What's new for the clinician – excerpts from and summaries of recently published papers (November 2018)

SADJ November 2018, Vol. 73 No. 10 p629 - p632

Compiled and edited by Prof V Yengopal, Dept. of Community Dentistry, School of Oral Health Sciences, Faculty of Health Sciences, University of the Witwatersrand

1. Retention rates and caries-preventive effects of two different sealant materials: a randomized clinical trial

RN Cabral, J Faber, SAM Otero, et al.
Clin Oral Invest. 2018; 22: 3171- 3177.

Despite all efforts at controlling dental caries, the disease continues to affect billions of people worldwide.[1] At a tooth level, the occlusal surfaces are the most susceptible areas for caries lesion development, and caries risk is higher during the first years after tooth eruption. According to the literature, up to 90% of all carious lesions in school-aged children occur on occlusal surfaces. [1]Particularly vulnerable are the newly erupted first permanent molars, since proper cleaning is difficult as the teeth are not yet in occlusion.

Sealants were introduced in the 1960s as a caries-preventive measure for avoiding caries occurrence and/or progression and, consequently, reducing treatment costs. Sealants have been shown to be a highly effective strategy for preventing the development and progression of caries lesions on occlusal surfaces. Sealants are recommended for children where the targeted teeth are the occlusal surfaces of healthy deciduous molar teeth or the non-cavitated occlusal surfaces in permanent molars.

With regard to the selection of sealant materials, two different materials have been used—resin-based and glass-ionomer-cement-based (GIC) materials. Both types of sealants provide a barrier between the tooth and the oral environment.[1] Evidence suggests that resin-based materials present a higher retention rate compared with GIC.[1] However, resin-based sealants require perfect moisture control during placement, which might be difficult to achieve in all children and in community based settings such as schools. Conversely, GIC-based materials are more tolerant to moisture during the application procedure, which eases the operative process, mainly for non-cooperative patients. Although the retention rate of resin-based sealants is higher than that of GIC sealants, the caries-preventive effects of the materials are similar.[1] This might be due to the fact that the caries-preventive effects of GIC sealants are related not only to the retention of the material, but also to its biologic properties.[1]

Veerasamy Yengopal, *BChD, BScHons, MChD*, PHD, Community Dentistry Department, School of Oral Health Sciences, University of Witwatersrand, Medical School, no 7 York Road, Parktown 2193.
Email address: veerasamy.yengopal@wits.ac.za

ACRONYMS

GIC:	Glass-ionomer-cement-based
ICDAS II:	International Caries Detection and Assessment System

Cabral and colleagues (2018)[1] reported on a trial that sought to compare the retention rates and the caries-preventive effects of a modified GIC (Clinpro™ XT Varnish) and a high-viscosity GIC (FUJI IX GP FAST – GC Co.) in newly erupted first permanent molars. The null hypothesis tested was that there would be no difference between the performances of the materials after 6-, 12- and 24-month follow-up periods.

MATERIALS AND METHODS

Initially, 298 children aged 5–7 years old were examined by one trained and calibrated examiner. Caries status was recorded based on ICDAS II (International Caries Detection and Assessment System), and parents were interviewed regarding their children's general health, diet and oral hygiene habits. The information obtained from parents was used to complete a data form which enabled the classification of children as being of low, moderate or high risk for caries.

Children who were classified as moderate or high risk were re-examined, and those with their four first permanent molars not in occlusion, with occlusal deep fissures (ICDAS 0) and/or presenting with incipient caries lesions (ICDAS scores 1–3) were included in the trial. Children whose parents did not sign the informed consent, those with special needs and those not presenting all four first permanent molars were excluded.

All children included in the randomised clinical trial received an oral hygiene kit containing a toothbrush, a fluoridated dentifrice and dental floss. They were instructed how to use the devices and were encouraged to brush their teeth twice daily. Additionally, they also had access to fluoridated water (0.7 ppm).

Of the 298 children, 56 were included in a split-mouth randomised clinical trial, randomized by means of a computer-generated program, with the unit of randomisation being the side of the mouth. This procedure guaranteed that all children had the four permanent molars sealed with either Clinpro XT Varnish (maxillary and mandibular first permanent molars in one side of the mouth) or Fuji IX GP FAST (maxillary and mandibular first permanent molars on the contralateral side). The same trained operator placed all sealants, in accord with the manufacturer's instructions. The cases were followed over 24 months.

A dental office located inside the school was used for the placement of all sealants in the trial, with the children sitting on a conventional dental chair under optimal lighting and with the operator being assisted by a dental assistant. Prior to placement of the sealants, the teeth were cleaned with a rotation brush. Cotton rolls and a suction device were used for moisture control.

For placement of the Clinpro XT Varnish (CXT), the occlusal surface was conditioned with 37% phosphoric acid for 15 s, rinsed with water for 60 s and dried gently with an air syringe. Immediately thereafter, an explorer was used to place the material into the pits and fissures, where it was light-cured for 30 seconds.

