

Naoshi Sato

# Periodontics & Restorative Maintenance

**A Clinical Atlas**

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# Preface

This book discusses changes in the periodontium, problems occurring during the periodontal maintenance phase and their solutions using a case study approach. The underlying concept is based on my conviction that maintenance is crucial for the long-term success of periodontal therapy. The objective is to give the reader guidance in selecting the appropriate treatment and maintenance methods needed for long-term periodontal and prosthetic success.

While writing this book, I reviewed the outcome of periodontal therapy in my patient population. The findings strengthened my conviction that flexible treatment planning and systematic professional care are crucial to the long-term success of periodontal therapy. Successful periodontal therapy requires teamwork across different dental specialties, particularly periodontology and prosthetics. The relevant methods for restoration and preservation of periodontal health (surgical and nonsurgical modalities, restorative-prosthetic treatment with occlusal therapy, etc.) must be given due consideration when carrying out such treatment.

In order to meet the goal of consistently providing high-quality care for their patients, dentists must continuously increase their treatment standards and thus must be willing to update their skills and knowledge on a daily basis. Even after complex and sophisticated techniques have been learned, it is not possible to apply them successfully without proper knowledge of their indications and the timing of their performance. The lack of adequate follow-up and aftercare likewise leads to treatment failure. Providing high-quality treatment is a mission that dentists can rightfully be proud of. Even in this age where new developments are continually being introduced in the field of dentistry, high quality does not mean that the treatment must always be innovative.

A dentist can easily lose sight of what is important in the constant flood of information and commercial trends. Vast amounts of information are easily accessible today. Still, we must try to judge new research findings and treatment approaches openly and objectively. Objectivity can be distorted by our personal preferences.

The introduction of regenerative therapy and implants has led to major advances in surgery in general and periodontal surgery in particular, e.g., gingivoplastic surgery. Continuous improvement of one's clinical skills based on scientific developments is an important aspect of modern dental practice. Interest in new treatment methods and continuous learning are crucial to raising the quality of periodontal treatment services. In many cases, treatment results for a new method are published without a comprehensive evaluation of the new method, after too short a follow-up period, and before long-term follow-up data become available. Many new methods and materials are quickly abandoned. Therefore, critical judgment and due caution are required, particularly when considering the use of a new treatment method.

In order to achieve long-term and predictable results of periodontal therapy, the clinician must use methods with a long history of proven efficacy in clinical trials. Adherence to this rule ensures that the treatment will be safe and effective. The competence of clinicians depends, among other things, on their ability to consistently perform the safest and most reliable methods in daily practice. In many cases, clinicians tend to neglect treatments based on solid evidence in favor of novel methods that are more lucrative. Guided tissue regeneration, enamel matrix protein derivative application and other methods of periodontal tissue regeneration as well as plastic periodontal surgery techniques of peri-implant tissue improvement used by many dentists today are based on sound principles of periodontal surgery.

Accurate assessment of the outcome of treatment requires careful aftercare and proper follow-up. This makes it possible to establish a specific, long-term and meaningful

treatment plan for the individual patient. Clinicians must be positive and open-minded in daily practice in order to objectively analyze their treatment results and to accurately evaluate failures.

The long-term success of periodontal therapy depends mainly on the type and quality of aftercare. The outcome of treatment is not determined by patient compliance alone. Maintenance therapy encompasses all aspects of individual supervision and continued treatment of patients at risk of periodontal disease. This work requires extensive knowledge of the diagnosis and treatment of periodontal diseases. Another important goal is to create a healthy periodontal environment that is easy to maintain. Therapeutic compromises can lead to complex problems during the maintenance phase. As the individual maintenance plan varies depending on age-related, mental and physical factors, the presence or absence of general diseases, and social, familial and job-related factors, a flexible approach is required. In any case, a healthy mouth provides a good quality of life.

All of the clinical periodontal and related endodontic restorative-prosthetic, implantological and occlusal cases presented in this book are patients that I have personally treated and maintained. Selected long-term outcomes are presented at the end of each chapter. Numerous intraoral clinical photographs and radiographs with detailed commentary are used to explain the periodontal changes that occurred over the course of time. Additional references to relevant maintenance therapy literature are also cited. Essential terminology is explained in an easily comprehensible manner in the form of a glossary. Historical facts surrounding the use of these terms are included where applicable.

