

Aesthetic Periodontal Plastic Surgery – a Case Report

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A 46-year-old woman presented at the Department of Periodontology, University of Giessen, with mild chronic periodontitis and multiple gingival recessions in the upper jaw. Examination revealed poorly contoured metal ceramic restorations. Resulting soft tissue contours were also less than ideal from an aesthetic perspective. Oral hygiene instructions, scaling, and root planing were performed to reduce periodontal inflammation. Subsequently, periodontal plastic surgery was conducted, applying various root coverage procedures and aesthetic crown lengthening. New metal ceramic restorations and bridges were inserted. Long-term stability was achieved by effective plaque control and periodic recalls.

Key words: aesthetics, gingival recession, connective tissue graft

Periodontal recession is the exposure of the root surface due to an apical shift of the gingival margin. Either in its localized or generalized form, periodontal recession is an aesthetically undesirable condition that may lead to root dentine hypersensitivity and root caries. Exposed root surfaces are also prone to abrasion due to intensive tooth brushing. Periodontitis and gingival abrasion are the main etiological factors for recessions. However, poorly contoured dental restorations and crowns, prominent roots, coronal frenum attachment and orthodontic movements can predispose an area to recession. Miller (1985) proposed a classification scheme for recession defects that is currently the one most commonly used in periodontal practice (Table 1).

Today, clinicians are confronted with the challenge not only of addressing biological and functional problems present in the periodontium, but also of providing therapy that is aesthetically acceptable. The gingival tissues form the soft tissue frame of the dentition and play an important role in aesthetics, especially in the maxillary anterior region of the mouth. Additionally, the visibility of the teeth

and gingiva depends on the position of the smile line. A high smile line, exposing gingival recessions with poorly contoured and exposed metal ceramic restorations constitutes a common aesthetic problem (Figs. 1a, b).

Multiple clinical factors must be considered for the final aesthetic result of periodontal therapy. Certainly, the patient's aesthetic judgment plays a pivotal role; however, other aspects like tooth and defect morphology, as well as surgical techniques and potential wound healing are also determining factors for successful periodontal plastic surgery. The term 'periodontal plastic surgery' derives from mucogingival surgery. According to the World Workshop in Periodontics (1996), it comprises periodontal surgical procedures designed to correct or eliminate deformities in the gingiva or alveolar mucosa arising from anatomic, developmental, traumatic or inflammatory causes (Wennström, 1996). This includes the classical therapies like gingival extension procedures (Bohannon, 1962), free soft tissue grafts (Bjorn, 1963), and coronally repositioned flap (Norberg, 1926). However, it also addresses other surgical procedures for improve-

Class I	Marginal recession that does not extend beyond the mucogingival junction. There is no loss of bone or soft tissue in the interdental area.
Class II	Marginal recession that extends to or beyond the mucogingival junction. There is no loss of bone or soft tissue in the interdental area.
Class III	There is marginal tissue recession that extends to or beyond the mucogingival junction. There is also bone and/or soft tissue loss interdentally or there is malpositioning of the tooth.
Class IV	There is marginal tissue recession that extends to or beyond the mucogingival junction with severe bone loss and soft tissue loss interdentally and/or severe tooth malposition.

Table 1 Miller's classification of recessions (Miller PD Jr, 1985)



Fig. 1a The patient's smile prior to periodontal and restorative treatments.



Fig. 1b Poorly contoured restorations and multiple gingival recessions.

ment of soft tissue aesthetics, such as the subepithelial connective tissue graft (SCTG) (Langer and Langer, 1985). This technique is supported by several clinical studies and can be used for many different procedures such as: Augmenting the dimensions of gingival tissues, root coverage, loss of interdental papillae, and augmentation of the edentulous ridge (Harris, 2002; Langer and Calagna, 1980; Langer and Langer, 1985; McGuire and Cochran, 2003). In comparison with other techniques, evidence supports a higher predictability of the results (Harris, 2003). New connective tissue attachment formation following root coverage with SCG has been also reported (Goldstein et al, 2001; Guiha et al, 2001).

The aim of this case report is to present the therapeutic periodontal procedures to accomplish predictable aesthetics in a 46-year-old woman with increased aesthetic demands.

Medical History

The patient was in good health, with no contraindications to surgical periodontal therapy. She was a non-smoker. She was referred for treatment to the Department of Periodontology, University of Giessen, because she expressed a desire for a more aesthetic smile.

Extra- and Intraoral Examinations

Routine inspection of the extraoral structures and intraoral tissues showed no abnormalities.

Periodontal Screening Index and Diagnosis

The Periodontal Screening Index (PSI) was recorded first (PSR American Dental Association and American Academy of Periodontology, 1992;

Fig. 2 Periodontal screening.

