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Provides a general overview of current and future trends in risk prediction, control, and nonaggressive management of caries and periodontal disease; preventive dentistry methods and programs; and quality control.

Volume 2 Diagnosis and Risk Prediction of Dental Caries
Includes a comprehensive discussion of the etiology, pathogenesis, diagnosis, risk indicators and factors, individual risk profiles, and epidemiology of caries.

Volume 3 Diagnosis and Risk Prediction of Periodontal Diseases
Presents a comprehensive discussion of the etiology, pathogenesis, diagnosis, risk indicators and factors, individual risk profiles, and epidemiology of periodontal diseases. Considers periodontal diseases as a possible risk factor for systemic diseases and presents current and future trends in the management of periodontal diseases, including nonaggressive debridement and preservation of the root cementum.

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Discusses self-care and professional methods of mechanical and chemical plaque control, use of fluorides and fissure sealants, and integrated caries prevention. Addresses needs-related preventive programs based on risk prediction and computer-aided epidemiology analysis for quality control and outcome.

Volume 5 Minimally Invasive Treatment, Arrest, and Control of Periodontal Diseases
Details current and future trends in minimally invasive treatment to preserve the root cementum and promote successful healing of infectious inflamed periodontal tissues as well as repair and regeneration of lost periodontal support. Provides recommendations for needs-related maintenance care to ensure the long-term success of treatment and prevent recurrence of periodontal disease.

Volume 6 Minimally Invasive Treatment, Arrest, and Control of Caries and Erosions
Describes current and future aspects of prevention and control of caries and erosions as well as arrest and remineralization of noncavitated lesions. Focuses on minimally invasive preparations, esthetic and hygienic restorations, and needs-related supportive programs to prevent recurrence of caries and erosions.

MINIMALLY INVASIVE TREATMENT, ARREST, AND CONTROL OF PERIODONTAL DISEASES, VOL 5

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PREFACE

According to the principles of *lege artis*, all members of our profession are obliged to offer treatment based on the most current scientific and clinical knowledge available. The etiology of the periodontal diseases is well understood, and we now have developed efficient methods for prevention, treatment, arrest, and control of these diseases as well as repair and regeneration of lost periodontal tissues. For example, in our 30-year longitudinal needs-related preventive study in adults, the mean number of lost teeth was only 0.5 per subject over the 30 years, and the periodontal attachment level was maintained irrespective of age (the oldest age group was 81 to 95 years at the final examination). Large-scale implementation of the study's methods in the preventive programs for the adult population in the county of Värmland, Sweden, has led to an increase of more than 15% in the number of remaining teeth in randomized samples of 65-year-old adults, as well as a reduction of more than 20% in loss of periodontal support during the first 10 years. Thus we must concentrate our efforts on prevention, control, and arrest of the periodontal diseases using treatment methods that are as minimally invasive as possible.

The aim of this book, the fifth of a six-volume series of textbooks and atlases, is to serve as a well-illustrated clinical "cookbook" that shows step-by-step how to practice minimally invasive nonsurgical treatment, healing of infectious inflamed periodontal tissues, repair and regeneration of lost periodontal tissues, and efficient supportive programs for prevention of recurrence of periodontal disease. Because of the many clinical illustrations combined with recent evidence-based scientific documentation, this volume should be useful for general dental practitioners and dental hygienists as well as undergraduate and postgraduate dental students.

The first chapter focuses on the importance of preservation of the root cementum through minimally invasive instrumentation and elimination of subgingival plaque biofilms and plaque-retentive factors such as calculus, unplaned rough root cementum, and restoration overhangs. Advantages and disadvantages of different methods of instrumentation are discussed and illustrated together with the negative consequences of iatrogenic aggressive scaling (eg, exposed dentinal tubules, plaque-retentive grooves, roughness).

Chapter 2 describes the importance of initial intensive therapy for healing of the periodontal tissues by combinations of needs-related mechanical and chemical plaque control supplemented with the elimination of plaque-retentive factors as described in chapter 1. Materials and methods for home as well as professional gingival plaque control are illustrated and discussed.

Initial intensive therapy is not always successful in healing the periodontal tissues. Chapter 3 presents information about available supplementary therapies that can be implemented in such cases. Indications, materials, and methods for use of antibiotics are discussed. Different materials and methods for supplementary treat-

ment of furcation-involved teeth, which are very difficult to heal because of the limited accessibility for plaque removal, are also illustrated. Finally, periodontal surgery for accessibility and reduction of deep residual pockets is described.

