

Trial finds better haemostasis with aluminium chloride during periapical surgery

Abstracted from

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Hemostatic Agents in Periapical Surgery: A Randomized Study of Gauze Impregnated in Epinephrine versus Aluminium Chloride. *J Endod* 2016; **42**: 1583–1587.

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Question: Is an epinephrine impregnated gauze as effective as aluminium chloride for haemostasis during periapical surgery?

Design Randomised controlled trial in a university setting.

Intervention Patients were randomised to epinephrine impregnated gauze or aluminium chloride for periapical surgery involving a single tooth with a periapical area of <10mm.

Outcome measure Haemorrhage control.

Results One hundred and twenty patients were randomised, with 98 being allocated. Forty-eight patients in the epinephrine group and 51 in the aluminium chloride group were analysed. Adequate haemostasis was achieved in 25 (52.1%) of the epinephrine group and 37 (72.5%) of the aluminium chloride group, a statistically significant difference.

Conclusions The outcome showed better efficacy of haemostasis in the aluminium chloride group than in the gauze impregnated epinephrine group. The analysis of the patients and tooth-dependent variables showed no relationship with the effectiveness of haemostasis.

Commentary

Periapical surgery is indicated when there has been failure of endodontic treatment.¹ To improve the long-term prognosis of the tooth, elimination of the contaminated apical portion of the root is required as well as placement of an adequate apical seal. This is accomplished via periapical surgery.¹

Achieving haemostasis during periapical surgery is one of the most important factors when considering the long-term prognosis of the tooth.²⁻⁵ An effective haemostatic agent used during periapical surgery will improve vision of the surgical site, reduce the operating time and also improve the application of the root-end material onto a dry root surface.²⁻⁵

Previous studies^{3,5} have found both epinephrine and aluminium chloride to be effective at controlling peri-operative bleeding during apical surgery. Consequently this randomised controlled trial was conducted to compare the two agents and diligently reported in accordance with the CONSORT statement (www.consort-statement.org).

This prospective study saw patients split into two parallel groups; one group received gauze impregnated in epinephrine as a haemostatic agent and the other group received aluminium chloride as an alternative haemostatic agent. The peri-operative bleeding was assessed and haemostasis was deemed to be either adequate or inadequate.

The authors declared no conflict of interest for this study. Appropriate and defined selection criteria were applied; only single teeth with periapical lesions of less than 10mm were included. Exclusion criteria were teeth with vertical root fractures, periodontal probing defects of more than 6mm, teeth that were not appropriate for retrograde filling, patients taking anticoagulant therapy and incomplete treatment protocols.

Descriptive statistics of patients and the tooth treated were recorded. While block randomisation was used, group sizes were different (48 epinephrine, 51 AlCl). There was also an unequal distribution of smokers with more in the aluminium chloride treatment arm. The site of surgery, maxillary vs mandibular, was also unequally distributed between the groups.

The surgical procedure was standardised and clearly described, with the same local anaesthetic, antibiotics and surgeon, with only the intervention varying. Concealed allocation was achieved successfully, with the treatment arm only revealed to the investigator at the time of surgery when the agent was required. The authors used defined outcome measures to assess the haemostatic status (ie a dry surgical field). The surgeon assessed and recorded the

outcome at time of surgery. Two additional blinded independent assessors reviewed an image of the surgical site at a later date. The equipment displaying the image to each assessor was standardised but calibration of the assessors was not described. Whilst the logistical implications of having multiple assessors at the operation is recognised, the use of images to assess bleeding status can be subjective.

Statistical analysis of treatment outcomes was comprehensive, with variable factors collated against the different treatment groups. A masked biostatistician carried out logistic regression modelling to adjust for confounding factors and determine the effectiveness of treatment. 37% of those in the aluminium chloride were smokers compared with 8% in the epinephrine group and no information on the level and duration of smoking presented. This may have influenced the haemostatic outcomes due to the cumulative vasoconstrictive potential of nicotine. There was also unequal distribution of site of surgery, with more maxillary teeth treated in the aluminium chloride group. The maxilla is more vascular and would therefore be expected to bleed more. The authors declare no relationship with patient dependent variables and variables dependent on the tooth and the effectiveness of the treatment. Given the sample size it may have been preferred to use stratified randomisation or matching over the use of statistical analysis to account for confounding factors.

The authors have accounted for all patients in the study using the CONSORT flow diagram. There were low levels of drop-out or loss to follow-up. The authors recognise that there is no long-term follow-up for the patients and no results measuring the long-term outcomes of the treatment in either arm of the study. It has been

suggested that further studies should include longer follow-up and further outcome measures.

The results of this study suggest that aluminium chloride may be superior to epinephrine soaked gauze. This result should be taken with some caution given the randomisation process used and the confounding factors present in each arm. A further study employing a different randomisation process and more equal distribution of confounding factors amongst the groups would improve the reliability of the results and allow more accurate clinical application.

Practice points

- Aluminum chloride may be more beneficial in achieving haemostasis in periapical surgery compared to gauze impregnated with epinephrine. Further studies are required to build on the limited evidence.

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1. Chalakkal P, Akkara F, Ataide Ide N, Pavaskar R. Apicoectomy versus Apexification. *J Clin Diagn Res* 2015; **9**: ZD01-ZD03.
2. Jang Y, Kim H, Roh BD, Kim E. Biologic response of local hemostatic agents used in endodontic microsurgery. *Restor Dent Endod* 2014; **39**: 79-88.
3. Peñarrocha-Diago M, Maestre-Ferrín L, Peñarrocha-Oltra D, von Arx T, Peñarrocha-Diago M. Influence of hemostatic agents upon the outcome of periapical surgery: dressings with anesthetic and vasoconstrictor or aluminum chloride. *Med Oral Patol Oral Cir Bucal* 2013; **18**: e272-e278.
4. Peñarrocha-Diago M, Maestre-Ferrín L, Peñarrocha-Oltra D, Gay-Escoda C, von-Arx T, Peñarrocha-Diago M. Pain and swelling after periapical surgery related to the hemostatic agent used: anesthetic solution with vasoconstrictor or aluminium chloride. *Med Oral Patol Oral Cir Bucal* 2012; **17**: e594-e600.
5. Jensen SS, Yazdi PM, Hjørtting-Hansen E, Bosshardt DD, von Arx T. Haemostatic effect and tissue reactions of methods and agents used for haemorrhage control in apical surgery. *Int Endod J* 2010; **43**: 57-63.

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