PERIODONTAL SCREENING

Name: Sch P.		Date of birth: 01.02.57	
Date: ████████	Diagnosis: <input type="checkbox"/> G <input type="checkbox"/> NUG <input type="checkbox"/> NUP <input checked="" type="checkbox"/> CP <input type="checkbox"/> AP <input type="checkbox"/> P-SYS		
Further diagnosis/Modifiers:			
TMJ function:	<input type="checkbox"/> clicking r/l	Mouth opening	mm <input type="checkbox"/> Deviation
Muscles (pain):	<input type="checkbox"/> M. mass. r/l	<input type="checkbox"/> M. temp. r/l	<input type="checkbox"/> M. pt. lat. r/l
		<input type="checkbox"/> M. pt. med. r/l	<input type="checkbox"/> M. dig. r/l
Prosthetic renewal:	<input type="checkbox"/> no	<input checked="" type="checkbox"/> yes	years: >10 years
Risk factors:			
- Smoking:	<input checked="" type="checkbox"/> no	<input type="checkbox"/> low (< 10)	<input type="checkbox"/> high (> 10)
- past history of periodontitis (PD ≥ 5 mm):	<input checked="" type="checkbox"/> no	<input type="checkbox"/> yes	
- Diabetes mellitus:	<input checked="" type="checkbox"/> no	<input type="checkbox"/> yes	since:
- HbA _{1c} - value (normal: 4.5% - 5.5% ± 0.5) =	%		
- Polymorphisms:	<input type="checkbox"/> II-1	<input type="checkbox"/> II-4	<input type="checkbox"/> Fc-γ <input type="checkbox"/> others
- Osteoporosis:	<input checked="" type="checkbox"/> no	<input type="checkbox"/> yes	
- Stress:	<input checked="" type="checkbox"/> low	<input type="checkbox"/> high	
- HIV / AIDS:	<input checked="" type="checkbox"/> no	<input type="checkbox"/> low (Sera positiv: T ₄ > 400/mm ³)	<input type="checkbox"/> high (AIDS)
- other system. risk factors			
Priority of treatment :	<input type="checkbox"/> low	<input checked="" type="checkbox"/> middle	<input type="checkbox"/> high

Sextants:	Total-PSI:													
<table border="1" style="margin: auto;"> <tr> <td>S¹</td><td>3</td> <td>S²</td><td>2*</td> <td>S³</td><td>3</td> </tr> <tr> <td>S⁶</td><td>3</td> <td>S⁵</td><td>1</td> <td>S⁴</td><td>3</td> </tr> </table>	S¹	3	S²	2*	S³	3	S⁶	3	S⁵	1	S⁴	3	<table border="1" style="margin: auto;"> <tr> <td style="font-size: 2em; font-weight: bold;">3</td> </tr> </table>	3
S¹	3	S²	2*	S³	3									
S⁶	3	S⁵	1	S⁴	3									
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Clinical dental examination:

Plaque index:

Date	UJ (%)	LJ (%)	Tot. (%)
██████	16.6	44.23	30.4

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Meyle and Vonholdt, 2002). This Index was developed based on the concepts of the Community Periodontal Index of Treatment Needs = CPITN (Ainamo et al, 1982). According to the American Academy of Periodontology (AAP), common risk factors should be evaluated in order to detect potential associations between peri-

odontal status and general health conditions. For this purpose, the screening of risk factors has been included in the patient questionnaire in our clinic. No risk factors were identified in this case (Fig. 2).

Dental examination showed that in the upper jaw, teeth 18, 16 and 28 were missing. In the lower

Figs. 3a–e Intraoral appearance prior to the anti-infective therapy.



Fig. 3a Frontal view.



Fig. 3b Lateral right view.



Fig. 3c Lateral left view.



Fig. 3d Occlusal view of the maxilla.



Fig. 3e Occlusal view of the mandible.

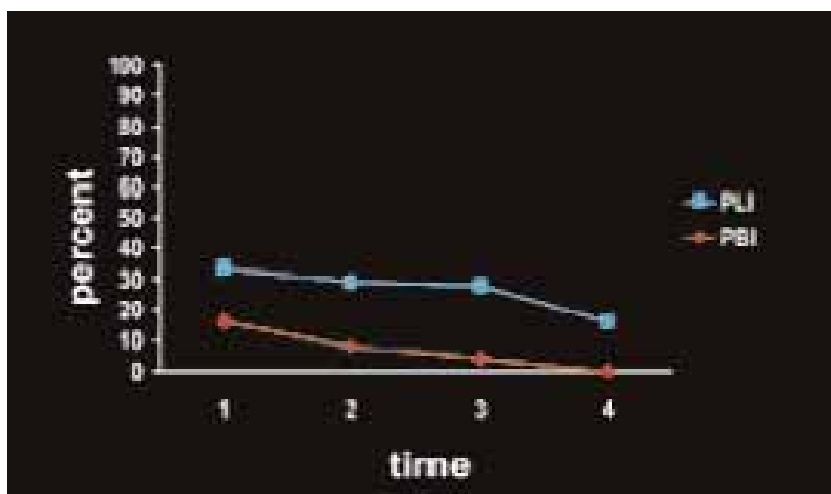
jaw, teeth 38, 46 and 48 were missing. Teeth 14, 11 and 21 had been treated endodontically. All other teeth responded positively to the pulp vitality test with compressed CO₂. Teeth 13, 24, 35 and 34 had poorly contoured restoration of

gold, amalgam and composite. Teeth 17, 15, 14, 25, 27, 45 and 47 supported poorly contoured metal ceramic bridges. Teeth 12, 11, 21, 22, 37 and 36 had also poorly contoured metal ceramic individual crowns. The endodontic and

Fig. 4 Initial orthopantograph.