Repair of intrabony defects may be achieved successfully by surgical as well as nonsurgical treatment in combination with excellent gingival plaque control. However, recent evidence-based studies have shown that regeneration of all the periodontal tissues (ie, alveolar bone, periodontal ligament, and cementum) can be achieved by so-called guided tissue regeneration (the use of different types of barriers) and the use of biomaterials such as enamel matrix derivatives. Chapter 4 presents several clinical cases showing the techniques and long-term outcome of different regenerative methods.

After successful treatment of periodontal disease, efficient and needs-related secondary preventive and maintenance programs must be established in order to prevent recurrence of the disease. Materials and methods for such programs are discussed in detail in chapter 5. Also presented is a computer-aided analytic epidemiologic system with relevant variables, which must be established for quality control and evaluation of the long-term outcome of the periodontal therapy.

The next and final volume in this series, *Minimally Invasive Treatment, Arrest, and Control of Caries and Erosions*, will follow this same clinical cookbook style, presenting similar information on the topic of dental caries rather than periodontal diseases.

This project could not have been completed without the support of my family, friends, and colleagues. I am grateful to all my colleagues around the world as well as several companies and publishers (including Blackwell Munksgaard and The American Academy of Periodontology), who have generously permitted me to use their illustrations (about 30% of the total). Last but not least, the excellent cooperation of the publisher is gratefully acknowledged.

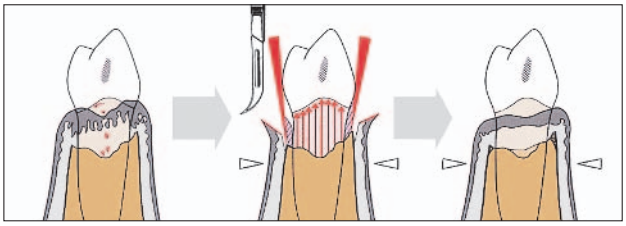

Fig 195 The modified Widman flap technique is used for pocket reduction. The *red lines* indicate the location and direction of incisions. (Courtesy of Dr K. Rateitschak.)

Today, the only indications for gingivectomy should be the elimination of hyperplastic gingival tissues and the creation of access to the subgingival margins of caries lesions before restorative treatment.

Pocket reduction procedures

Access flaps for debridement. Flap debridement surgery may be defined as surgical scaling, planing, and debridement of the root surface and the removal of granulation tissue after the reflection of the soft tissue flap. The most commonly practiced technique is based on the modified Widman flap, although not always performed as originally described by Ramfjord and Nissle (1974; Fig 195).

The original Widman flap (Widman, 1918) was a mucoperiosteal flap that followed a scalloped gingival incision that separated the pocket epithelium and inflamed connective tissue from the noninflamed gingiva and was bordered by two vertical releasing incisions extending to the alveolar mucosa. The flap was elevated to expose 2 to 3 mm of the alveolar bone. The soft tissue collar incorporating the pocket epithelium and connective tissue was removed, the exposed root surfaces were scaled, planed, and debrided, and the bone was recontoured to reestablish a physiologic alveolar form. The flap margins were placed at the level of the bony crest to achieve optimal pocket reduction.

The main advantages of this technique over gingivectomy were claimed to be a reduction in postoperative discomfort, because healing was by primary intention, and the reestablishment of a physiologic bony contour at sites with angular bony defects.

The term *modified Widman flap* was adopted for the flap procedure designed to obtain access to the root surface and close postoperative adaptation of healthy collagenous connective tissue and normal epithelium to the root surface (Ramfjord and Nissle, 1974; Ramfjord et al, 1987; Fig 196). Unlike its predecessor, this procedure did not aim at surgical pocket elimination and apical displacement of the flap. Therefore, the interproximal bone was not exposed, and infrabony defects were not eliminated by osseous recontouring. The initial inverse bevel incision, which passed down to bone, commenced approximately 1 mm from the gingival margin and extended as far as possible between the teeth to ensure optimal flap adaptation and complete coverage of the interdental bone. However, when esthetic considerations are paramount, intracrevicular incisions starting at the free gingival margins are used to minimize postsurgical gingival shrinkage (Ramfjord et al, 1987; Smith et al, 1987). Vertical releasing incisions are usually not required for the mucoperiosteal flap elevation for access to the root surfaces and interproximal bone.

The collar of soft tissue around each tooth is excised by a combination of vertical incisions from the bottom of the pocket to the subjacent bony crest and a horizontal incision following the contour of the alveolar bone. Following careful scaling, root planing, and debridement, all soft tissues are removed from the bony surfaces of intrabony defects, and the flaps are joined to meet interproximally. To achieve a good interproximal junction, the flaps can be trimmed, and bone can be removed from the outer aspect of the alveolar process. The flaps are secured with individual interproximal sutures.

