The Influence of Intra-Alveolar Curettage on Wound Healing after Tooth Extraction: A Histological Study in Rats

by

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Abstract

The purpose of this study was to histologically analyze the influences of intra-alveolar curettage on the chronology of wound healing after tooth extraction in rats. From this study it was concluded that intra-alveolar curettage delayed the chronology of wound healing after tooth extraction.

Introduction

Previous papers have established the chronology of the healing process following tooth extraction in rats[1,2]. Thus, it is known that approximately 21 days after tooth extraction, the dental alveolus is completely filled by a thick newformed osseous trabeculae.

However, this chronology has been altered by the presence of foreign materials in the dental alveolus[3,4]. Remnants of the periodontal ligament are of great importance in the biological process that begins immediately after tooth extraction. But, curettage of the dental alveolus during dental extraction procedures is common and this may eliminate the remnants of the periodontal ligament.

The purpose of this paper is to histologically analyze the effects of intra-alveolar curettage on wound healing after tooth extractions in rats.

Materials and Methods

Fifty-six albino rats weighing 100 to 120 grams were used in this study. Under general anesthesia, induced with sodium pentobarbital, the maxillary right incisors of all the rats were extracted[2]. Following this, two experimental groups of 28 animals each were formed.

Group I—After tooth extraction, the gingiva was sutured with no. 4-0 nylon.
Group II—After tooth extraction, the alveolar cortical bone was curetted with instruments specially designed for this and the gingiva was sutured in the same way as in Group I.

During all the experimental periods, the animals received standard solid food and water “ad libitum”. Four animals from each group were sacrificed after each
post-operative period of 15 minutes, 1, 3, 6, 9, 15 and 21 days. The pieces containing
the dental alveolus of the right maxilla were fixed in a 10% formalin solution, de-
calcified in a formic acid-sodium citrate solution and embedded in paraffin. The
alveolar pieces of the sagittal serial sections were six micrometers thick. The tissues
were stained with hematoxylin and eosin for histological study.

Results

To discern the results, we established three equal areas for the dental alveolus
designated as the cervical, middle and apical thirds respectively from the gingival
margin to the alveolar fundus.

In Group I, at 15 minutes, the alveolus was partially filled with a blood clot
and remnants of the periodontal ligament were observed near the cortical bone
(Fig. 1). In Group II, the remnants of the periodontal ligament were absent (Fig. 2).

In the apical third at 1 day and the middle third at 3 days (Fig. 3) there was, in
group I, cellular proliferation with newly formed fibroblasts and capillaires invading
the blood clot. There was a more intense proliferation near the cortical bone from
the lingual side.

In group II, cellular proliferation was slower and a moderate amount of newly
formed tissue was observed at 6 days. However, fibroblastic proliferation was more
intense in the buccal alveolar cortical bone.

On the 9th day, in group I, the alveolus showed newly formed osseous trabeculae
at the apical third (Fig. 4) and near the alveolar cortical bone at the level of the
middle third, while in group II, the alveolus was filled with connective tissue without

Fig. 1  Group I. Remnants of the periodontal ligament with good vascularization at the
middle third of the dental socket (15 minutes, Hematoxylin and eosin stain. Original mag-
nification, ×40)
Fig. 2 Group II. Few remnants of the periodontal ligament at the middle third (15 minutes, Hematoxylin and eosin stain. Original magnification, ×40)

Fig. 3 Group I. Newly formed fibroblasts and capillaries at the middle third of the dental socket (3 days, Hematoxylin and eosin stain. Original magnification, ×40)
Fig. 4  Group I. Newly formed osseous trabeculae at the apical third of the dental socket (9 days, Hematoxylin and eosin stain. Original magnification, ×40)

Fig. 5  Group II. A few newly formed osseous trabeculae near the alveolar cortical bone (9 days, Hematoxylin and eosin stain. Original magnification, ×40)
Fig. 6 Group I. Thick osseous trabeculae filling the dental socket (21 days, Hematoxylin and eosin stain. Original magnification, ×40)

Fig. 7 Group II. Osseous trabeculae at the middle third of the dental socket (21 days, Hematoxylin and eosin stain. Original magnification, ×40)
bone differentiation at the apical and middle thirds. Only near the alveolar cortical bone were there a few bone spicules (Fig. 5).

In group I, on the 15th day, there were thin osseous trabeculae with numerous osteoblasts in their periphery at the cervical third. In Group II, newly formed connective tissue filled the alveolus, but showed newformed osseous trabeculae only at the periphery of the alveolar cortical bone.

In group I, the alveolus exhibited thick osseous trabeculae at 21 days (Fig. 6), while in group II, there was a more intense intra-alveolar ossification than in the former group. The alveolus showed connective tissue without osseous differentiation and/or blood clot in its central areas (Fig. 7).

Discussion

In our study, in Group II (curettage) there was an evident delay of wound healing as a consequence of periodontal ligament removal. This influence was observed in all phases of wound healing. On the 3rd postoperative day newly formed connective tissue was not observed in the curetted areas in contrast to that observed in group I (controls).

Thus, according to our results, it is doubtless that fibroblastic proliferation occurs at the expense of the periodontal ligament remnants as was pointed out earlier by HADDAD and other investigators[1], OKAMOTO and RUSSO[2].

For this reason, we believe that the presence of this structure has a very important role in wound healing. Thus, our point of view is different from those authors[5–7] who state that the periodontal ligament does not have a role in granulation tissue formation.

We think that our results permit an extrapolation to clinical procedures. Curettage must be avoided as routine post-extraction care. It should be indicated in cases of extractions of teeth that present periapical lesions and when the surgical technique to be employed is an odontotectomy and/or an osteotomy.

Summary and Conclusions

Fifty-six albino rats were used in order to analyze what occurs when alveolar cortical bone is curetted after dental extraction. The rats were sacrificed from 15 minutes to 21 days and the following conclusions were drawn: intra-alveolar curettage delays wound healing of the dental socket; intra-alveolar curettage may be indicated in cases of extractions whose teeth present periapical lesions and when the surgical technique employed is an odontotectomy and/or an osteotomy.

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References