Fig. 5 Oral hygiene indices during anti-infective therapy. PLI = modified plaque index, PBI = modified papillary bleeding index.



prosthetic treatment was more than 15 years old and needed to be renewed (Figs. 3a–e).

The examination showed localized probing pocket depths of 4 mm with bleeding on probing, as well as bridges and crowns in need of renovation, which gave a total PSI score of 3. Localized findings like recessions were marked with an asterisk. Furthermore, an overall plaque index was recorded as presence or absence of plaque at 4 sites/tooth using the modified O'Leary plaque index (O'Leary et al, 1972). An overall plaque index of 30.4% was recorded.

Based on the age of the patient, the shallow depth of the periodontal pockets, and the moderate oral hygiene, the diagnosis of chronic periodontitis was established.

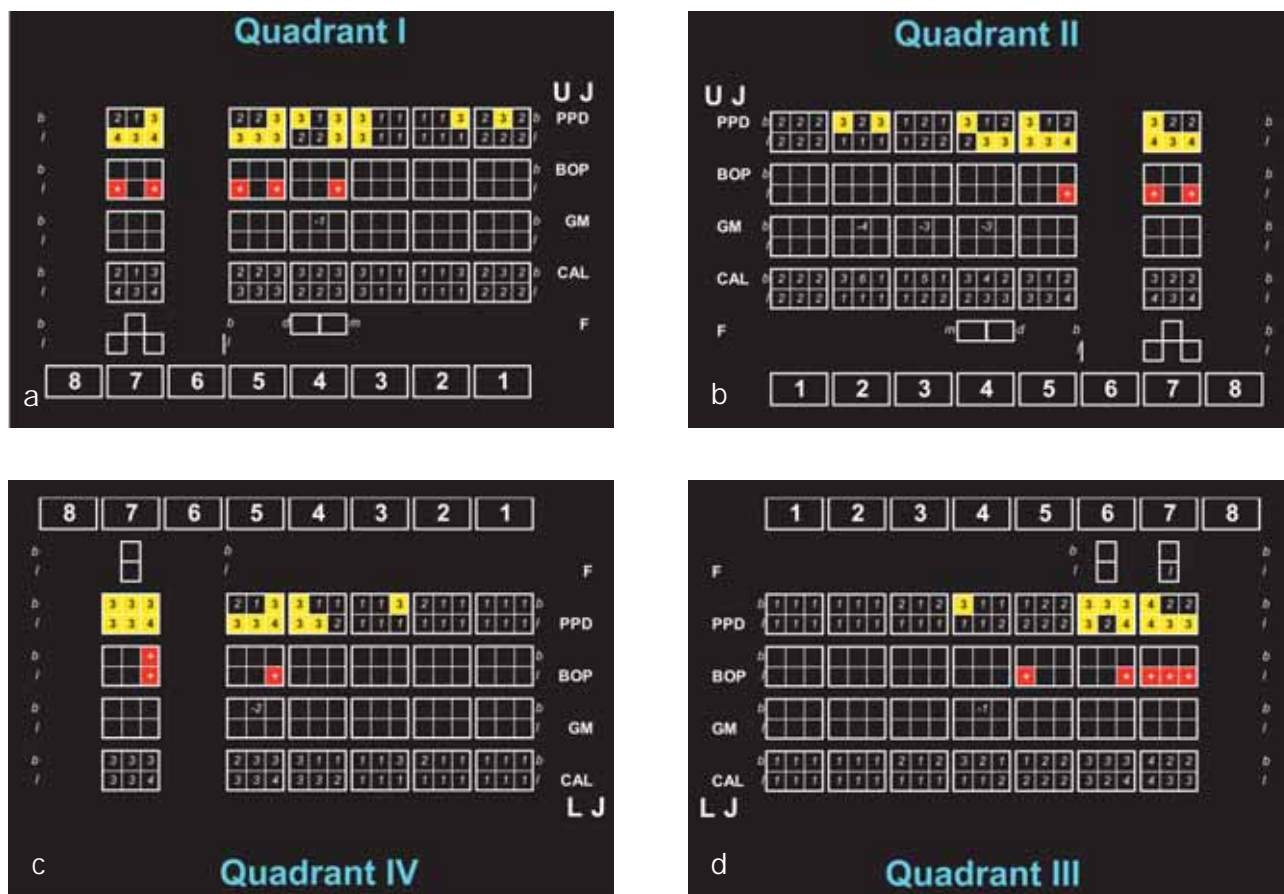
Radiographic Examination

The panoramic radiograph revealed the following features (Fig. 4): A slight, localized horizontal alveolar bone loss was apparent around teeth 17, 12, 22, 25, 26, 37, 36 and 47. Teeth 14, 11 and 21 were endodontically treated, 11 and 21 revealed a retrograde root restoration of amalgam. Additionally, teeth 17–27, 37–35, 44 and 45–47 had poorly contoured restorations.

Anti-infective Therapy

Following the screening examination, the patient received oral hygiene instructions and motivation. Initial clinical photographs were taken, and supra-gingival debridement and contouring of the fillings

Figs. 6a–e Initial periodontal examination.



