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Histological evaluation of a replanted tooth retained for 49 years

Keklikoglu N, Kaan Asci S. Histological evaluation of a replanted tooth retained for 49 years. © Blackwell Munksgaard, 2006.

Abstract – A maxillary incisor that had been replanted immediately after avulsion 49 years previously was evaluated histologically after extraction. The histological evaluation revealed resorption of the apical root surface, depositions in cement with different phases and mineral density, and histological changes in the periodontal ligament.

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The ultimate aim after replantation of an avulsed tooth is long-term retention of the tooth. The most favorable long-term prognosis is achieved when the extra-alveolar period that extends from avulsion to replantation is brief (1, 2). The most common sequel after replantation of teeth are ankylosis (replacement resorption) and inflammatory resorptions on the root surface (3–8). Studies have shown optimal tissue repair in teeth immediately replanted after avulsion (9, 10). The reattachment of periodontal fibers and the formation of Sharpey fibrils occur about 2 weeks after replantation (11). However, exposed collagen fibers on the surface of the cement during avulsion create a suitable surface for the colonization of mesenchymal cells (12). Osteoprogenitor cells that relocate on this surface may result in complete mineralization of the periodontal ligament (13). Consequently, dentoalveolar ankylosis in association with root resorption may develop (5).

We had the opportunity to histologically examine a replanted tooth that had been retained for 49 years and was extracted for prosthodontic and not pathological reasons.

Case report

We examined a maxillary incisor that was extracted from a 69-year-old women whose maxillary incisor was replanted after avulsion when she was 20-year-old. Following avulsion due to trauma, the patient immediately replanted the maxillary incisor. Next day the tooth was splinted and root canal treatment was conducted 3 months later. It was first used as an abutment tooth in the 3-unit plastic bridge prosthesis. Thereafter, it was used as an abutment tooth in the porcelain bridge prosthesis with metal support for an additional 4 years.

Approximately 49 years after replantation, the tooth was extracted for prosthethic reasons. The radiograph of the extracted tooth showed adequate root canal treatment and apical root resorption (Fig. 1). The extracted tooth was placed in 10% buffered neutral formaline solution and was fixed for 48 h. It was decalcified in 14% EDTA (ethylene diamino tetraacetic acid) solution that was replenished weekly and that was applied for a total duration of 7 weeks. After decalcification, the tooth was embedded in paraffin and 5-μm thick slices were prepared in vestibulolingual direction and were stained by H&E. The evaluation and the photography were performed with a Leitz Laborlux K (Germany) light microscopy.

The histological evaluation revealed the following.

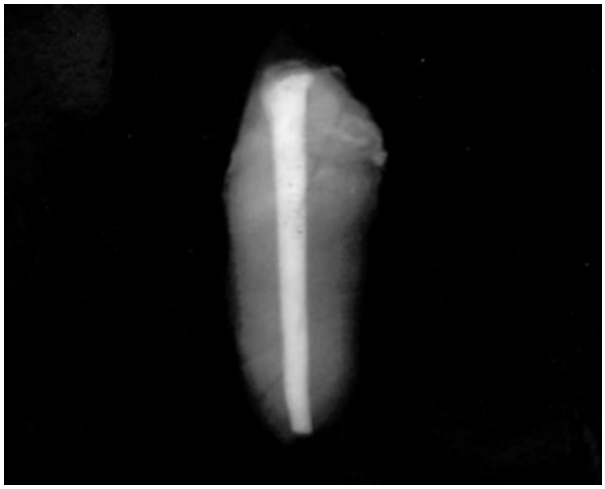

Fig. 1. Radiograph of the tooth following extraction. The treatment appears adequate. Apical resorption is apparent.