The FUJI IX GP FAST (FJ) is an encapsulated glass-ionomer. When this material was to be placed, the occlusal surface was dried with cotton wool pellets, and the cavity conditioner was then applied with a cotton wool pellet for 15 seconds. Thereafter, the surface was washed with cotton wool pellets soaked in water, then dried with cotton wool pellets.

The capsule was activated, placed in an amalgamator and triturated for 10 seconds. The capsule was then loaded into the capsule applier, and the material was immediately extruded onto the tooth and firmly pressed for 10 seconds by a gloved finger coated with petroleum jelly.

For both procedures, the patient's bite was checked with carbon paper, and excess CXT or FJ material was removed with rotatory and hand instruments. Thereafter, the sealants from the FJ group were protected with a resin-based coat and light-cured for 30 s.

For the follow-up evaluation periods (6, 12 and 24 months), the development of dentine caries lesions and the retention of sealants were clinically evaluated by the same calibrated and independent evaluator using ICAS II to evaluate sealant retention.

The occlusal surfaces of the first permanent molars were divided arbitrarily into three sections for mandibular teeth and into two sections for maxillary teeth. Thereafter, the survival of sealants was assessed for two different categorisations: one traditional and one modified.

For the traditional categorisation, fully and partially retained sealants were considered a success. However, if the main pits and fissures were partially visible in any of the sections (partially retained sealants) of the sealed occlusal surface, the sealant was judged as a failure according to the modified categorisation. Thus, for the occlusal surface, fully retained sealants were considered successful, and partially retained and completely lost sealants were considered failures.

RESULTS

The sample population comprised 56 children (34 girls and 22 boys) with a mean age and standard deviation of 7.06 ± 0.56 years. At baseline, 224 molars were sealed (4 per children). The percentage dropouts during the study was 17.9%.

Regarding caries frequency, 100% of the sample presented enamel caries lesions and 80.35% presented dentine caries lesions. The frequency of dentine caries lesions on the buccal surfaces of first permanent molars was 2.67%. Considering the occlusal surfaces that were sealed, the distribution of ICDAS scores was as follows: for CXT and FJ groups, 66.96% and 72.32% (ICDAS 0); 23.21% and 16.07% (ICDAS 1); 8.03% and 8.92% (ICDAS 2); and 1.78 and 2.67% (ICDAS 3).

The retention rates after six and 12 months were not statistically significant when groups were compared under the traditional categorisation. However, for the modified categorisation, FJ sealants survived longer than CXT sealants. After 24 months, FJ sealants presented statistically significantly higher retention rates in comparison with CXT sealants, regardless of the retention categorisation used.

In relation to caries-preventive effect, there was no statistically significant difference between the two types of sealants. With regard to the failures, it was observed that two teeth per group developed cavitated dentine lesions (ICDAS 5). For the CXT group, at baseline, one tooth was scored ICDAS 0 and the other ICDAS 2, whilst for the FJ group, the occlusal surfaces were initially recorded as ICDAS 1 and ICDAS 2, respectively.

CONCLUSION

The two materials were equally effective in preventing the development of cavitated dentine lesions, although sealants prepared with high-viscosity GIC survived longer than those prepared with modified GIC.

Implications for practice: Both materials were moisture tolerant and performed equally well as regards the main outcome which was caries prevention. Thus the choice of material in this case could be based on clinical preference, cost and ease of use.

Reference

Cabral RN, Faber J, Otero SAM, et al. Retention rates and caries-preventive effects of two different sealant materials: a randomised clinical trial. Clin Oral Invest. 2018; 22: 3171- 3177.

2. Evaluation of teeth in line of mandibular fractures treated with stable internal fixation

KO Bang, PK Pandilwar, SR Shenoi, et al.
Journal of Maxillofacial & Oral Surgery 2018;17:164-168.

The mandible is the largest and the main bone of the lower part of the face. Anatomic parts of the mandible are the symphysis, parasymphysis, body, angle, ramus, coronoid process, condyle, and alveolus. Inherent weak sites of mandible which are liable to fracture include the angle of mandible (especially when third molar is impacted), the socket of the canine tooth and the condylar neck. Mandible fractures in maxillofacial trauma occur more commonly due to the prominence of mandible and comparative lack of bony and soft tissue support. Mandibular fractures are the second most common fracture of the face after the nose and the 10th most common fractured bone in the human body.[1]

The teeth in line of a fractured mandible are considered open and are always in communication with oral cavity because of presence of periodontal ligament. With the advent of open reduction internal fixation in the management of fractures, obtaining anatomic reduction and three- dimensional fixation is easily achieved, which has seen radical transformation in the management of fractures with teeth in line of fractures.[1] Bang and colleagues (2018)[1] reported on a trial that sought to determine whether retention or removal of teeth in line of mandibular fractures affects the incidence of postoperative complications. Additionally, the researchers sought to evaluate the fate of teeth retained in mandibular fractures based on location of fracture line in relation to apical foramen and lateral periodontium of retained tooth.

