reasonable milieu for the acceptance of the necessary dentistry. Failure to demand such a level of plaque control results in therapeutic failure, and increased levels of frustration and anxiety for both the patient and the treating clinicians.

While the patient has an obligation to make every effort to perform appropriate plaque control, it is imperative that the treating clinicians provide the patient with a milieu that is most conducive to effective plaque control, and that provides the greatest chance of a favorable long-term prognosis.

When faced with active periodontal disease, one of seven therapies may be employed (see Table 1.1).

1. *No treatment*: Whether such a decision is due to the patient's refusal of active therapy, or the patient's physical, financial, or psychological inability to undergo the necessary treatments, it is important to recognize the short- and long-term risks to oral and overall health represented by such a decision. Periodontal diseases are self-propagating disease entities. If no active therapy is carried out to halt disease progress, extension of the disease will result in tooth loss. When a patient refuses necessary care, every effort should be made to motivate the patient to pursue treatment, and to adapt the treatment to the individual patient.
2. *Subgingival debridement and institution of a regular professional prophylaxis schedule*: In many cases, such an approach does not halt the ongoing periodontal disease processes, but merely slows the rate of attachment loss. This treatment option is indicated for patients who are physically, financially, or psychologically unable to undergo more comprehensive therapy, in an attempt to delay tooth loss. Other than patients of an advanced age who have demonstrated moderate attachment loss, most patients are ill suited to such actuarial therapeutic regimens. The potential dangers to adjacent teeth must also be recognized.
3. *Surgical therapies aimed at defect debridement and/or pocket reduction:* These treatment approaches represent a significant compromise in therapy. As a patient who has undergone such surgical intervention is left with a milieu that is highly susceptible to further periodontal breakdown, the need for retreatment and the potential damage to the attachment apparatuses of adjacent teeth must be weighed. This treatment option offers minimal advantages over debridement, and no advantages when compared to the treatment approaches described below.
4. *Resective periodontal surgical therapy, including elimination of furcation involvements, in an effort to ensure a post therapeutic attachment apparatus characterized by a connective tissue attachment to the root surface, followed by a short junctional epithelial adhesion to the root surface, and elimination of probing depths greater than 3 mm:* While such a treatment approach offers the greatest chance of preventing reinitiation of periodontal disease processes, it must be utilized appropriately. Osseous resective therapy that results in irreversible compromise of a given tooth, the initiation of secondary occlusal trauma due to reduced periodontal support and a poor crown-to-root ratio, or an aesthetically unacceptable treatment result should not be considered ideal therapy, especially as the advent of regenerative and implant therapies affords additional treatment options in previously untenable scenarios.
5. *Periodontal regenerative therapy aimed at rebuilding lost attachment apparatus and surrounding alveolar bone*: Due to a history of misunderstanding of the indications and contraindications of periodontal regenerative therapy, and less than fully defined

Table 1.1. Treatment options for periodontally involved teeth.

Options	Advantages	Disadvantages
No treatment	Patient undergoes least amount of therapy.	Disease will continue to progress resulting in disease loss.
Subgingival debridement	Patient undergoes minimal amount of therapy. Ongoing disease process is slowed.	Disease process is not halted. Continued loss of attachment apparatus and eventual loss of teeth will occur.
Surgical debridement and/or pocket reduction	More thorough debridement than previous treatment options	Reinstitution of disease process is common. Attachment loss and eventual tooth loss
Resective periodontal therapy with elimination of furcations and no pocket depths greater than 3 mm	Delivers the most predictable attachment apparatus post therapy. Periodontal prognosis is optimized.	Patient must undergo various surgical therapies. Treatment is highly technique sensitive.
Regenerative therapy to rebuild lost attachment apparatus and alveolar bone	Lost tissues are regained. Prognosis is excellent when therapy is successful.	Poor understanding of prerequisites to delivery of therapy compromises results. Treatment is not as predictable as resective therapy.
Tooth removal with implant placement and regeneration if needed	Questionable teeth are eliminated. Therapy is predictable. Prognosis is excellent.	Teeth are lost. Highest cost of therapy
Combination of above therapies	As listed above	Potential highest cost of therapy

diagnostic systems, treatment outcomes have proven highly inconsistent. When utilized in the appropriate manner in stringently diagnosed and selected periodontal defects, guided tissue regeneration yields highly predictable treatment outcomes. The advent of new materials offers the potential for even more impressive regenerative results.