In recent years, I had the opportunity to publish the books *Clinical Applications and Techniques of Periodontology and Prosthodontics* (1992), *Periodontal Surgery: A Clinical Atlas* (1997), and *Peri-implant Soft Tissue Management* (2001). *Periodontal Surgery: A Clinical Atlas* [Translation of the Japanese Title] was first translated into English and later into German, Spanish, French, Italian, Korean and Portuguese. The English edition of *Periodontal Surgery: A Clinical Atlas* (2000) became a bestseller and is highly regarded, which was a great honor for me. At the same time, it made me realize what a great responsibility I have for the contents of my book.

I would like to thank Mr. Ikko Sasaki of Quintessence Publishing Co. Ltd. for giving me the opportunity to publish this book, and Mr. Hidetoshi Akimoto and Ms. Sanae Omiya of Editorial House Aki for doing all of the editorial work. I am grateful to my revered teacher Prof. Dr. Kazuyuki Ueno, Emeritus Professor at the Iwate University Department of Dentistry, and Dr. Haruhiko Abe, Director of the Institute of Total Prosthetics.

Thanks also to Drs. Norimasa Endo, Hitoshi Shirahama and Yoshiro Hattori for their valuable comments and continuous encouragement during the preparation of this book, Mr. Etsuo Sekiya for dental laboratory work, and my dental practice staff for good teamwork.

Last but not least, I would like to thank my wife Akiko, my son Kimihiko, and my daughter Yuka. This book is dedicated to my late father Keisuke and to my mother Yoko.

Naoshi Sato

## Chapter I

### Maintenance Therapy – A Vital Part of Periodontal Therapy . . . . . 1

1	Maintenance Therapy as Part of Periodontal Treatment . . . . .	3
2	Effective Maintenance Therapy . . . . .	11
3	Occlusal Stability during the Maintenance Phase . . . . .	29
4	Reevaluation during the Maintenance Phase . . . . .	34
5	Attachment Loss during the Maintenance Phase . . . . .	45
6	Pocket Management during the Maintenance Phase . . . . .	49
Case I-A	Smoker with recurrent periodontal breakdown due to irregular maintenance . . . . .	53
Case I-B	Monitoring after conservative therapy and minimally invasive furcation treatment . . . . .	58
Case I-C	Maintenance therapy of strategically important teeth in a patient with few remaining teeth . . . . .	65
Case I-D	Partial denture design in a patient with few remaining teeth and little periodontal support . . . . .	71
Case I-E	Treatment and maintenance of a periodontitis patient with secondary occlusal trauma: Initial therapy followed by prosthodontic treatment . . . . .	77
Case I-F	Problem abutments and maintenance therapy in a periodontal-prosthetic patient with multiple tooth loss . . . . .	82
Case I-G	Treatment and long-term management of a deep infrabony defect in the posterior region . . . . .	91
Case I-H	Maintenance therapy with residual risk factors remaining after active therapy . . . . .	97
Case I-I	Occlusal management of a partially edentulous patient with advanced periodontitis . . . . .	104
Case I-J	Nonsurgical periodontal therapy and maintenance of a patient with severe gingivitis and moderate periodontitis . . . . .	110

## Chapter II

### Selection of Treatment Method Based on Long-term Outcome . . . . . 121

1	Objective and Long-term Outcome of Treatment . . . . .	123
2	Effects of Nonsurgical Pocket Therapy . . . . .	126
3	Selecting the Method of Periodontal Therapy . . . . .	136
4	Periodontal Surgery from the Perspective of Maintenance Therapy . . . . .	148
5	Surgical Management of Infrabony Defects . . . . .	164
6	Pocket Management during Maintenance Therapy . . . . .	171
7	Furcation Involvement and Maintenance Therapy . . . . .	179
8	Establishing Adequate Interdental Space . . . . .	197
Case II-A	Esthetic considerations in the treatment of localized deep pockets . . . . .	201
Case II-B	Multiple episodes of attachment loss during the maintenance phase . . . . .	207
Case II-C	Bilaterally fixed splint: Risk potential and therapeutic intervention . . . . .	213
Case II-D	Long-term maintenance of advanced furcation involvement . . . . .	221
Case II-E	Management of thick palatal mucosa by palatal flap surgery . . . . .	226
Case II-F	Root resective therapy of furcation-involved teeth and its long-term outcome . . . . .	230
Case II-G	Flap curettage for furcation involvement and its long-term outcome . . . . .	238
Case II-H	Long-span fixed dental prosthesis restoration of an arch with few remaining teeth with root proximity and its outcome . . . . .	247