MATERIALS AND METHODS

51 mandibular fracture sites in 39 patients were selected as study sample. Teeth in the line of the fracture were removed if there was extensive caries, excessive mobility of tooth, or root fracture.

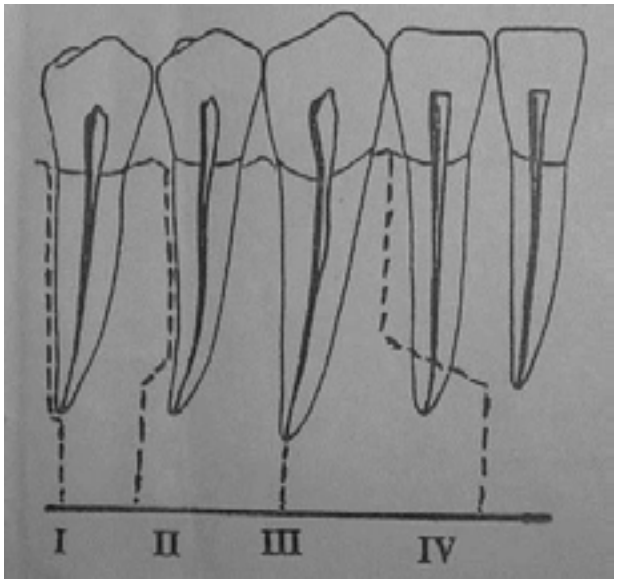

Figure 1. Schematic representation of fracture types based on relationship of fracture line to tooth apex and periodontium.

Patients were divided into two groups, group I tooth removed (15 sites) and group II tooth retained (36 sites). Teeth retained in line of fracture were classified as per Kamboozia's classification based on position of the fracture in relation to apical foramen and the lateral periodontium of involved tooth estimated from preoperative panoramic radiograph into four types (see Fig. 1).[2]

Kamboozia's classification is as follows:

- Type I: Fracture line which follows the root surface from apical region to gingival margin with denudation of root surface.
- Type II: Fracture line which follows the root surface from gingival margin but does not cross apical region.
- Type III: Fracture line passing only through apical region.
- Type IV: Fracture line crossing the root without passing through apical region or without producing denudation of root surface.

From this classification, it is clear that the apical foramen is involved in Types I and III fractures but not involved in Types II & IV.

The clinical and radiological examination protocols and treatment were the same for all cases. Open reduction and internal fixation (ORIF) using stainless miniplates and monocortical screws via intraoral or extraoral approach under suitable anaesthesia were done.

Intermaxillary fixation was done in some cases for one to four weeks to obtain greater stability and to treat concomitant condylar fractures. A standard regimen of anti-microbial and anti-inflammatory drugs was administered postoperatively. Chlorhexidine mouth wash was prescribed for maintenance of oral hygiene. Periodic follow up was carried out for one year during which the patient was assessed clinically and radiographically. Teeth which were symptomatic i.e. showing presence of mobility, tenderness or radiographic changes were subjected to further treatment, either root canal treatment or extraction.

RESULTS

Out of 36 fracture sites in which teeth were retained, five (13.89%) showed postoperative complications, and out of 15 fracture sites in which teeth were removed three (20%) showed postoperative complications. Hence, the percentage of postoperative complications was higher in teeth removed fracture sites compared with teeth retained fracture sites, though the difference was not statistically significant ($p > 0.05$).

Out of 36 fracture sites in which the tooth was retained, three cases showed the fracture line passing through two adjacent teeth. Thus, of the 39 teeth in the fracture line, 26 required no treatment, nine were subjected root canal treatment and four teeth required extraction.

In observing the association between the relationship of fracture line to teeth and the fate of teeth, none of the Type II relationship cases required extraction, whereas two cases in each Type I and Type III needed extraction. Teeth not necessitating any treatment were more in Type II (83.33%), followed by Type III (63.64%) and Type I (40%). Thus Type II relation teeth were found to have a better prognosis followed by Type III and Type I. However there was no significant statistical association between the relationship of fracture line to teeth and the fate of teeth.

CONCLUSION

The researchers found that there was an increased risk for postoperative complications when a tooth is removed, though this was not statistically significant. Evaluation of the fate of retained teeth showed better prognosis of teeth in Type II cases than Type III and Type I cases. However these relations were also statistically not significant.

Implications for practice

The results of this study indicate that teeth associated with mandibular fractures need not be removed on a prophylactic basis. Non-infected sound teeth in line of fracture can be preserved. However retained teeth should be followed for at least one year and should be treated endodontically if this is indicated. Conservation of dentition as an adjunct to the surgical treatment of mandibular fractures can benefit many patients.

Reference

1. Bang KO, Pandilwar PK, Shenoi SR et al. Evaluation of teeth in line of mandibular fractures treated with stable internal fixation. Journal of Maxillofacial & Oral Surgery 2018; 17: 164-8.
2. Kamboozia AH, Punnia-Moorthia A. The fate of teeth in mandibular fracture line: a clinical and follow-up study. International Journal of Oral and Maxillo-Facial Surgery 1933;22(2):97-101.