6. *Tooth removal with either simultaneous regenerative therapy and implant insertion or guided bone regeneration with subsequent implant placement and restoration*: Despite their high level of predictability, regenerative and implant therapies must not be viewed as a panacea. To remove teeth that may be predictably maintained through more conservative therapies that will yield acceptable treatment outcomes is unconscionable. It is also unreasonable to maintain compromised teeth that will eventually be lost or to subject a patient to an inordinate amount of therapy or expense to keep teeth that may be more simply and predictably replaced by implants.
7. *A combination of the above therapies:* Patients are all too often viewed as either “periodontal patients” or “implant patients.” Patients are neither.

Rationale for Pocket-Elimination Periodontal Surgery

Pocket elimination, which has long been advanced as one of the primary endpoints of periodontal therapy, is most frequently accomplished through osseous resective surgery.

The primary goal of pocket-elimination therapy is to deliver to the patient an environment that is conducive to predictable, long-term periodontal health, both clinically and histologically. As such, the objectives are as follows:

1. Pocket elimination or reduction to such a level where thorough subgingival plaque control is predictable for both the patient and the practitioner.

2. A physiologic gingival contour that is conducive to plaque-control measures. Soft-tissue concavities, in the area of the interproximal col and elsewhere, soft-tissue clefts, and marked gingival margin discrepancies are eliminated.
3. The establishment of the most plaque-resistant attachment apparatus possible. This includes the elimination of long junctional epithelial relationships to the tooth surface where possible, and the minimization of areas of nonkeratinized marginal epithelium, especially in the presence of restorative dentistry.
4. The elimination of all other physical relationships that compromise patient and professional plaque-control measures. These include furcation involvements and subgingival restorative margins.
5. A clinically maintainable milieu. This condition will evolve as a result of the previous four criteria having been met.

Pocket-elimination therapy helps maintain the plaque-host equilibrium in the host's favor, by closing the window of host vulnerability due to characteristics of the periodontium as much as possible.

RATIONALE FOR POCKETING-ELIMINATION PROCEDURES USING OSSEOUS RESECTIVE TECHNIQUES

Periodontal pockets are recognized as complicating factors in thorough patient and professional plaque control. Waerhaug has shown that flossing and brushing are only effective to a depth of about 2.5 mm subgingivally (3). Beyond this depth, significant amounts of plaque remain attached to the root surface following a patient's oral hygiene procedures. Professional prophylaxis results are also compromised in the presence of deeper pockets. The failure of root planing to completely remove subgingival plaque and calculus in deeper pockets is well documented in the literature (4–8). Through the examination of extracted teeth, which had been root planed until they were judged plaque free by all available clinical parameters, Waerhaug (3) demonstrated that instrumentation of pockets measuring 3 mm or less was successful, with regard to total plaque removal, in 83% of the cases. In pockets of 3–5 mm in depth, 61% of the teeth exhibited retained plaque after thorough root planing. When pocket depths were 5 mm or more, failure to completely remove adherent plaque was the finding 89% of the time. Tabita et al. (9) noted that no tooth demonstrated a plaque-free surface 14 days after thorough root planing when the pretreatment pocket depths were 4–6 mm, even in the presence of excellent supragingival plaque control.