**Chapter III**  
**Regenerative Treatment of Infrabony Defects: Procedures and Outcomes . . 259**

1 Open Flap Curettage of Infrabony Pockets . . . . . 261  
 2 Guided Tissue Regeneration (GTR) . . . . . 268  
 3 Long-term Stability of Regenerative Therapy Results . . . . . 282  
 Case III-A Bone regeneration after flap curettage and long-term outcome . . . . . 291  
 Case III-B Outcome of full-arch regenerative therapy for progressive periodontitis . . . . . 297

**Chapter IV**  
**Restorative Therapy and Maintenance of Gingival and Periodontal Tissues . . 311**

1 Attached Gingiva around Restored Teeth and Maintenance Therapy . . . . . 313  
 2 Restorative Therapy and Gingival Margin . . . . . 330  
 3 Subgingival Restoration Margins . . . . . 355  
 4 Periodontal Biotype and Maintenance Therapy . . . . . 363  
 5 Root Exposure . . . . . 369  
 6 Surgical Treatment of Gingival Recession and Stability of the Results . . . . . 381  
 Case IV-A Periodontal environment of abutments and preservation of attached gingiva . . . . . 396  
 Case IV-B The significance of biotype and therapeutic interventions during the maintenance phase . . . . . 403

**Chapter V**  
**Complications during the Maintenance Phase and their Solutions –  
 with Special Reference to Restored Dentitions . . . . . 419**

1 Occlusal Therapy during the Maintenance Phase . . . . . 421  
 2 Complications in Abutment Teeth during the Maintenance Phase . . . . . 432  
 3 Maintenance Therapy of the Edentulous Arch . . . . . 449  
 Case V-A Treatment of advanced periodontitis and occlusal therapy . . . . . 454  
 Case V-B Surgical crown lengthening of key teeth and caries risk during the maintenance phase . . . . . 460  
 Case V-C Partial dentures supported by molar teeth with an uncertain prognosis: Retreatment during  
 the maintenance phase . . . . . 465  
 Case V-D Root caries after long-term maintenance and complications of retreatment . . . . . 474  
 Case V-E Resective procedures for abutment teeth and removable partial denture for an anterior edentulous  
 space . . . . . 480

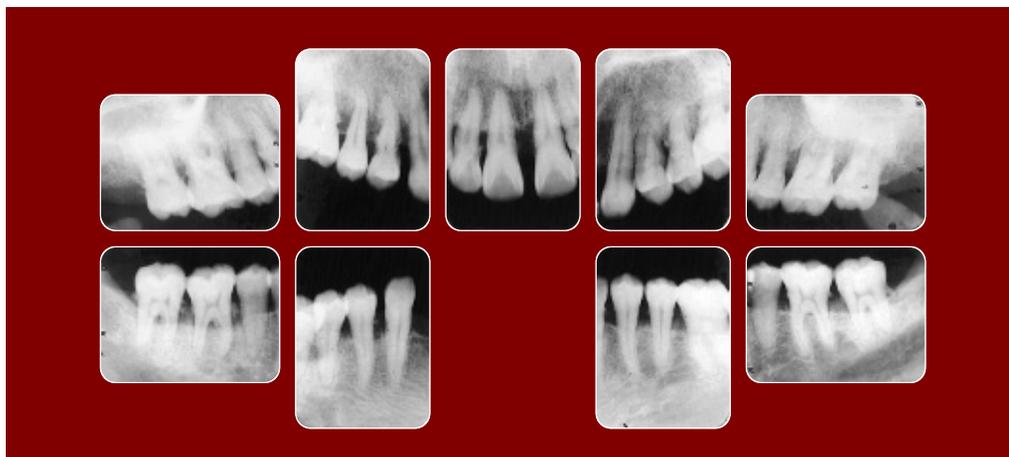
**Study Index . . . . . 491**  
**Subject Index . . . . . 492**

## Case I-B Monitoring after conservative therapy and minimally invasive furcation treatment

**Initial examination: 01/1983. Patient: 51-year-old female**  
**Complaints: "Occasional swelling of the gums and pain on chewing"**

The patient had no dental caries or dental restorations. Because the continuity of the rows of teeth and chewing function were intact, initial periodontal therapy was to consist of minimally invasive procedures. Temporary splinting was performed to stabilize the mobile maxillary molars. After stabilization of the oral hygiene situation, periodontal surgery was performed in the maxillary molar region. Surgery was indicated because initial treatment was not likely to reduce pocket depths due to the thickness of the maxillary gingiva. Flap curettage was to be performed in order to minimize postoperative furcation exposure. After initial therapy, subgingival curettage was performed at 3-month intervals within the scope of maintenance therapy. Still, it was not possible to prevent the progression of periodontal disease. Debridement was repeated 17 years after the initial examination. Currently, the patient is still in maintenance care with unresolved furcation involvement.