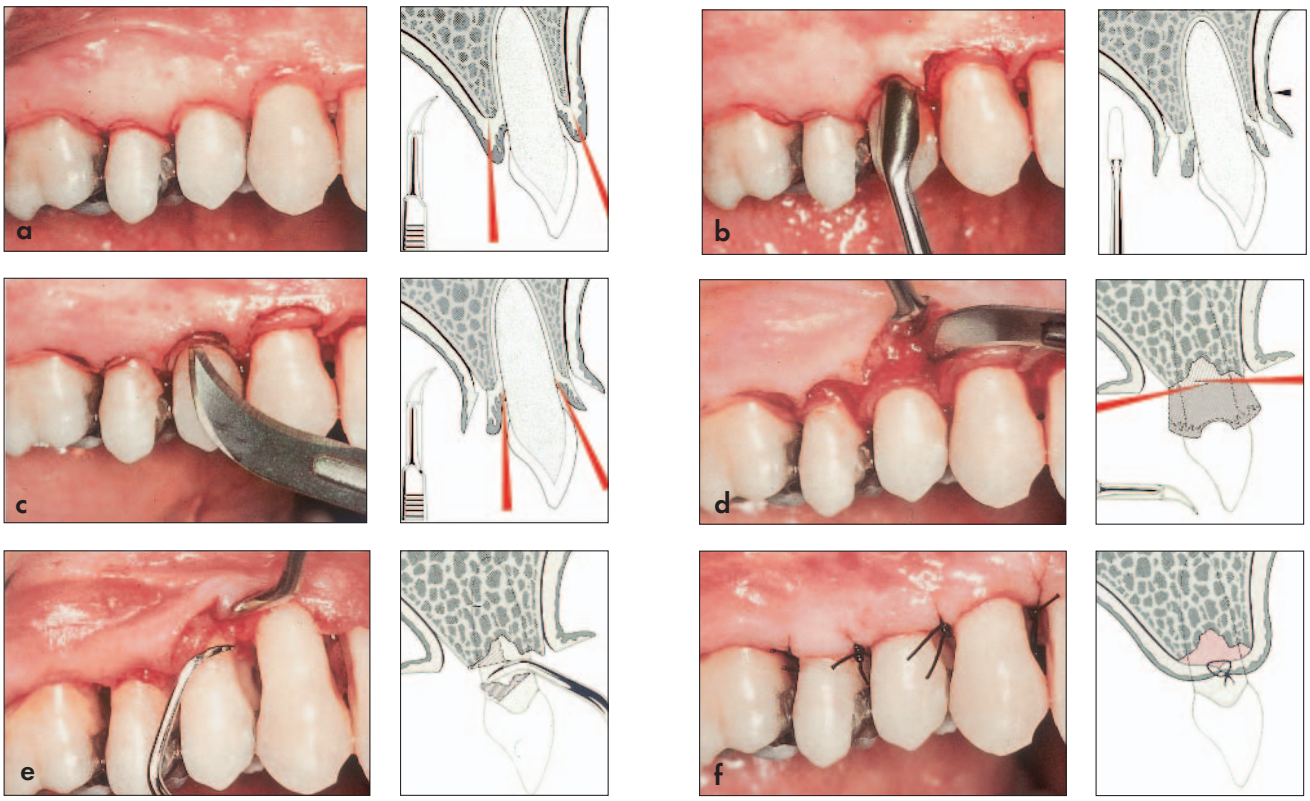

Fig 196 Clinical and schematic illustrations of the modified Widman flap technique. The *red lines* indicate the location and direction of incisions. *(a)* First incision, a scalloping inverse bevel. *(b)* Flap reflection. *Black arrow* indicates mucogingival junction. *(c)* Second incision, an intrasulcular incision. *(d)* Third incision. *(e)* Root instrumentation with direct vision. *(f)* Tight coverage of interdental defects by interdental suturing. (Courtesy of Dr K. Rateitschak.)

Although the chief aim of the modified Widman flap surgery is, according to Ramfjord and Nissle (1974), healing and reattachment of periodontal pockets with minimum loss of periodontal tissues during and after surgery, reduction in probing depth by shrinkage occurs in some individuals.

Other techniques. Reduction of probing depths distal to the maxillary second molars is complicated because of the thick fibrous tissues. Figures 197 to 200 show three different techniques to solve this problem: the modified incision, the classic distal wedge incision, and the wedge incision. Special periodontal surgery techniques such as the simplified papilla preservation flap and the modified papilla preservation flap will be discussed in chapter 4.

Figs 224a to 224e Case 7. (From Gottlow et al, 1994. Reprinted with permission.)