Such reinfection of a treated site occurs along three pathways (3, 9):

1. Plaque that remains in root lacunae, grooves, etc., multiplies and repopulates the root surface following therapy.
2. Plaque that is adherent to the epithelial lining of the pocket repopulates the root surface after healing. Complete removal of the epithelial lining of the pocket is not a common finding following curettage (10–12).
3. Supragingival plaque extends subgingivally, beyond the reach of the patient, and adheres to the root surface.

Waerhaug has stated, "If the pocket depth is more than 5 mm, the chances of failure are so great that there is an obvious indication for surgical pocket elimination" (3).

Poor soft-tissue morphologies contribute to increased plaque accumulation. Deep, sharp clefts and marked soft-tissue marginal discrepancies in adjacent areas are contributing factors to inadequate patient plaque control (13).

The morphology of the interproximal soft-tissue col must also be considered. When the buccal and/or lingual peaks of tissue are coronal to the contact point, the gingiva must "dip" under the contact point to reach the other side, resulting in a concave col form (14–16). Because the col tissue touches the contact point, its epithelium does not keratinize (17,18) (Fig. 1.54). Lack of keratinization is not an inherent property of either col or sulcular epithelium, as this tissue will keratinize when it is no longer in contact with the tooth, either as a result of periodontal therapy or eversion (18–20). Nonkeratinized epithelium is less resistant to disruption and penetration by bacterial plaque than its keratinized counterpart (21, 22). When a concave, nonkeratinized col form is present, the patient must try to control an area that is conducive to plaque accumulation and more

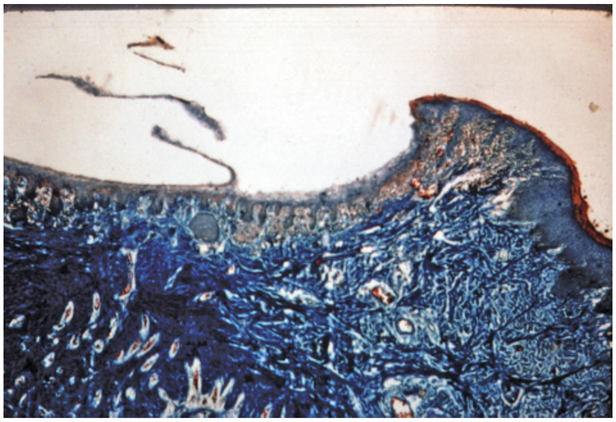

Fig. 1.54 The epithelium covering the soft tissues of the concave interproximal col form is not keratinized, due to the epithelium touching the contact points of the adjacent teeth. This nonkeratinized tissue is more vulnerable to penetration by bacterial by-products.

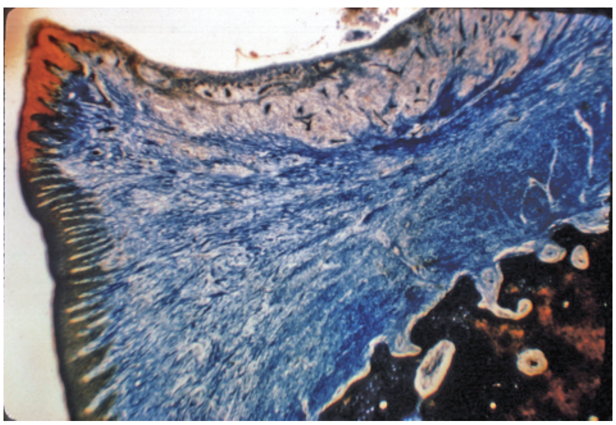

Fig. 1.55 The concave nonkeratinized col form demonstrates significant inflammation and tissue breakdown, as a result of its penetration by bacterial by-products.

easily breached by the plaque and its by-products (Fig. 1.55).

Junctional Epithelial Adhesion or Connective Tissue Attachment?

