The effects of the inverse bevel flap procedure on gingival contour and plaque accumulation

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Abstract. Periodontal surgery should eliminate disease and produce a good gingival contour to allow ease of cleaning and maintenance. An important factor in the achievement of these aims may be the contour of the attached gingiva following surgery. At present, gingival contour is evaluated by one of two indices. A new disease-related gingival contour index was designed and compared with existing indices (plaque index, periodontal index, sulcus bleeding index) following inverse bevel flap procedures. The results demonstrated that there was a statistically significant increase in the scores for gingival contour (p<0.001) a significant decrease in scores for the periodontal index (p<0.001) and sulcus bleeding index (p<0.05), but no change in the amounts of plaque accumulating (p>0.7).

One of the suggested aims of periodontal surgery is to improve tissue contour so that plaque control procedures are facilitated and recurrence of disease prevented (Manson 1980).

Since the 1950s, many techniques have been described for artificially contouring tissue using the gingivoplasty and the osteoplasty techniques (Schluger 1949, Ochsenbien 1958, Friedman & Levine 1964). However, more recently, these surgical methods have become less frequently employed. Animal wound healing studies (Zander & Matherson 1963, Glickman et al. 1963) showed that the gingiva governs the contour of the underlying alveolar bone and not vice versa as was previously thought (Schluger 1949). Moreover, the shape of interdental tissues depends largely on the shape and contour of the proximal tooth surfaces and crown form (Zander & Matherson 1963).

At present, gingival contour is usually assessed by one of two indices. The first is that introduced by MacLeod et al. (1965) and the second is a modification of the same index (Zamet 1967). In both indices, any deviation from normal is allocated a score of 1 and no differentiation is made between the various gingival deformities associated with acute and chronic gingival and periodontal disease.

The effects of changes in gingival contour prior to and following periodontal surgery and their effects on plaque accumulation have not been previously assessed. Since one of the aims of periodontal surgery is to produce a gingival contour conducive to cleaning and maintenance, it would appear pertinent to assess the effects of the inverse bevel flap procedure on gingival contour and plaque accumulation. This study attempts to measure these parameters by developing a contour index designed to record changes in gingival contour considered to be related to gingival and periodontal diseases which may predispose proportionately to plaque accumulation.
Material and Methods

For the purpose of this study, previous indices of gingival contour were considered inadequate and a new disease-related gingival contour index was designed (Fig. 1). The index is scored by examining buccal, lingual and inter-proximal surfaces of the teeth and gingiva under study. The scores allotted range from 0, which indicates a feather-edged marginal attached gingiva with pointed and tightly bound papillary attached gingiva — the 'ideal' gingival contour — to 4, allotted to gross fibrous deformity as may be seen in such abnormalities as epanutin hyperplasia and hereditary gingivo-fibromatosis. The scores between are graded according to the degree of deformity of both marginal and papillary attached gingiva for each tooth between the previously described boundaries. The total mouth score is calculated by dividing the sum of the scores for buccal, lingual and inter-proximal gingival units of the teeth under investigation by the total number of scores, giving a total maximum score for each patient of 4. All scoring was carried out prior to disclosing for plaque and without drying of the gingiva.

Patients were randomly selected from those attending the Department of Periodontology, The Dental School, Welsh National School of Medicine for whom inverse bevel flap procedures had been treatment planned. 12 patients completed their treatments, 4 male and 8 female, with a mean age of 37.9 ± 8.7 years. No conscious recontouring was carried out on any of the patients. All patients received a routine course of scaling and polishing and oral hygiene instruction prior to assessment for surgery.

Pre-operative records comprised gingival contour (Fig. 1), Russell's periodontal index (1956), sulcus bleeding index (Muhlemann & Son 1971), and plaque index (Greene & Vin-

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**Fig. 1. Gingival contour index.**

| P - Papillary attached gingiva | M - Marginal attached gingiva |

0. Feather edge M, pointed and tightly bound P filling interdental spaces.

1. Rolled M with slight rounding and enlargement of P.

2. Blunting or cratering of P rolled M.

3(a) Detachment of buccal and lingual portions of P as demonstrated by an air jet.

(b) Vertical clefts in M.

4. Gross fibrous enlargement of M and/or P.

Gingival Konturenindex.

Indice de Contour Gingival (caractères de la gencive adhésive papillaire (P) et marginale (M)).
of the number of each prior to the study. No one of the patients had any previous periodontal surgery. The gingival index was used for the evaluation of the gingival contour and plaque accumulation.

Surgery was undertaken by 4 members of the department, but records of indices were made exclusively by the same person. No specific area of the mouth was selected for treatment in the study, but each area included consisted of one quadrant of surgery from each patient. Statistical analysis of the results was carried out using the Student t test for paired data, the plaque scores and gingival contour scores also being evaluated using the Wilcoxon ranked signed pairs test. Correlation coefficients (r values) were calculated for pre-operative and post-operative plaque and gingival contour indices.

Fig. 1: Mean preoperative and postoperative scores for the periodontal index.
Mittlere pro- und postoperative Skor für den periodontalen Index.

Fig. 2: Mean preoperative and postoperative scores of the gingival contour index.
Mittlere pro- und postoperative Beurteilungs-
ieheiten (Scores) des gingivalen Kammerindex.

Fig. 3: Mean preoperative and postoperative scores for the gingival contour index.
Scores moyens de l’indice Gingival avant (prep.) et après (postop.) l’intervention.

Results
Gingival contour
Fig. 2 shows the mean pre-operative and post-operative scores for the gingival contour index for each of the 12 patients. There is an increase in the mean scores post-operatively for each of the patients. This difference being statistically significant when analysed by the Wilcoxon ranked signed pairs test (p<0.001).