- 1983 Age 51
  - Initial examination
  - MTM in the maxillary region
  - Flap curettage
- 1985 Age 54
- 1988
  - Pocket elimination surgery at 46
  - Pulp necrosis of tooth 14, endodontic treatment
- 1990 Age 59
  - Free gingival graft of tooth 15
- 1991
  - Removal of "A" splint from anterior tooth region
- 1995 Age 64
- 2000 Age 69
  - Flap curettage with bone graft at teeth 17, 16, 15, and 14
  - Flap curettage of tooth 26
- 2001
  - Flap curettage of teeth 47 and 46
  - Extraction of tooth 26
- 2005
- 2006 Age 75
  - 23 years and 2 months after the initial examination



### ◇ I-B-1 Findings at the initial examination (01/1983):

Marked loss of interdental bone, vertical bone loss in the molar region, and widening of the periodontal ligament space.



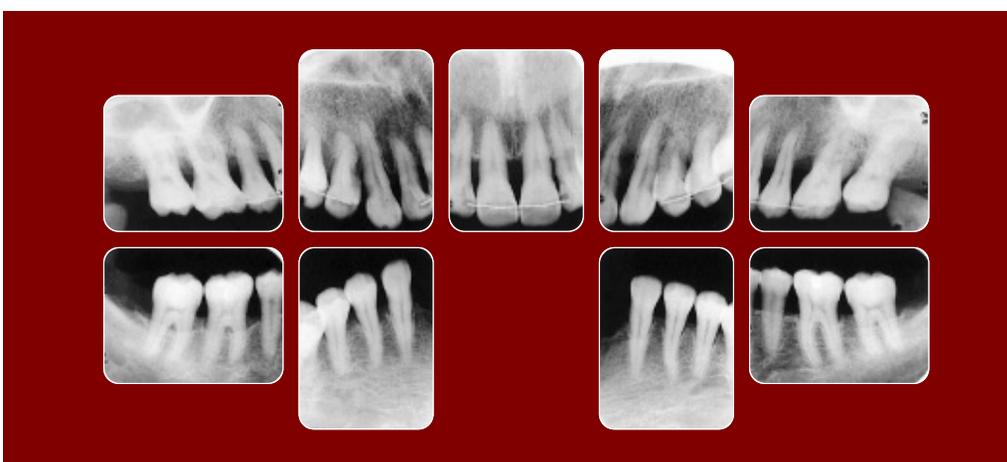
### ◇ I-B-2 Intraoral findings 1 month after the initial examination:

Significant redness and swelling of the gingiva and accumulation of plaque and calculus, probing depths of 5 to 9 mm, Class I to II tooth mobility, and bleeding and suppuration on probing in all teeth.



◇ I-B-3

Due to the thickness of the periodontal tissues and the delayed decrease in pocket depths, flap curettage of the molar region was performed at an early stage (06/1983). A bony pocket was detected in the interdental region (mirror photographs of palatal and lingual views).



◇ I-B-4 Status 3 years and 9 months after the initial examination and 3 years and 4 months after scaling and curettage (10/1986)

During initial therapy (following root curettage), temporary splinting and minor tooth movement procedures were performed (09/1983) to correct the axis of the maxillary anterior teeth. Probing depths were less than 3 mm at all sites except on the mesial surfaces of teeth 16, 17, 26, and 27 (4 mm). Periodontal subgingival curettage was repeated during the maintenance appointments scheduled at 3-month intervals.



# 6 Surgical Treatment of Gingival Recession and Stability of the Results

## 1 Prognosis of Surgical Recession Coverage

Various mucogingival procedures for surgical treatment of gingival recession have been investigated in several clinical studies. A number of new surgical procedures have been developed, increasing the range of available treatment options. Procedures involving the use of pedicle grafts, free gingival grafts, subepithelial connective tissue grafts, and guided tissue regeneration have been developed and investigated (◇ IV-6-3). Unfortunately, most of the relevant clinical studies have a relatively short postoperative follow-up period (Wennström 1996; Oates et al. 2003). Longitudinal long-term studies are needed to obtain a useful assessment of the efficacy of the extent and stability of root coverage achieved by these procedures and the potential incidence of recurrences of gingival recession (Paolantonio et al. 1997; Harris 2002) (□ IV-6-1, □ IV-6-2). If a surgical procedure is unable to achieve stable root coverage without later recurrence of recession, it is useless.