The tenuous nature of the epithelial adherence to the tooth and the ease with which it is separated from the root surface in the presence of inflammation are well known (23–29). The junctional epithelium represents a dual compromise, as it more easily penetrated by bacterial enzymes and more easily detached in the presence of inflammation

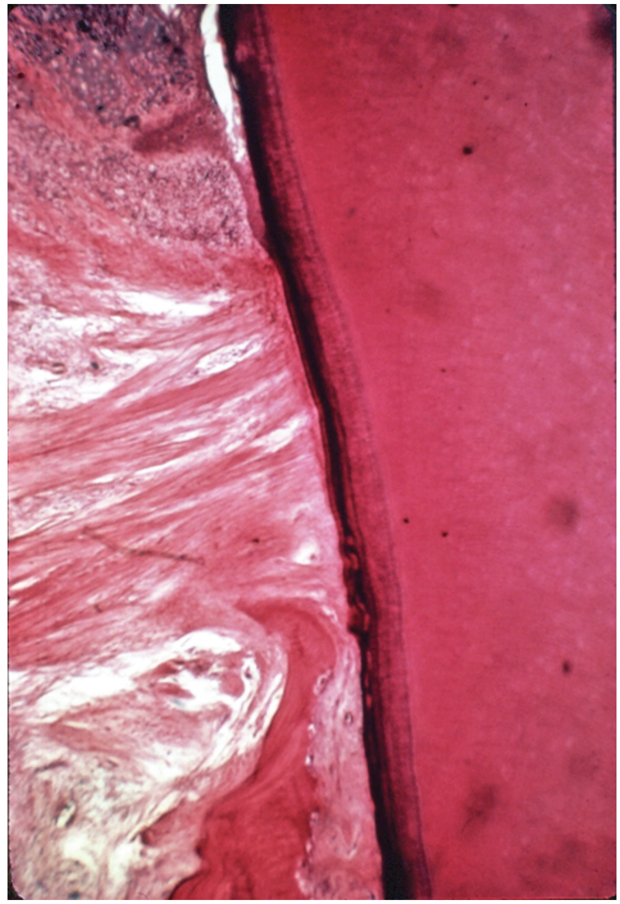

Fig. 1.56 A junctional epithelial adhesion has detached in the face of an inflammatory insult. Note that the connective tissue attachment is still intact apical to the inflammatory infiltrate.

than connective tissue fibers inserted into root cementum (Fig. 1.56). The "initial" periodontal lesion develops as follows:

1. Bacterial accumulation occurs in the gingival sulcus.
2. An increase in the concentration of specific bacterial products takes place.
3. These products penetrate the more permeable junctional epithelium, into the underlying connective tissue.
4. Dilation of the intercellular spaces of the junctional epithelium occurs and polymorphonuclear and mononuclear cells become present.
5. Perivascular collagen destruction takes place.
6. Progression to the "early" periodontal lesion occurs.

In light of its relative biologic and mechanical inferiority when compared to connective tissue attachment to the root surface, the expanse of junctional epithelial adhesion to the tooth should be minimized. This goal is accomplished through appropriate osseous resective surgery with apically positioned flaps. An attachment apparatus is formed, which consists of approximately one millimeter of connective tissue fiber insertion into the root surface, followed by one millimeter of junctional epithelial adhesion coronally (30,31). The connective tissue attachment is derived from a combination of outgrowth of the periodontal ligament and resorption of the osseous crest (32). This result is markedly different than the postsurgical attachment apparatus obtained following either curettage or replaced flap (modified Widman or open-flap curettage) surgery, which demonstrate healing to previously periodontally affected root surfaces by the formation of a long junctional epithelial adhesion (33–51). The length of the junctional epithelium is dependent upon the distance between the osseous crest and the margin of the soft tissue. In contrast, pocket-elimination surgery consistently results in a short junctional epithelium, avoiding the compromises inherent in a longer epithelial adhesive relationship.