Periodontal index
Fig. 3 shows pre-operative and post-operative mean scores for the periodontal index. A highly significant decrease (p<0.001) is evident following surgery.

Sulcus bleeding index
Fig. 4 shows mean bleeding index scores for...
each patient within the group pre-operatively and post-operatively. A mean reduction in the scores is shown post-operatively and this reduction is statistically significant (p<0.05).

Plaque index
Fig. 5 shows pre-operative and post-operative mean plaque index scores for each patient. A small increase in the mean plaque score is apparent post-operatively. However, the difference between pre-operative and post-operative scores is not statistically significant (p > 0.7).

Plaque and contour
No significant correlation was found between

Fig. 5. Mean preoperative and postoperative scores for the plaque index.

Mêlées préopératoires et postopératoires des indices de plaque.
Scores moyens de l'indice de plaque avant et après l'intervention.

either pre-operative plaque scores and pre-operative contour indices or post-operative plaque scores and post-operative contour indices (r=0.00003 and 0.00003, respectively).

Discussion
The results of this study again demonstrated that surgical treatment of chronic periodontal disease is successful with regard to reduction of pocket depths and inflammation as indicated by decreasing scores for the periodontal index and sulcus bleeding index. However, as measured by the contour index described, the production of a good post-operative gingival shape was not attained. This is perhaps not surprising, since clinical experience of gingival contour after inverse bevel flap procedures differs considerably from what is considered the contour of normal healthy gingiva. The basic aim of this index was to describe and grade such changes.
from the absolute norm. The findings thus contradict those previously reported (Zanet 1967). This investigation observed an overall statistically significant improvement in gingival contour after periodontal surgery. Because of the differing criteria for scoring used, comparisons are difficult to make. Perhaps the major difference between the scoring methods reported is that in the study by Zanet (1967) no weight was given to the filling of the interdental spaces by gingival tissue.

Over the relatively short post-operative period studied, it would appear that no significant changes occurred in the amount of plaque accumulation around the teeth, suggesting that most patients who are prepared for periodontal surgery, are capable of properly cleaning the buccal and lingual aspects of the teeth in the post-operative phase, even though the gingival contour is not necessarily improved by surgery.

Unfortunately, the plaque index used (Greene & Vermillion 1960) as with others (Shaw & Murray 1977, Harrap 1974), only recorded plaque on the buccal and lingual surfaces of the teeth and did not measure interdental plaque, even when it was post-operatively visible.

Despite the observed presence of plaque interdentally, the sulcus bleeding index did not increase during the 3-month assessment period. Nevertheless, this emphasises the need for re-disciplining the patients in the need for interdental cleansing during the post-operative period.

In conclusion, it would appear that for this group of patients, the gingival contour was not improved by surgery and therefore one of the suggested aims of surgery (Manson 1980) was not fulfilled. Despite this, plaque scores, which interestingly did not correlate with gingival contour, were not significantly increased and the pocketing and sulcus bleeding indices were reduced and remained low up to 3 months. The findings question the importance of a good gingival contour for the maintenance of periodontal health.

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Zusammenfassung

Die Folgen der Lappenoperationen mit invertierter Horizontalresektion auf die Kontur der Gingiva und die Plaqueansammlung

Es ist die Aufgabe der Parodontalkrise, neben der Beseitigung der Krankheit eine gültige gingivale Kontur zu erreichen, um Zahnezahnung und Nachsorge zu erleichtern. Hierbei spielt die postoperative Kontur der festen Gingiva eine wichtige Rolle. Zur Untersuchung der postoperativen Plaqueansammlung und zur Konturqualität der Gingiva wurden ausgewählte Patienten mit invertierter Horizontalresektion auf einer Zahnmeierei behandelt. Die Ergebnisse der vorliegenden Arbeit werden mit den Ergebnissen der kontinuierlichen Kontrollen verglichen. Die Untersuchungen ergaben, dass nach einer invertierter Horizontalresektion die Plaqueansammlung signifikant reduziert ist (p<0.001) und dass die Konturqualität der Gingiva verbessert wird (p<0.05).

Résumé

Influence de l‘opération à lambeau avec biseau inversé sur le contour gingival et sur l‘accumulation de la plaque

La chirurgie parodontale vise à éliminer la maladie et à créer un contour gingival favorable qui permet un nettoyage et un maintien facile. Il est possible que le contour de la gencive adhérente constitue un facteur important pour atteindre ces objectifs. On utilise actuellement pour l'évaluation du contour gingival deux indices, celui de Löe et s'il n'existe, celui de Zanet. Cette étude utilise un nouvel indice de contour gingival conçu pour évaluer les changements ayant une importance pour la maladie. Cet indice a été comparé, après des opérations à lambeau avec biseau inversé, aux indices existants (indice de plaque, indice parodontal, indice de saignement du sillon). Il ressort des résultats qu‘il se produisait une augmentation statistiquement significative des scores concernant le contour gingival (p<0.001) et une diminution significative des scores concernant l‘indice parodontal (p<0.001) et l‘indice de saignement du sillon (p<0.05), mais pas de changement quantitatif dans l‘accumulation de la plaque (p>0.7).
References


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Abstract: There is an increasing demand for less invasive dental procedures, particularly periodontal treatment. The purpose of this study was to evaluate the effectiveness of a novel technique, using ultrasonic instrumentation, in the treatment of periodontal disease.

The results of the study showed a significant improvement in clinical parameters such as probing depth and attachment level. Patient satisfaction was also high, with many reporting a reduction in bleeding and discomfort.

In conclusion, the use of ultrasonic instrumentation in periodontal treatment offers a viable alternative to conventional surgical procedures. Further research is needed to confirm these findings and to assess long-term outcomes.