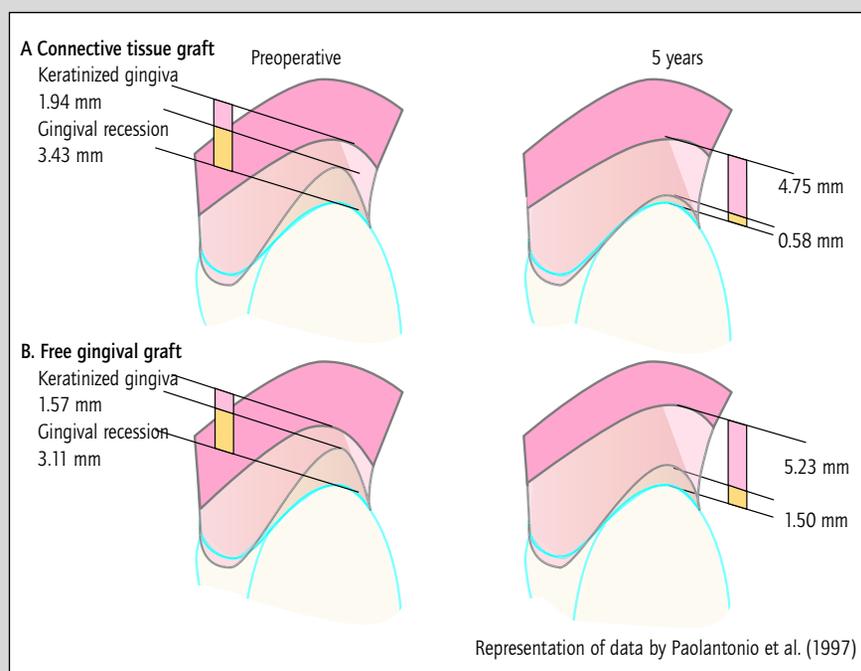
The lateral sliding flap for coverage of exposed roots is generally attributed to Grupe and Warren (1956). This procedure is associated with a risk of recession in the donor area if the alveolar bone is thin at the donor site. In order to solve this problem, Espinel and Caffesse (1981) covered the donor site with a free gingival graft. The lateral sliding flap also has a risk of necrosis of the entire flap because blood supply is provided only via the pedicle. The double papillae repositioned flap, in which both interdental papillae serve to provide blood supply, was developed by Cohen and Ross (1968) to avoid this disadvantage of pedicle gingival grafts (◇ IV-6-1). However, the double papillae repositioned flap procedure could be performed only at sites where both papillae in the recession region were sufficiently broad and long.

### Paolantonio et al. (1997)

Paolantonio et al. divided 70 patients with Miller Class I and II recession into two groups. Group A was treated with connective tissue graft (CTG), and Group B with free gingival graft (FGG). The 5-year postoperative results were compared. The mean root coverage gained was 85.23% in Group A and 53.19% in Group B (□ IV-6-1).

#### □ IV-6-1

Clinical efficacy of connective tissue graft versus free gingival graft, measured as the extent of recession coverage in mm





◇ IV-6-2  
Subepithelial connective tissue graft technique for recession coverage (continued)

**g**  
Approximately 4 years and 2 months after surgery (03/1998): From the third year on, the gingival margin migrated coronally and then remained stable.

**h**  
Twelve years and one month after surgery (03/2006): There was partial loss of the distal interdental papilla, but the root surface remained covered.

	Preoperative	Postoperative	
		2 years and 7 months	12 years and 1 months
CEJ-Gingival margin	3.5 mm	0.0 mm	0.0 mm
Probing depth	1.0 mm	1.0 mm	1.0 mm
Clinical attachment level	4.5 mm	1.0 mm	1.0 mm
Width of keratinized gingiva	1.0 mm	2.5 mm	2.5 mm



◇ IV-6-3  
Free gingival graft procedure for recession coverage\*

**a**  
Tooth 32 exhibited Class I recession (03/1995).

**b**  
A trapezoidal full-thickness flap was prepared. An osseous dehiscence defect (length: 3.5 mm) was detected apical to the CEJ. A recipient bed extending more than 3 to 5 mm apically was created around the exposed root.