(1) Obvious apical root resorption (Fig. 2),
(2) areas of cemental healing with reversal lines in different areas of the cement (Fig. 3),
(3) stratifications that show the presence of different degrees of calcification in the cementum (different staining characteristics) (Fig. 4),

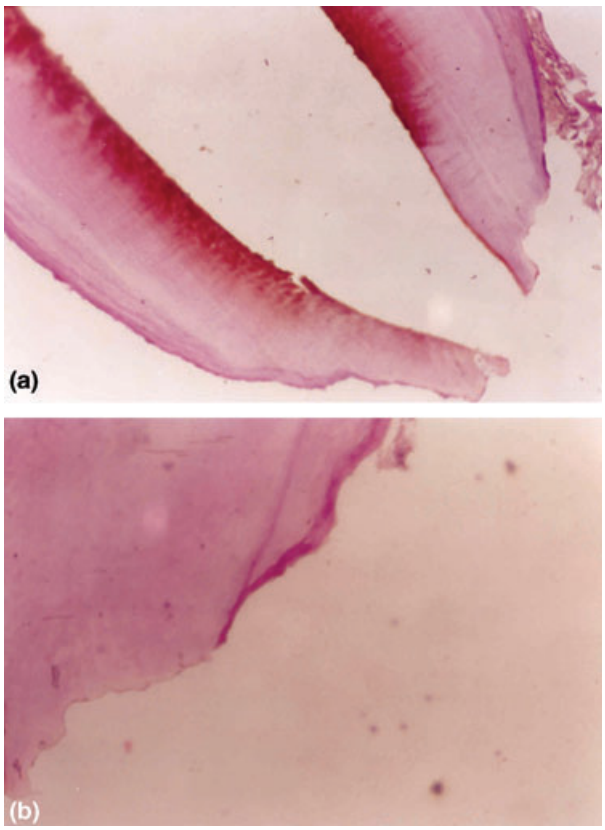

Fig. 2. a) Low magnification showing loss of cemental covering in the apical region with root resorption; (b) higher magnification of the apically resorbed root.

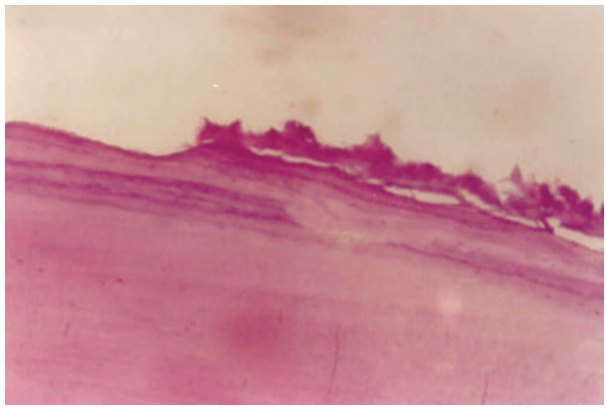

Fig. 3. Favorable healing in the cemental layer.

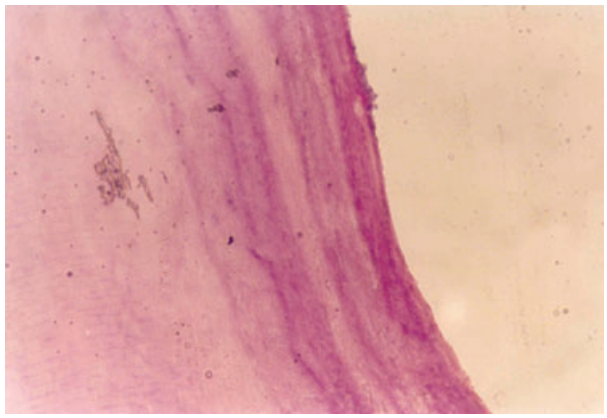

Fig. 4. Differential calcification in cement layers.

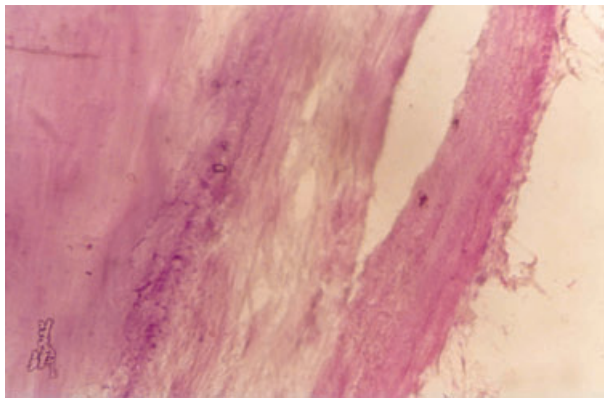

Fig. 5. Detached layers in cement.