Figs. 6a–e Periodontal parameters: probing pocket depths (PPD), bleeding upon probing (BOP), gingival margin (GM), clinical attachment level (CAL) and furcation involvement (F) in the upper (U) and lower jaws (L).

and crowns were performed. During this phase, a modified plaque index (PLI) and papillary bleeding index (PBI) were assessed at 4 sites/tooth. Patient compliance was good, thus, PLI and PBI improved considerably (Fig. 5)

Initial Periodontal Examination

Recording of probing pocket depth (PPD), bleeding on probing (BOP), clinical attachment level (CAL), and the level of the gingival margin (GM) at 6 sites/tooth was performed using the PCP-UNC-15 periodontal probe (Hu-Friedy Mfg. Co., Inc., Leimen, Germany). Furcation involvements were also examined (Figs. 6a–d).

In this phase, manual scaling and root planing were performed on those shallow pockets with bleeding on probing. The poorly contoured crown on tooth 22 was removed and replaced by

an acrylic resin temporary restoration (Fig. 7). Consequently, the primary goal of periodontal therapy, i.e. preventing, slowing or arresting disease progression, was achieved.

Periodontal Surgical Protocol

The following different surgical periodontal procedures were selected: A subepithelial connective graft and coronally advanced flap for the gingival recession at tooth 22; a semilunar coronally repositioned flap for the recessions at teeth 23 and 24; and an aesthetic crown lengthening at tooth 11.

Periodontal Plastic Surgery

The extent of the gingival recessions was measured at the time of surgery. The depth was recorded as the distance between the cement enamel

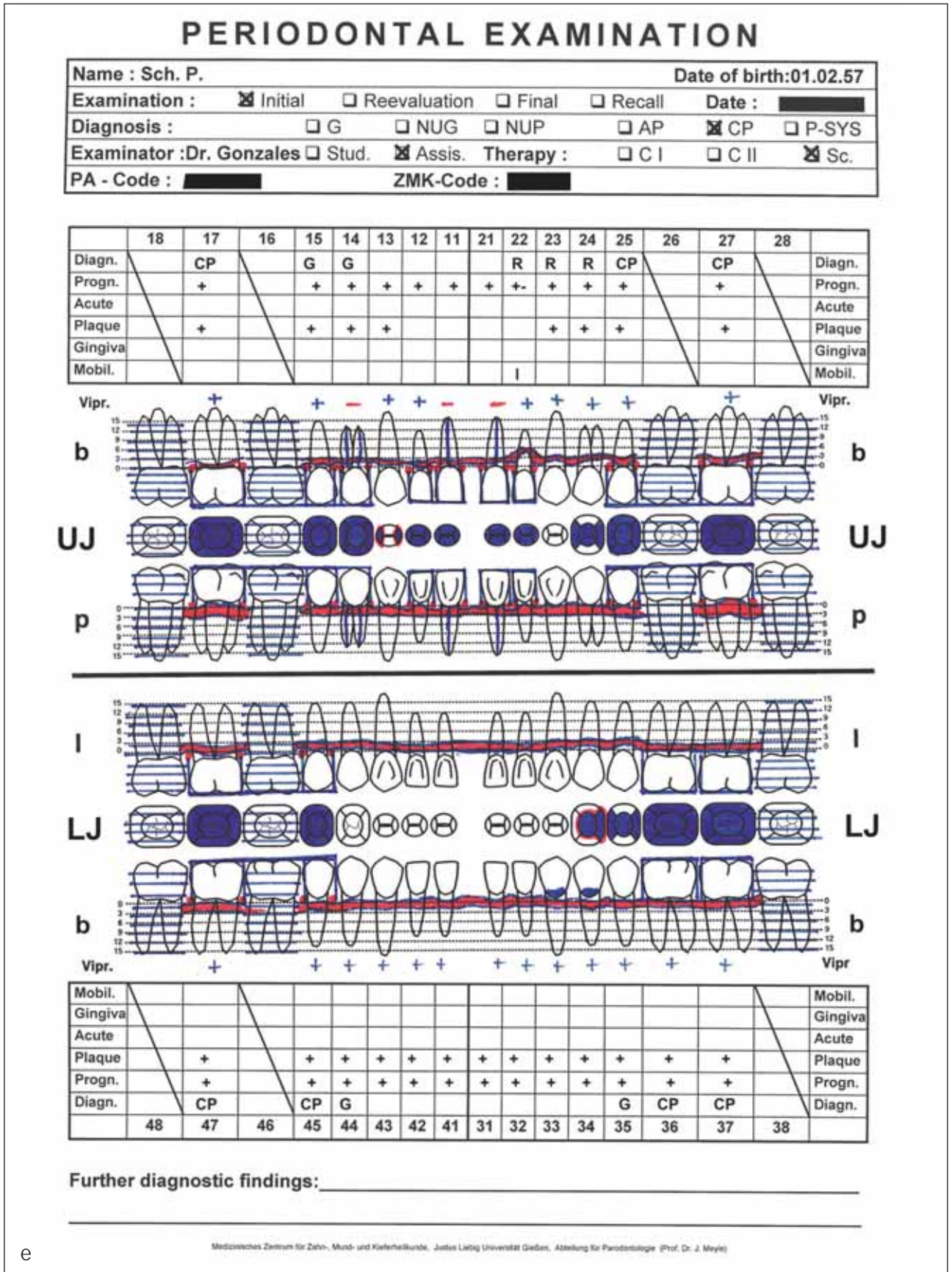


Fig. 6e Initial periodontal chart.