The Significance of Furcation Involvements

Horizontal destruction of periodontal support, which results in furcation involvements, is a significant negative factor with regard to long-term prognosis if left untreated. The inaccessibility of even early furcation involvements to proper plaque control measures is well documented (4, 52–55). In addition, "maintenance" care, open and closed debridement, chemical treatment of the root surface, and placement of particulate materials without covering membranes have all failed to demonstrate predictable success in the treatment of the periodontally involved furcation. Removal of the vertical periodontal pocket without eliminating the horizontal component of a furcation involvement results in a compromised environment for the removal of plaque, and contributes to continued periodontal breakdown.

Fig. 1.57 Recurrent caries has developed at the most apical extent of a deep subgingival interproximal restoration.

The Influence of Restorative Margins

Restorative-margin position also influences long-term periodontal health, as plaque accumulation at the restorative-margin–tooth interface is a consistent finding, in both research and clinical practice (56–63). When a restorative margin extends subgingival, the resultant increased plaque accumulation often leads to acceleration of periodontal breakdown and recurrent caries (63, 64) (Fig. 1.57). This fact is especially critical if the attachment apparatus in place includes a long junctional epithelium, as the increased permeability and detachability of a long junctional epithelial adhesion in the face of inflammation lend the long junctional epithelium a greater vulnerability to the increased inflammatory insult inherent in subgingival margin placement.

Does Pocket-Elimination Therapy Work?

Smith et al. (65) and Olsen et al. (66) evaluated the relative efficacies of appropriately executed osseous resection with apically positioned flaps, and apically positioned flaps with root planing alone. Data were pooled by pocket depth and subdivided into tooth surfaces within a given pocket depth, to help elucidate the strengths and differences of the postsurgical attachment apparati. Mesial and distal probing depths were recorded with the probe placed as far interproximally as possible, and angulated to follow the long axis of the tooth. Only lesions that were amenable to resective therapy, and could therefore properly evaluate its applicability, were so treated. Surgical photographs were published, which demonstrated the techniques employed.

Five years postoperatively, statistically significant interproximal pocket-depth differences were noted between the sites treated with and without osseous resective therapy. Pocket depths in the flap curettage areas were approaching preoperative values, while the pocket elimination attained in other sites with osseous therapy was maintained. On the buccal and lingual surfaces, pocket elimination was maintained with both treatment approaches, underscoring both the fragility of a junctional epithelial adhesion and the danger of collapsing data. Radicularly, where patient plaque removal was easier and the junctional epithelium was shorter, pocket elimination was maintained following both types of therapies. However, in interproximal areas where plaque removal was more difficult and there was a longer junctional epithelial relationship to the root surface following root planing, curettage, and apically positioned flap therapy due to the presence of osseous craters, repocketing occurred in sites treated with open-flap curettage. Flap curettage sites that initially probed 4 mm underwent repocketing at 5 years three times more often than sites treated via osseous resection. If initial probing depths were 5 mm, flap-curettage sites repocketed 3.6 times as often as those treated with osseous resection. With initial probings of 6–8 mm, repocketing was six times as likely to occur with open-flap curettage. Bleeding upon probing was encountered 2.3 times more often in sites treated with open-flap curettage than those treated with osseous resection, 5 years postoperatively. As expected, there was a 91% correlation between the presence of subgingival plaque and bleeding upon probing.

Lindhe and Nyman (67) reported the 14-year results of pocket-elimination therapy in 61 patients with advanced periodontal disease preoperatively, who had remained on regular maintenance schedules. Only 0.49 teeth were lost per patient over 14 years. Disease progression was shown to be 20–30 times slower than in Swedes with untreated periodontal disease (68).

Nabers et al. (69) reported upon the results of 1,435 patients treated via pocket-elimination therapy. Patients lost an average of 0.29 teeth per patient over a mean postoperative time of 12.9 years.

Retrospective studies that assess treatment modalities other than pocket-elimination therapy carried out in patients with active periodontal disease demonstrated markedly different results than those reported upon following use of pocket-elimination therapy.