(4) scattered areas of non-adherence in cement layers due to trauma during extraction or due to histological preparations (Fig. 5),
(5) an adherence of extensions of periodontal ligaments which is unusual for extraction (Fig. 6).

Discussion

The long-term retention of this avulsed tooth after immediate replantation strongly supports the find-

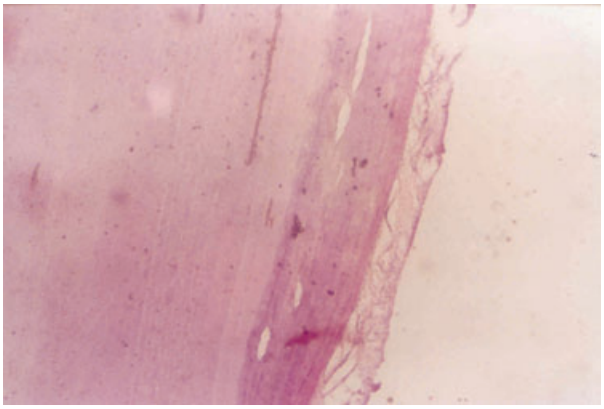

Fig. 6. The residues of periodontal ligament that has not detached from cements during extraction.

ings that immediate replantation will result in favorable long-term outcomes.

Histological evaluation of this replanted tooth demonstrated areas of cemental repair and mineralization of the cemental layer. While no non-avulsed control was available, these findings are consistent with a tooth that has undergone trauma with favorable healing. It is likely that the apical resorption is related either to the root treatment or the forces of occlusion due to the fixed prosthesis.

This case supports the experimental findings that immediate replantation of an avulsed tooth followed by adequate endodontic treatment can result in the long-term retention of the tooth.

References

1. Andersson L, Bodin I. Avulsed human teeth replanted within 15 minutes-a long-term clinical follow-up study. Endod Dent Traumatol 1990;6(1):37–42.
2. Johnson WT, Goodrich JL, James GA. Replantation of avulsed teeth with immature root development. Oral Surg Oral Med Oral Pathol 1985;60(4):420–7.
3. Heimdahl A, von Konow L, Lundquist G. Replantation of avulsed teeth after long extra-alveolar periods. Int J Oral Surg 1983;12(6):413–7.
4. Kandemir S, Alpoz E, Caliskan MK, Alpoz AR. Complete replacement resorption after replantation of maxillary incisors:report of case. J Clin Pediatr Dent 1999;23(4):343–6.
5. Hammarstrom L, Blomlof L, Lindskog S. Dynamics of dentoalveolar ankylosis and associated root resorption. Endod Dent Traumatol 1989;5(4):163–75.
6. Lengheden A, Blomlof L, Lindskog S. Effect of immediate calcium hydroxide treatment and permanent root-filling on periodontal healing in contaminated replanted teeth. Scand J Dent Res 1991;99(2):139–46.
7. Andreasen JO. Relationship between cell damage in the periodontal ligament after replantation and subsequent development of root resorption. A time-related study in monkeys. Acta Odontol Scand 1981;39(1):15–25.
8. Hellsing E, Alatli-Kut I, Hammarstrom L. Experimentally induced dentoalveolar ankylosis in rats. Int Endod J 1993;26(2):93–8.
9. Pettiette M, Hupp J, Mesaros S, Trope M. Periodontal healing of extracted dogs' teeth air-dried for extended periods and soaked in various media. Endod Dent Traumatol 1997;13(3):113–8.
10. Klinge B, Nilveus R, Selvig KA. The effect of citric acid on repair after delayed tooth replantation in dogs. Acta Odontol Scand 1984;42(6):351–9.
11. Mueller BH, Whitsett BD. Management of an avulsed deciduous incisor. Report of a case. Oral Surg Oral Med Oral Pathol 1978;46(3):442–6.
12. Ehnevid H, Lindskog S, Jansson L, Blomlof L. Tissue formation on cementum surfaces in vivo. Swed Dent J 1993;17(1–2):1–8.
13. Andreasen JO. Analysis of pathogenesis and topography of replacament root resorption (ankylosis) after replantation of mature permanent incisors in monkeys. Swed Dent J 1980;4(6):231–40.