Fig. 7 Preoperative situation and acrylic resin temporary restoration on tooth 22.

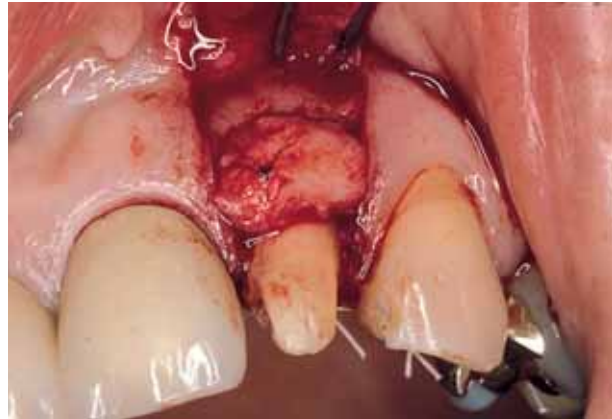


Fig. 8 Intraoperative situation and SCTG in situ. The graft was secured with 7-0 absorbable microsutures.



Fig. 9 Flap repositioned and closed with microsutures (6-0).



Fig. 10 Postoperative situation on suture removal after 7 days.

junction (CEJ) and the buccal soft tissue margin. The width was recorded as the distance between the adjacent papillae at the level of the CEJ. At tooth 22, pre-treatment recession depth and width were both 4 mm (Fig. 7).

Following local anesthetic (Ultracain DS Forte 1.8 ml, Höchst, Frankfurt, Germany), bone sounding was performed. The distance between the CEJ and the alveolar bone level was 7 mm.

Subepithelial Connective Tissue Graft

For the treatment of the recession at tooth 22, a subepithelial connective tissue graft was performed (Langer and Calagna, 1980). A sulcular incision was made at the site of recession, and the incision was extended horizontally into the adjacent interdental areas slightly coronal to the CEJ. The interproximal papillae were left intact. The horizontal incisions were connected to parallel verti-

cal releasing incisions both mesially and distally. A partial thickness flap was elevated in an apical direction until the mucogingival junction (MGJ) had been passed (Langer and Langer, 1993).

Subsequently, the exposed root surface was planed and scaled using curettes. Afterwards, the denuded root was conditioned with 24% EDTA (PrefGel®, Straumann GmbH, Freiburg, Germany) and thoroughly rinsed with saline. The extension of the recipient site was then measured. The donor area for the subepithelial connective tissue was the palate in the bicuspid region on the same side as the receiver site. Donor palatal tissue was harvested using a single incision technique (Hurzeler and Weng, 1999).

The details of this technique are as follows: After local anesthesia, the first horizontal incision of 2–3 mm was made parallel to the free gingival margin with the blade oriented at 90° to the



Fig. 11 Postoperative situation of teeth 23 and 24 one day after surgery using semilunar coronally repositioned flap.



Fig. 12 Postoperative situation after 2 months.

palate. The length of the incision was commensurate with the length of the graft required. The blade was then angled at 135° to the palate and an undermining preparation was started within the first incision. With each further stroke of the blade, the angle was further opened until the blade was parallel to the surface of the palate. The sharp dissection of the partial thickness graft was extended until the desired size was reached. The connective tissue graft was separated from the donor bed by cutting to the periosteum on the mesial, distal and medial sides of the graft. The graft was then detached from the surface of the palate using a periosteal elevator. The dimensions of the harvested tissue were 6 mm wide x 8 mm long. It was kept moist in saline. The incision was closed using non-absorbable 5-0 Gore-Tex sutures. The graft was transferred to the recipient site and micro-surgically sutured interproximally to the underlying connective tissue, using 7-0 absorbable sutures (Vicryl[®], Ethicon GmbH, Norderstedt, Germany). The facial portion of the interdental papillae was de-epithelialized to create a connective tissue bed for the advanced flap (Fig. 8). The periosteum was then cut so that the flap could easily be positioned coronally over the graft without tension and secured with 6-0 non-absorbable sutures (Prolene[®], Ethicon GmbH, Norderstedt, Germany) (Fig. 9). At the control visit after 7 days the sutures were removed (Fig. 10). Further controls were performed after 14 and 21 days.

Semilunar Coronally Repositioned Flap

The semilunar coronally repositioned flap (Tarnow, 1986) is easy to perform and is highly repro-

ducible in class I moderate defects when gingival augmentation is not needed. Both recessions at teeth 23 and 24 had a length and width of 3 mm. Following anesthesia, the exposed root surfaces were scaled and planed. A semilunar incision following the curvature of the free gingival margin was made at the mucogingival junction, since there was enough keratinized tissue to cover the recession. The distance from the free gingival margin to the apical part of the incision was proportional to the recession depth plus 2–3 mm. Then, beginning with an intrasulcular incision, a split thickness flap was created by an undermining incision that connected with the initial semilunar incision. The mid-facial tissue was then coronally positioned to the CEJ (Fig. 11). Immediately afterwards, the tissue was held in place with moist gauze against the tooth for 20 min. Initial control visits were performed after 7, 14 and 21 days. After 2 months, the postoperative situation showed stable and aesthetic results (Fig. 12).