McFall (70) reported an average tooth loss of 2.6 teeth per patient 19 years post-therapy; a ninefold greater tooth loss than that reported by Nabers et al. (69). Similarly, Goldman et al. (71) documented a tooth mortality rate of 3.6 teeth per patient 22.2 years post-active periodontal therapy. Such mortality represented an incidence of tooth loss approximately 13 times greater than that reported by Nabers et al.

Kaldahl et al. (72, 73) compared treatment results in 82 periodontal patients treated in a split mouth design with either root planing, modified Widman surgery, or flap surgery with osseous resection. Breakdown of sites during maintenance care of up to 7 years was greater in areas treated with modified Widman surgery and scaling and root planing than in areas treated with osseous resective therapy. These differences became more dramatic as initial pocket depth increased, underscoring the superiority of osseous resective therapy as a clinical modality for eliminating pockets and rendering areas maintainable over time by patients. Shallower pocket depths, coupled with the biologically stronger attachment apparatus of a short connective tissue attachment and a short junctional epithelium attained after osseous resection, proved more resistant to periodontal breakdown during maintenance than the attachment apparatus of a short connective tissue attachment and a long junctional epithelial adhesion obtained following root planing or modified Widman surgery.

Differences in tooth retention can be traced to the ability of the patient and the clinician to successfully and predictably effect thorough plaque removal. Properly performed pocket-elimination therapy provides an environment of minimal probing depth, which is conducive to plaque removal. Patient plaque removal is only effective to a subgingival depth of 2.5 mm (3). The clinician must not be misled by the supragingival scenario. Lindhe et al. (74) have demonstrated that there is no relationship between supragingival plaque control and changes in probing depths or attachment levels, or between supragingival plaque control and bleeding upon probing. Waerhaug spoke of the existence of subclinical inflammation (3). In such a situation, the tissues appear healthy, but periodontal destruction is occurring subgingivally.

Badersten et al. (75, 76) and Waite (77) noted that bleeding upon probing was directly related to pocket depth, with deeper areas bleeding more often. Therefore, the same limitations that apply to subgingival root planing in the face of pocket depths must be considered in the maintenance phase of therapy.

The deeper the residual probing depths, the more difficult debridement and maintenance become for both the patient and the dental professional (78–85). Sites with probing depths of greater than or equal to 6 mm are at significantly higher risk for future deterioration and additional attachment loss as a result of disease activity, if left untreated.

The scenario for continued loss of attachment in the face of post-therapeutic pocketing is as follows:

1. The patient presents with pocket depths in excess of 3 mm.
2. Patient plaque control removes plaque up to 2.5 mm subgingivally.
3. The attachment apparatus which results from curettage, modified Widman surgery, or flap curettage, has a long junctional epithelial component.
4. This epithelial adhesion exhibits greater permeability to plaque than a connective tissue fiber insertion.
5. Junctional epithelium is easily detached from the root in the presence of inflammation.
6. Subgingival scaling is increasingly less effective in areas probing greater than 3 mm.
7. Plaque left behind subgingivally following root planing begins to grow and repopulate the root surface within 14 days.
8. As the plaque front proceeds farther subgingivally, its removal is less effective.
9. As the pocket deepens, the problems with plaque removal are exacerbated.
10. The presence of furcation involvements and/or subgingival restorations makes plaque removal even more difficult.
11. The result is continued periodontal breakdown.

Employed in conjunction with selective extractions, root resective therapy, and prosthetic reconstruction, pocket-elimination techniques afford a high degree of predictability (86).

CLINICAL EXAMPLE SIX

A 26-year-old female presented in 1981 with a number of periodontal and restorative concerns. Postorthodontic blunting of the roots was noted (Fig. 1.58). Class I furcation involvements were present on all maxillary and mandibular molars. Subgingival caries was present in many areas. Osseointegrating implants were not a viable treatment option at the time of patient examination.

