Gingival inflammation by well-adapted subgingival approximal restorations

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Abstract.—Restorative dentistry and periodontal health are closely related. Changes which occur in the periodontal tissues during and after restorative treatments of dental caries can be expected not only on theoretical grounds but also can be observed in the daily routine practice. Various experiments have been made concerning the character of these changes. A series of animal experiments concerning the histological reaction of periodontium from different filling materials and the applied restorative procedures were carried out. They demonstrated that the gingiva after injury may heal fairly soon, provided that the area concerned is free from bacterial plaque. However, in practice it appears to be difficult to meet this condition. Rough filling materials, microscopic fissures between the filling and the cavity margins and small overhangs—especially situated in the clinical sulcus—are important factors favouring development of plaque accumulations. Clinicians often suppose that extending the margin of dental restorations into the gingival sulcus, is a good caries preventive measure. Several authors, however, have shown, that subgingival fillings are associated with gingival inflammation. Inflammation has been found epidemiologically more pronounced beside well-adapted restorations with subgingival margins than beside fillings with cervical margins placed supragingivally. These findings, however, are in contrast with some histological observations. It was the aim to clarify in clinical experiments whether subgingival restoration margins cause inflammation of the adjacent gingiva.

The first study was to clinically and epidemiologically clarify whether gingival inflammation is more pronounced adjacent to sound tooth structure, or to well-adapted supragingival or well-adapted subgingival filling margins. Twenty-nine of 554 recruits had one restoration-free tooth, one tooth with a well-adapted subgingival margin and one tooth with a well-adapted supragingival margin among teeth 16, 24, 36 and 44—the teeth selected for this investigation.

The cervical position of the filling margin was determined from the difference between the clinically estimated distance from gingival margin to cementoenamel junction and radiologically determined distance from filling margin to cementoenamel junction. Gingival inflammation adjacent to sound tooth surfaces, sub- and supragingival filling margins was scored with the SBIndex. Plaque accumulation was measured after fuchsin staining, using the plaque index. Filling ranged from 1 month to 14-years-old.

Degree of gingival inflammation was higher adjacent to subgingival filling margins when compared to supragingival margins or to sound surfaces. There was no significant difference in inflammatory grade between sound surfaces and supragingival margins. Plaque accumulation was in all three instances statistically similar.

These results are in contrast to histological investigations. It should therefore be clarified whether inflammation of adjacent gingiva can be caused by placement of well-adapted subgingival filling margins. A model was worked out for this purpose.
Cavities were prepared in 12 subjects, and cast gold restorations were placed on the same day. The disto-occlusal inlays were constructed so that the cervical margin, which extended 1 mm above the gingival margin, had a 1 mm overhang. Changes in inflammatory grade were determined using sulcus fluid flow rate measurements at the test papilla (adjacent to the overhang), at the collateral control papilla (the other papilla of the same tooth) and at the contralateral control papilla (of the same tooth in the opposite quadrant). Plaque accumulation was measured using the Silness-Løe Index on test, collateral and contralateral control surfaces.

Measurements were performed immediately before, and 14 and 60 days after the inlays were seated. Average sulcus fluid flow rate at the test papilla was significantly higher after only 14 days, when compared with initial findings before preparation. The difference increased significantly within 14 days compared to initial findings, and was even greater after 60 days. Neither sulcus fluid flow rate nor plaque accumulation changed on control surfaces. This demonstrated that the model is effective, so that effects of subgingival filling margins could be studied.

One proximal inlay was seated on both sides of one jaw in 8 subjects. The subgingival margin of one of the inlays was roughed up after 23 days, the other remained polished. Influence of rough and polished subgingival filling margins was studied on the papillae adjacent to the subgingival filling margins during 34 (Ⅰ period) and 28 (Ⅱ period) days, using sulcus fluid rate as the criterium. Plaque accumulation on both filled and sound tooth surfaces was measured using the Silness-Løe index. In addition, plaque which accumulated on supra- and subgingival parts of the inlays with rough margins was planimetrically measured. As comparison, Plaque accumulation on the polished inlays was also measured. Average sulcus fluid flow was significantly higher near fillings, regardless of rough or polished, when compared to restoration-free teeth. There was no significant difference between filled and non-filled surfaces with regard to plaque accumulation. However, planimetric analysis revealed significantly more plaque accumulation on rough filling margins when compared to polished margins. Subgingival plaque amounts clearly increased during periods Ⅰ and Ⅱ.

Results indicate, that preparation of the cervico-proximal step should not be within the clinical sulcus.

追加

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歯頸部のインレイ充填および金属冠などの装着によってその部の歯肉に炎症がひき起こされることはしばしば認められるところです。この問題を検討するのに充填物または補綴物の下線の位置、輪郭、表面の状態と歯淵沈着、歯肉の炎症、特に歯肉壊からの溢出液の流出速度などとの関係を比較し、下線の位置は歯肉上にあるべきことを明解に結論された総説的な御発表に敬意を表します。

私も比較的よく適合していた冠を装置していた歯の歯周組織を組織学的に検索して、歯肉壊深部の炎症は歯淵によることを示唆する所見を観察しました。