Aesthetic Crown Lengthening

The final, and third element of periodontal plastic surgery was designed in order to correct discrepancies in gingival margin heights between teeth 11 and 21. The length of the clinical crown of tooth 21 was 11 mm, whereas the length of the clinical crown of tooth 11 was, at 9 mm, shorter. Since the clinical crown with a length of 11 mm was in harmony with the anatomic dimensions of the face, an aesthetic crown lengthening of tooth 11 was indicated to establish this proportion. Following local anesthesia, the level of the bone crest around both teeth was clarified by perform-

Fig. 13a, b Aesthetic crown lengthening on tooth 11.

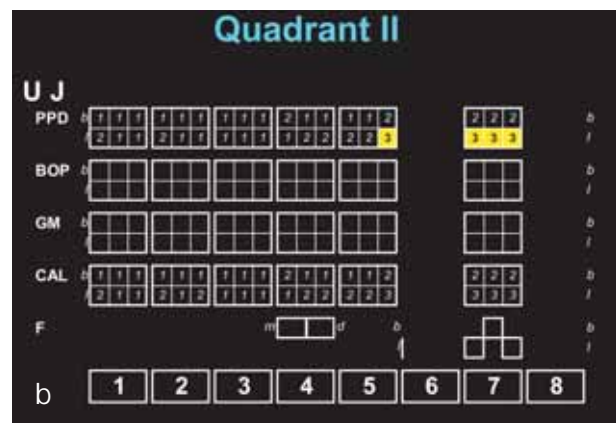
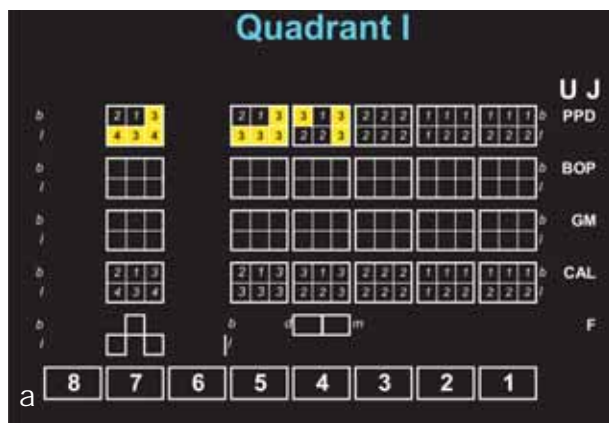


Fig. 13a Measurement of the maxillary incisors with the periodontal probe after surgery, showing the length of tooth 21 of 11 mm.



Fig. 13b Postoperative situation on tooth 11 showing the same length as tooth 21.

Figs. 14a–e Periodontal examination after active treatment.



Figs. 14a–d Periodontal parameters: probing pocket depths (PPD), bleeding upon probing (BOP), gingival margin (GM), clinical attachment level (CAL), and furcation involvement (F) in the upper (U) and lower jaws (L).

ing bone sounding with the periodontal probe. This procedure showed an appropriate osseous level in adequate relationship with the tooth-sup-

porting soft tissues. Also, it was determined that an adequate zone of attached gingiva would remain after surgery. Consequently, it was possible to per-

