

On healing after periapical surgery and different retrograde root-filling materials. A clinical and histological study.

Akademisk avhandling

som för avläggande av medicine doktorsexamen vid Göteborgs Universitet kommer att offentligens försvaras i lecture hall vid Avdelningen för Biomaterialvetenskap, Arvid Wallgrens Backe 20, plan 5, fredagen den 27 maj 2011 kl.13.00 av

Dan-Åke Wälivaara
leg. tandläkare

Fakultetsopponent: Professor Tore Björnland, Avd för oral kirurgi och oral medicin, Oslo Universitet, Norge och Tandläkarhögskolan i Malmö, Sverige.



UNIVERSITY OF GOTHENBURG

Avhandlingen baseras på följande delarbeten:

- I. Wälivaara DÅ, Abrahamsson P, Isaksson S, Blomqvist JE, Sämfors KA.
Prospective study of periapically infected teeth treated with periapical surgery including ultrasonic preparation and retrograde intermediate restorative material root-end fillings.
J Oral Maxillofac Surg. 2007 May;65(5):931-5.
- II. Wälivaara DÅ, Abrahamsson P, Sämfors KA, Isaksson S.
Periapical surgery using ultrasonic preparation and thermoplasticized gutta-percha with AH Plus sealer or IRM as retrograde root-end fillings in 160 consecutive teeth: a prospective randomized clinical study.
Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2009 Nov;108(5):784-9.
- III. Wälivaara DÅ, Abrahamsson P, Fogelin M, Isaksson S.
Super-EBA and IRM as root-end fillings in periapical surgery with ultrasonic preparation. A prospective randomized clinical study of 206 consecutive teeth.
Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2011, Accepted
- IV. Wälivaara DÅ, Abrahamsson P, Sennerby L, Salata L, Isaksson S, Dahlin C.
Periapical tissue responses after use of IRM, Gutta-percha, Super-EBA and MTA as retrograde root-filling materials. A histological study in dogs.
Submitted

ABSTRACT

On healing after periapical surgery and different retrograde root-filling materials.
A clinical and histological study.

Aims: The outcome from conventional endodontic therapy does not always result in a healing of the periapical area, thus leaving a remaining lesion with or without symptoms. The primary treatment alternative is a revision of the orthograde root-filling if applicable. A second treatment alternative might be a periapical surgery procedure. The overall aim of this research project was to analyze the healing after a defined periapical surgical technique and commonly used retrograde root-filling materials in teeth with periapical periodontitis. Specific aims were to evaluate any difference in the healing outcome and tissue response from the used materials. The influence on healing from three variables; lesion size, lesion type and orthograde root-filling quality, were also analyzed.

Materials and methods: Clinical studies: 422 teeth in 358 consecutive patients referred for a periapical surgery procedure to the Maxillofacial Unit, Halmstad Hospital, Halland, were included in three different consecutively implemented studies. All referred teeth were included except teeth with advanced periodontal disease with apical marginal communication and obvious root-fractures. The surgical technique and cleaning of the root-canals followed the same protocol in the 3 clinical studies, but the type of retrograde materials used differed. IRM was used in all studies as a control, due to its long-term use as a root-end seal, in the unit since before. The clinically compared materials were Super-EBA and thermoplasticized gutta-percha (Ultrafil®) with a sealer (AH-Plus®). All operated teeth were reviewed clinically and radiographically after minimum 12 months.

Experimental model: The three tested materials from the clinical studies and a fourth material, mineral trioxide aggregate, MTA (Angelus®), were analyzed in an animal model. The periapical tissue response to the retrograde materials and bone healing after the osteotomy was evaluated. Radiographic examination, descriptive and morphometric histological analyses and SEM analysis were performed as evaluation techniques.

Results: The results from the clinical studies revealed an overall successful healing outcome between 80-91%. There was no statistical significance in the healing between the materials when comparing IRM to the two other clinically tested materials. The healing result in teeth treated with IRM had an increasing success throughout the different study series. The three evaluated pre- and perioperative variables had no significant influence on the treatment outcome after 12 months follow-up.

The histological results revealed a better healing after the osteotomy in cases treated with IRM and MTA. New formed cement-like tissue was seen over all resected dentine surfaces in all healed cases regardless of the used retrograde material. The only material with signs of new cement-like tissue formation directly on the material surface was MTA.

Conclusions: The success rates regarding healing after 12 months is high for all tested materials and show that these materials can serve as a root-end seal in periapical surgery with ultrasonic preparation. The outcome figures might be altered after a longer follow-up period. There is a difference in the perioperative handling of the tested materials, which could be an explanation to the slight variation of the healing figures. The radiographic status of the orthograde root-filling, type and size of the periapical lesion do not have a significant influence on the treatment outcome after a one-year follow-up. Regardless material used by the surgical team, they must be confident in its handling and management. The MTA material seems to be more biocompatible compared to the other tested materials and should because of this be the first material of choice, but from the clinical results in this study, the other materials are suitable as retrograde root-fillings as well.

Keywords: periapical surgery, ultrasonic preparation, IRM, thermoplasticized gutta-percha, Super-EBA, mineral trioxide aggregate, root-filling status, lesion size, lesion type

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