A histologic evaluation of dental pulp tissue of a patient with periodontal disease

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Clinical and histologic examination of twenty-five teeth of a patient with varying degrees of attachment loss resulting from periodontal disease showed no correlation between the severity of periodontal disease and morphologic changes of the pulp tissue.

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Dental pulp communicates with periodontium through apical, lateral, or accessory canals. In experimental animals and human beings it has been shown that pulpal pathosis can cause varying degrees of periodontal change.1 Following successful root canal therapy, these pathologic changes of endodontic origin usually disappear and the periodontium returns to within normal limits.^{2,3} Although a clear cause-and-effect relationship between pulpal diseases and periodontal changes has been suggested, the effects of periodontal disease on the pulpal tissue still remain unclear and controversial. Different investigators have listed the histologic changes in the pulp tissues of periodontally involved teeth as varying from normal to necrotic.49 Some possible reasons for such a diversity in their respective findings may include lack of uniform documentation of the case histories, lack of definitive criteria for selection of the cases and their descriptive histologic observations, and failure of some authors to include control dental pulps with normal periodontium.

The purpose of this case report is to present histologic findings from dental pulps of a patient who had no previous periodontal therapy and could provide a number of teeth for histologic evaluation with varying degrees of attachment loss resulting from periodontal disease. Also present for comparison were pulps of a few teeth with minimal attachment loss.

Case Report

A 47-year-old white male was referred for dental evaluation to the Loma Linda University School of Dentistry. His medical history was noncontributory. Examination of his gingival tissues showed moderate to severe inflammation, along with a number of periodontally involved teeth. The patient reported that his gingiva had been sore for many years and that he had never received any previous periodontal treatment. Evaluation of a full-mouth radiographic series showed the presence of moderate to severe bone loss around most teeth (Fig. 1). The presence or absence of restorations on each tooth was recorded, and the pulpal conditions were evaluated with use of electric pulp tester, cold, and heat. In addition, sensitivity of teeth to palpation and percussion was recorded. The periodontal assessment was done by measuring periodontal pocket depth, soft-tissue recession, and degree of mobility of each tooth. In multirooted teeth, furcal involvement was evaluated and noted. A score was given to each tooth according to Russell's Periodontal Index.10 Clinical and radiographic findings indicated that all pulps responded within normal limits and that the patient had moderate to severe periodontal disease around most of his teeth. After consultation with the dental staff, the patient chose to have all teeth except Nos. 18, 27, 28, 29, and 30 extracted and to have a complete maxillary denture and a partial mandibular denture constructed. At the time of insertion of the maxillary immediate denture, the teeth were extracted as atraumatically as possible with the aid of a local anesthetic. Upon extraction, the apical 2 to 3 mm of the roots was immediately sectioned with a No. 701 fissure bur and an opening was made into the pulp chamber with a No. 4 round bur. Coronal and apical access to the pulp tissue was gained with a high-speed handpiece under a constant flow of cool water. The teeth were coded and placed into 10% buffered formalin solution for 1 week. After fixation, the teeth were decalcified in 20% formic acid and embedded in

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Fig. 1. Full-mouth radiographic series showing presence of moderate to severe bone loss around most teeth.



Fig. 2. A representative section of pulp tissue from a tooth with severe periodontitis. A, Apical third. B, Middle third.

paraffin. Step serial sections 6 microns in thickness were made and stained with hematoxylin and eosin. The sections were later examined by us and by an oral pathologist, and a chart was prepared according to Czarnecki and Schilder's criteria for assessment of pulpal changes.⁶

RESULTS

All teeth responded within normal limits to vitality tests, and no evidence of pulpal pathosis was found upon histologic evaluation. The periodontal status of teeth was divided into two groups according to the amount of average attachment loss per tooth. The teeth with a Russell Index score of 6 were categorized as having moderate periodontitis and teeth with a Russell Index score of 8 were classified as having severe periodontitis. Of the 25 teeth that were extracted, 18 had moderate periodontitis and 7 had severe periodontitis. Of the 18 teeth with moderate periodontitis, 5 had occlusal amalgam restorations and 1 had a gold crown. Of the 7 teeth with severe periodontitis, 3 had occlusal amalgam restorations. According to the histologic criteria used by Czarnecki and Schilder, no histologic evidence of pathosis was found in any of the pulpal tissues of extracted teeth. In general, the pulp tissues were within normal limits, and most of them had foci of calcifications inside the pulp chambers or in the root canals (Figs. 2 and 3).

DISCUSSION

Clinical and histologic evaluation of this case show no correlation between periodontal attachment loss



Fig. 3. A representative section of pulp tissue from a tooth with moderate periodontitis. A, Apical third. B, Middle third.

and morphologic changes in the pulp tissue. Nor was there seen any correlation between the presence of occlusal restorations and pulpal changes. Our findings parallel those of Czarnecki and Schilder, who suggested no cause-and-effect relationship between the presence of periodontal disease and pulpal changes.⁶ However, they found that teeth with extensive restoration had pulps that were not histologically within normal limits. The difference between our findings and theirs can possibly be explained by the fact that the amalgam restorations in our patient were generally very shallow and the tooth with the gold crown had received no preparation prior to cementation. The results of this study are also consistent with the findings of Sauerwein⁴ and Mazur and Massler,⁵ who found no adverse effect on the pulpal tissues of teeth with periodontal disease.

It should be noted, however, that our findings are not consistent with those of several other investigators.⁷⁻⁹ It is possible that these discrepancies are the result of different criteria for histologic and clinical evaluation of the pulp tissue and the lack of similar documentation of clinical periodontal disease parameters. Since our evaluation was of only one patient, our findings should not be generalized to the whole population. Although our results agree with those of several other investigators, more reports or studies would be helpful in documenting the effects of periodontal disease on the pulp tissues.

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