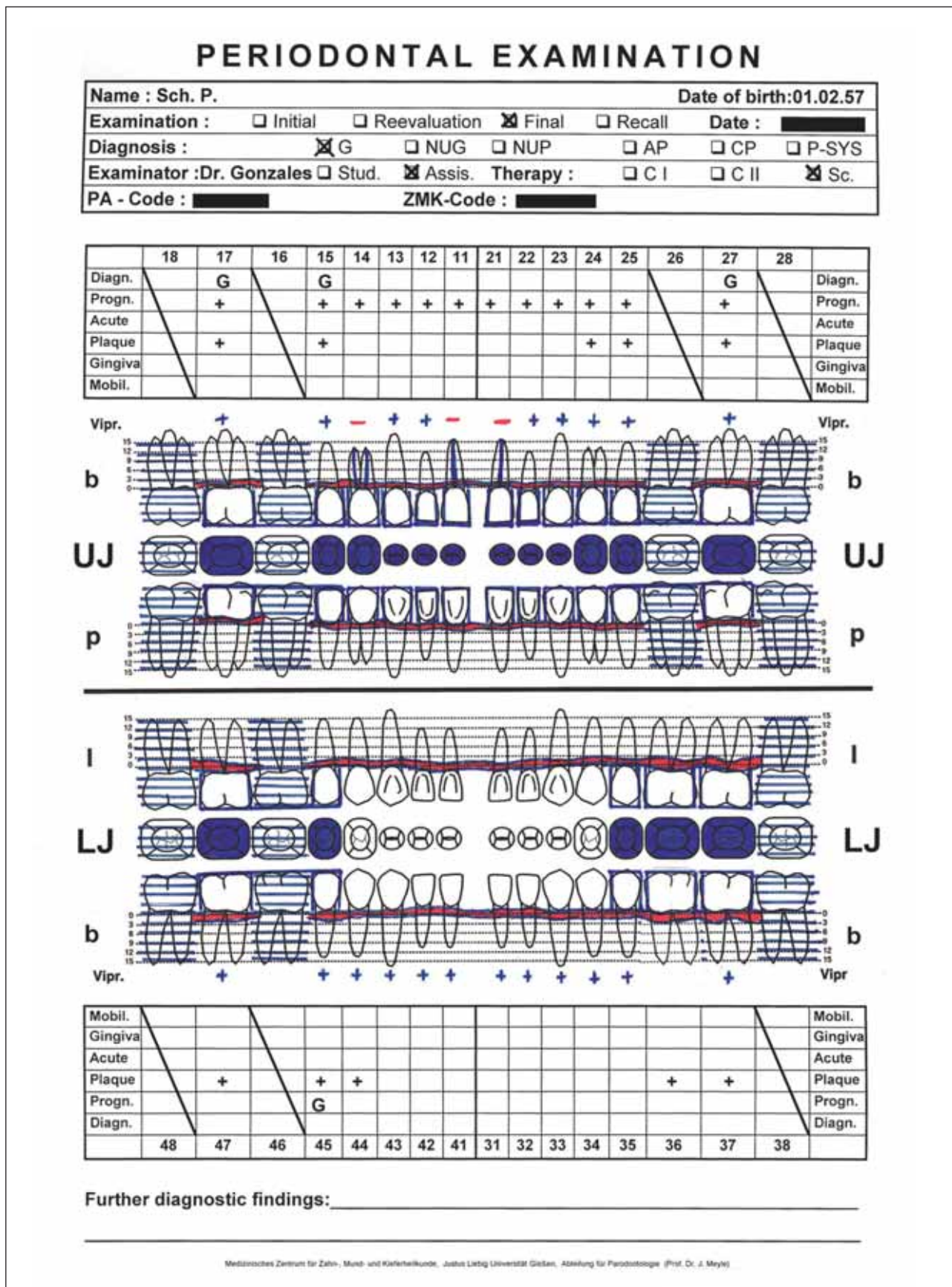


Fig. 14e Periodontal chart after active treatment.

Figs. 15a–e Intraoral appearance after periodontal and restorative treatment.



Fig. 15a Frontal view.



Fig. 15b Lateral right view.



Fig. 15c Lateral left view.



Fig. 15d Occlusal view of the maxilla.



Fig. 15e Occlusal view of the mandible.

form a gingivectomy without the need for osseous resection (Jorgensen and Nowzari, 2001). In order to minimize postoperative discomfort, electrocautery was used. A full thickness beveled incision was made, and the 2 mm excessive gingival tissue

was removed from the facial surface with the papillary tissue left undisturbed (Figs. 13a, b). With this technique, gingival health, comfort and optimum aesthetics were achieved and maintained.



Fig. 16a Intraoral view showing the clinical situation of the anterior maxilla after periodontal plastic surgery and restorative dentistry.



Fig. 16b Histochemical analysis of soft tissues with Schiller iodine solution.

Restorative Dental Treatment

Collaboration between the restorative dentist and periodontal specialist is essential in the development of a final treatment plan to realize the fullest potential for restorative excellence. Extensive restorative treatment was performed on the patient at the Polyclinic for Operative and Preventive Dentistry. Teeth 17, 15, 14, 13, 12, 11, 21, 22, 23, 24, 25, 27, 37, 36, 35, 45 and 47 were restored with metal ceramic crowns. All-porcelain labial margins were fabricated in order to achieve excellent aesthetics in the anterior region.

Final Periodontal Examination

Following active periodontal and restorative treatments, a final periodontal examination was conducted. A reduction in probing pocket depths and bleeding on probing was recorded (Figs. 14a, b). Thus, the prognosis for all teeth was very good. The clinical situation after the oral rehabilitation is shown in Figs. 15a–d.

All 3 different periodontal plastic surgeries demonstrated overall aesthetic outcomes. The preoperative dimensions of the gingival recessions were 8 mm² for tooth 22, and 4.5 mm² for teeth 23 and 24. After surgery, complete root coverage (100%) was achieved in all treated defects. Also, the aesthetic crown lengthening showed stable and aesthetic results (Fig. 16a). Clinical examination of the keratinized gingiva with Schiller iodine solution demonstrated an adequate width of keratinized tissue (Fig. 16b). The patient was then integrated into a supportive periodontal treatment regimen.



Fig. 17 Patient satisfied with the appearance of her smile after treatment.