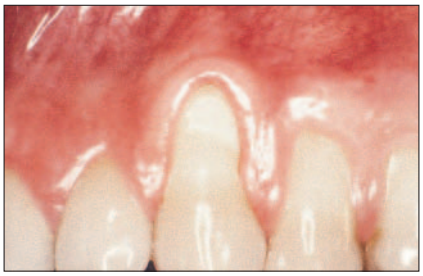

Fig 224a A 5-mm buccal gingival recession defect is present on the maxillary left canine.

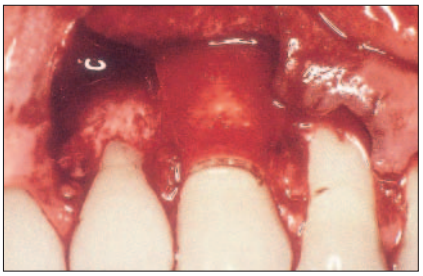

Fig 224b A bioresorbable matrix barrier is attached, covering the defect and a 2-mm-wide surrounding zone.

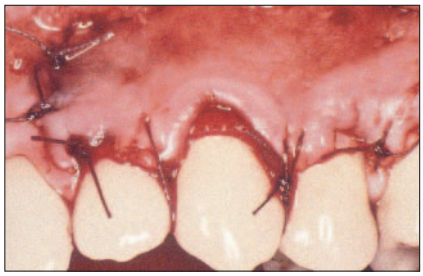

Fig 224c Some of the matrix barrier is exposed following suturing of the flap.

Fig 224d The gingival status 2 months after treatment is shown.

Fig 224e The gingival margin is healthy and located 3.5 mm coronal to the presurgical level after 6 months.

Case 7. A young man had a 5-mm gingival recession on the buccal aspect of the maxillary left canine (Fig 224a). The probing depth was 1 mm. A full-thickness flap and a split-thickness flap were raised without involving the papillae. The full-thickness flap was extended approximately 3 to 4 mm apical and lateral to the bone crest so that the peripheral part of the barrier was on the bone. A bioresorbable straight barrier configuration was placed over the defect and a 2-mm-wide zone of the surrounding bone (Fig 224b). The coronal portion of the matrix barrier extended slightly coronal to the buccal cementoenamel junction, resulting in some barrier exposure following coronal repositioning and suturing of the flap (Fig 224c).

One month after surgery, barrier exposure persisted, but without further gingival recession, and the soft tissues were not inflamed. Two months after surgery, the exposed part of the barrier membrane had disappeared (Fig 224d). At 3 months and 6 months postsurgery, the gingival margin was 3.5 mm coronal to the presurgical level, and the buccal probing depth was 1.0 mm (Fig 224e).

Case 8. After initial nonsurgical treatment and improved plaque control, a 7-mm mesial probing depth remained on the mesial surface of a mandibular left first molar (Fig 225a). The baseline radiograph revealed a narrow, deep intrabony defect mesial to the molar (Fig 225b).

The interdental space was accessed with a modified papilla preservation technique for GTR therapy (Fig 225c). After removal of granulation tissue and final cleaning of the root surface, a narrow, 6-mm-deep three-wall intrabony defect was exposed (Fig 225d). The membrane of choice was a bioresorbable barrier, well supported by bony walls (Fig 225e). Primary closure was obtained with a double-layer suturing technique, including an offset internal mattress suture and a modified internal mattress suture (Fig 225f). At 5 years, the defect was completely resolved (Fig 225g); the site exhibited healthy gingival conditions and only a 2-mm probing depth (Fig 225h).

Figs 225a to 225h Case 8. (Courtesy of Dr P. Cortellini.)

Fig 225a An intrabony osseous defect is present mesial to the mandibular left first molar.

Fig 225b A narrow intrabony defect is visible on the pretreatment radiograph.

Fig 225c The papilla is elevated according to the modified papilla preservation flap technique.

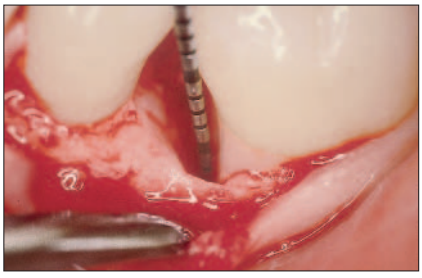

Fig 225d The narrow intrabony three-wall osseous defect is exposed after removal of granulation tissue and debridement.

Fig 225e A bioresorbable barrier (Resolut) is placed and attached over the defect.

Fig 225f The flaps are resutured with resorbable mattress sutures.

Fig 225g A radiograph taken 5 years after the GTR treatment reveals that the defect is completely resolved.

Fig 225h After 5 years, a 2-mm probing depth is measured mesially.