**c**  
After planing the root with rotating instruments, the graft was closely adapted to the recipient bed and sutured.

**d**  
Healing was almost complete by the fifth postoperative week, and the graft was in a stable condition by the eighth week. Complete root coverage was achieved by the 9-month follow-up (12/1995). Because of scar formation, there was a noticeable color difference.

**e**  
Three years and two months after surgery (05/1998).

**f**  
Eleven years after surgery (03/2006). The root surface was still completely covered.



	Preoperative	11 years postoperative
CEJ-Gingival margin	2.0 mm	0.0 mm
Probing depth	1.0 mm	1.0 mm
Clinical attachment level	3.0 mm	1.0 mm
Width of keratinized gingiva	2.0 mm	5.5 mm

\* Complete coverage of denuded root surfaces with a one-stage gingival graft (Holbrook and Ochsenbein 1983).

## ◇ IV-6-4 Root coverage and pocket elimination

**Root coverage****a1**

One year and seven months after the initial examination (10/1997): Broad and shallow Class II recession was present on the buccal surface of malpositioned tooth 43. The inserted probe was visible through the very thin gingiva.

**b1**

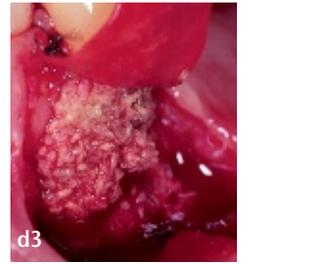
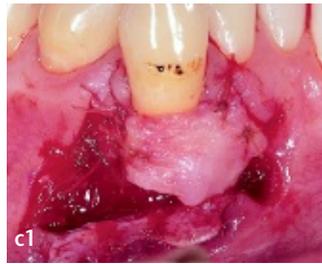
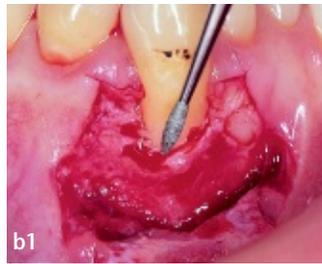
A trapezoidal split-thickness flap was prepared after making an incision on the mesial and distal aspects of the interdental papilla. After flap reflection, the root surface was planed with a curette and flattened with a rotating instrument.

**c1**

A connective tissue graft was harvested from the palate, placed on the root surface coronal to the CEJ, and sutured to the interdental papillae with individual absorbable sutures.

**d1**

The membrane was completely covered by the flap. The thin flap became perforated at the base, resulting in exposure of the graft.

**Pocket elimination****a2**

Tooth 33 had an extreme buccal position comparable to that of tooth 43, but the Class II gingival recession was broader and deeper (5 mm) (5/1997): The pocket probing depth was 6 mm, the muscle attachment extended to the gingival margin, and keratinized gingiva was almost completely absent. Guided tissue regeneration was performed in order to eliminate the periodontal pocket via recession coverage and formation of new attachment.

**b2**

Gingival grafting was performed as a preliminary measure to ensure that a wide band of keratinized gingiva was available for predictable guided tissue regeneration. A periosteal connective tissue recipient bed was prepared, and a free gingival graft was harvested and sutured at the gingival margin area (marginal graft).

**c2**

Status 3.5 months after grafting (08/1997): Keratinized gingiva had formed, producing a band of 5 mm width. The root surface was made concave using a sharp curette and a rotating instrument.

**d2-4**

A resorbable membrane was placed on the prepared recipient bed and sutured in place with absorbable sutures. In order to prevent a loss of height of the interdental papillae, only their epithelium was removed. Bone was grafted below the membrane in order to stimulate bone regeneration in the region of osseous dehiscence. Any method used for surgical treatment of gingival recession should not only cover the denuded root surfaces, but should also restore the lost periodontal tissues. In this case, the barrier membrane was completely covered by the coronally positioned flap, and the flap was sutured without tension.

	43		33	
	Preoperative	Postoperative	Preoperative	Postoperative
	8 years and 5 months		8 years and 10 months	
CEJ-Gingival margin	2.0 mm	0.0 mm	5.0 mm	< 1.0 mm
Probing depth	2.0 mm	1.0 mm	6.0 mm	1.0 mm
Clinical attachment level	4.0 mm	1.0 mm	11.0 mm	2.0 mm
Width of keratinized gingiva	0.5 mm	1.0 mm	0.0 mm	5.0 mm