DISCUSSION

A 46-year-old woman presented at the Department of Periodontology of our School of Dentistry with a chief complaint of an 'unaesthetic smile'. The patient was in excellent general health with no known allergies, took no medication and did not smoke. The position of the smile line was high and clinical examination revealed poorly contoured and exposed metal-ceramic restorations. Gingival recessions of different dimensions were present at teeth 22, 23 and 24. Additionally, the clinical crown of tooth 21 was longer than the crown of tooth 11. Resulting soft tissue contours were less than ideal from an aesthetic perspective. Poor restorations were also found in the posterior regions. After periodontal examination, the diagnosis of 'chronic periodontitis' was established based on the age of the patient, the shallow depth of the periodontal pock-

ets and the moderate oral hygiene. After anti-infective periodontal therapy, patient compliance and the periodontal clinical parameters considerably improved. Also the periodontal plastic surgeries performed were successful and provided aesthetic results. The subepithelial connective tissue graft used for covering the recession of tooth 22 demonstrated a high success rate. This result is in accordance with those of other authors (da Silva et al, 2004; Harris, 2003; McGuire and Nunn, 2003; Vastardis and Yukna, 2003). Similar results were obtained with the semilunar coronally repositioned flap described by Tarnow (1986). An aesthetic crown lengthening of tooth 11 was performed in order to establish the symmetry of the anterior teeth and provide functional aesthetic results. This type of periodontal surgery depends on the osseous level. If the level is appropriate and the combined dimensions of the junctional epithelium and connective tissue attachment (biological width) are above 3 mm from bone to gingival margin, and if there is enough width of attached gingiva after the surgery, a gingivectomy without osseous surgery is indicated (Gracis et al, 2001). After active periodontal therapy the restorative treatment of the patient was completed. The patient was very pleased with the aesthetic results and the appearance of her smile (Fig. 17). Patient compliance and participation in further supportive periodontal treatment will maintain the results and together they offer the prospect of a generally good prognosis.

REFERENCES

- Ainamo J, Barmes D, Beagrie G, Cutress T, Martin J, Sardo-Infirri J: Development of the World Health Organization (WHO) community periodontal index of treatment needs (CPITN). *Int Dent J* 1982; 32: 281–291.
- Bjorn H: Free transplantation of gingiva propria. *Svensk tandlakare tidskrift* 1963; 22: 684.
- Bohannon HM: Studies in the alteration of vestibular depth. I. Complete denudation. *Journal of Periodontology* 1962; 33: 120–128.
- da Silva RC, Joly JC, de Lima AF, Tatakis DN: Root coverage using the coronally positioned flap with or without a subepithelial connective tissue graft. *Journal of Periodontology* 2004; 75: 413–419.
- Goldstein M, Boyan BD, Cochran DL, Schwartz Z: Human histology of new attachment after root coverage using subepithelial connective tissue graft. *J Clin Periodontol* 2001; 28: 657–662.
- Gracis S, Fradeani M, Celletti R, Bracchetti G: Biological integration of aesthetic restorations: factors influencing appearance and long-term success. *Periodontology* 2000 2001; 27: 29–44.
- Guiha R, el Khodeiry S, Mota L, Caffesse R: Histological evaluation of healing and revascularization of the subepithelial connective tissue graft. *J Periodontol* 2001; 72: 470–478.
- Harris RJ: Connective tissue grafts combined with either double pedicle grafts or coronally positioned pedicle grafts: results of 266 consecutively treated defects in 200 patients. *Int J Periodontics Restorative Dent* 2002; 22: 463–471.
- Harris RJ: Root coverage in molar recession: report of 50 consecutive cases treated with subepithelial connective tissue grafts. *J Periodontol* 2003; 74: 703–708.
- Hurzeler MB, Weng D: A single-incision technique to harvest subepithelial connective tissue grafts from the palate. *Int J Periodontics Restorative Dent* 1999; 19: 279–287.
- Jorgensen MG, Nowzari H: Aesthetic crown lengthening. *Periodontology* 2000 2001; 27: 45–58.
- Langer B, Calagna L: The subepithelial connective tissue graft. *J Prosthet Dent* 1980; 44: 363–367.
- Langer B, Langer L: Subepithelial connective tissue graft technique for root coverage. *J Periodontol* 1985; 56: 715–720.
- Langer L, Langer B: The subepithelial connective tissue graft for treatment of gingival recession. *Dent Clin North Am* 1993; 37: 243–264.
- McGuire MK, Cochran DL: Evaluation of human recession defects treated with coronally advanced flaps and either enamel matrix derivative or connective tissue. Part 2: Histological evaluation. *J Periodontol* 2003; 74: 1126–1135.
- McGuire MK, Nunn M: Evaluation of human recession defects treated with coronally advanced flaps and either enamel matrix derivative or connective tissue. Part 1: Comparison of clinical parameters. *J Periodontol* 2003; 74: 1110–1125.
- Meyle J, Vonholdt J: Parodontale Screeninguntersuchung. *Parodontologie* 2002; 13: 119–129.
- Miller PD Jr: A classification of marginal tissue recession. *Int J Periodontics Restorative Dent* 1985; 5: 8–13.
- Norberg O: Är en utlakning utan vovnadsfortust otänkbar vid kirurgisk behandling av s. k. alveolarpyorrhoe? *Svensk tandlakare tidskrift* 1926; 19: 171.
- O'Leary TJ, Drake RB, Naylor JE: The plaque control record. *Journal of Periodontology* 1972; 43: 38.
- Tarnow DP: Semilunar coronally repositioned flap. *Journal of Clinical Periodontology* 1986; 13: 182–185.
- Vastardis S, Yukna RA: Gingival/soft tissue abscess following subepithelial connective tissue graft for root coverage: report of three cases. *Journal of Periodontology* 2003; 74: 1676–1681.
- Wennstrom JL: Mucogingival therapy. *Ann Periodontol* 1996; 1: 671–701.

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