The combination of the patient's young age, short residual root structures, and active periodontal and restorative pathologies mandated a comprehensive, coordinated effort in order to afford her a predictable treatment outcome. The performance of periodontal surgical therapies that would not eliminate deeper pockets and furcation involvements and render all caries and defective

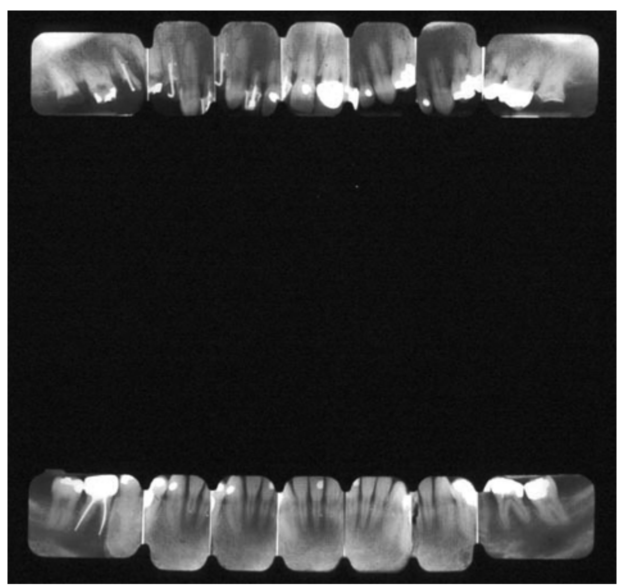

Fig. 1.58 A 26-year-old female presents with significant subgingival caries, Class I furcation involvements, and short roots on all maxillary teeth.

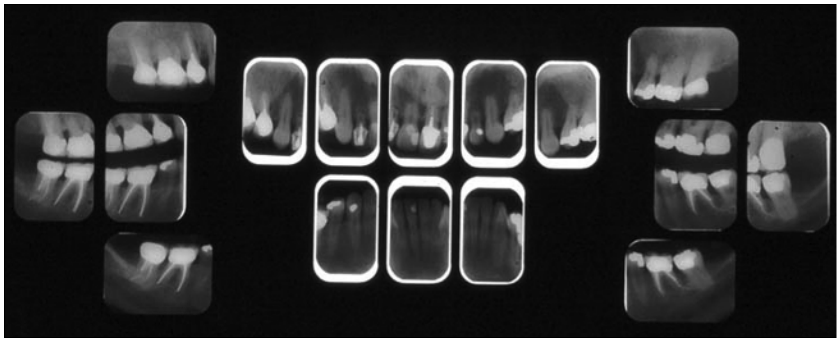

Fig. 1.59 Twenty-five years following appropriate periodontal and restorative therapy, all teeth have been maintained.

restorative margins supragingival for the restorative dentist's intervention would be ill-advised. When treating such a patient, the clinician has "one shot" at restoring the patient to health. The patient's limited attachment apparati could not withstand multiple surgical insults, nor afford to be subjected to continued periodontal breakdown following active care.

After ensuring the appropriate level of patient compliance with regard to plaque control efforts, the patient was treated with an osseous resective approach. All furcation involvements were eliminated through ondontoplasty. Tissues were positioned in such a manner as to allow placement of restorative margins supragingivally or intracrevicularly. The necessary restorative therapy was carried out.

A full series of radiographs taken 25 years after active therapy had been completed demonstrate the maintenance of periodontal support around the teeth, and the high degree of predictability afforded this patient through appropriate, coordinated care (Fig. 1.59).

Conclusion

When utilized appropriately, a multidisciplinary periodontal restorative approach is highly effective in the management of a variety of situations. Simple and complex patients may be successfully treated, with success being defined as long-term stability and maximization of patient comfort, function, and aesthetics. The challenge that will be discussed in subsequent chapters is how best to attain such treatment outcomes in everyday clinical practice.

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