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Glass Ionomer Cement Dressing for Surgically Exposed Impacted Teeth

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Glass ionomer cements are biocompatible,1-7 can bond to enamel or dentin without etching,5,7-9 and have certain antimicrobial properties.10-13 Therefore, they should fulfill both the biological and the technical requirements for dressing material in oral surgery.

In a previous study, Ketac-Fil, an encapsulated, conventional glass ionomer restorative material, was tested as a dressing after radical surgical exposure of palatally impacted maxillary canines. Only three of 35 dressings were lost during the first month after surgery–the most critical period for prevention of soft tissue regrowth and subsequent eruption failure.

When impacted teeth are covered with unkeratinized mucosa, however, radical surgical exposure is contraindicated, due to the risk of periodontal injuries such as lack of a keratinized gingival margin, pocket formation, and gingival recession. The treatment of choice is an apically positioned flap operation.14-18

In this procedure, the impacted tooth is approached by raising a mucoperiosteal flap, which contains keratinized mucosa in its free distal end. Once the crown of the tooth has been adequately exposed by removal of tissue, the flap is shifted apically and sutured into its new position. Thus, keratinized tissue is transferred to the prospective marginal region of the exposed tooth.

If the impacted tooth is in a superficial position, the surgery is uncomplicated. If it is more deeply impacted, however, adaptation of the flap can be difficult. The orthodontist may also find it difficult to obtain optimal bonding conditions for placement of an attachment for traction.

To overcome these problems, an apically positioned flap operation using a glass ionomer cement dressing was developed. The aim of this study was to evaluate the technique with regard to clinical performance, healing, and subsequent tooth eruption (spontaneous or orthodontic).

Materials and Methods

The subjects were 24 consecutive patients (five male and 19 female) referred by experienced orthodontists to the Department of Pediatric Dentistry, Public Dental Service, Sodertalje, Sweden, for surgical exposure of impacted maxillary teeth (23 canines and seven central incisors). All the teeth were buccally impacted and hence covered with unkeratinized mucosa. The patients with impacted incisors had previously been treated at the clinic for supernumerary tooth germs or cysts in the same regions. The mean age of the patients was 13 years, 3 months, with a range from 7 years, 8 months, to 18 years.

In each case, I performed the planning and treatment, which included:
1. History, clinical evaluation, and radiographs (Fig. 1)
2. Surgical exposure (all 30 teeth)
3. Postoperative check (30 teeth) after one to three weeks (mean 11 days)
4A. Postoperative check (17 teeth) after three to nine months (mean five months)
4B. Postoperative check (13 teeth) after one to three years

Intraoral photographs were taken at all four visits.

The surgery was performed under local anesthesia (Xylocaine adrenaline 2%). An incision was made through the keratinized mucosa coronally to the crown of the impacted tooth. After vertical releasing incisions were made on each side of the tooth, a mucoperiosteal flap containing keratinized mucosa was raised (Fig. 2). The tissue covering one-fourth to one-half of the buccal enamel, including the tip or incisal edge of the tooth, was removed with an excavator or round bur at low speed, under irrigation with sterile physiologic saline (Fig. 3). The exposed enamel was cleaned with gauze soaked in physiologic saline, then dried with dry gauze.

Ketac-Fil glass ionomer cement was prepared according to the manufacturer?s instructions and applied with the Espe Aplicap System (Fig. 4). The syringe nozzle was held almost touching the exposed enamel and then withdrawn gradually as the cement was ejected. The cement was allowed to set for three minutes.

One or two additional applications of glass ionomer cement were needed to reach the surrounding tissue surface level in cases of deep impaction. Bleeding was rare during the application procedure. Any excess cement was removed with a scalpel.

The flap was shifted apically, while the superficial portion of the glass ionomer remained in contact with the oral environment. The opening was then sutured, and a final check was made (Fig. 5).

Each patient received oral hygiene instructions, sometimes including rinsing with chlorhexidine twice a day.

Results

At the first postoperative appointments (one to three weeks), none of the patients had any complaints other than mild discomfort during the first 24 hours after surgery (Fig. 6). All the glass ionomer packings were firmly in place. Healing and flap adaptation were judged to be excellent, and no soft tissue regrowth was observed.

At the three-to-nine-month postoperative appointments, 15 of the 17 dressings were still firmly in place or had been deliberately removed by the orthodontists (Figs. 7A, 7B). One had been lost during orthodontic traction, and one had become dislodged and embedded in the mucosa. All the teeth except the two with loose dressings showed various degrees of spontaneous eruption or orthodontic movement. In each case, the neighboring mucosa was judged to be healthy. Lack of keratinized marginal soft tissue was seen in only one patient, who had two teeth in high labial positions.

In the patients checked after one to three years, all the teeth were either in adequate occlusion or were still being treated orthodontically (Fig. 8). All exhibited normal marginal conditions and were surrounded by keratinized mucosa. No pocket formation or gingival recession was observed.

Discussion

This study indicates that glass ionomer cement dressings can be advantageous following surgical exposure of impacted teeth by apically shifted flap operations. No packings were lost during the critical initial healing period, and only two of 30 were lost accidentally during the follow- up period, even though most were serving as bases for bonded orthodontic brackets. (The orthodontists used either glass ionomers or conventional adhesive resins for bonding the attachments.)

In the previous Ketac-Fil study, the frequency of lost dressings after the initial healing period was much higher. The exposed teeth in that study were all palatally impacted maxillary canines, and therefore the packings were subjected to direct masticatory forces. In addition, only one-fifth to one-fourth of the enamel surfaces could be exposed for bonding, and bleeding often hampered the bonding procedures.

The present investigation could be criticized for the lack of control subjects. After evaluating the results of pilot tests, however, I was reluctant to use conventional dressings, especially since experienced surgeons and orthodontists are well aware of the problem of retaining such material. Furthermore, a control group is difficult to organize in a clinical study such as this because of the many parameters involved–sex, age, root development, position of the impacted tooth in the jaw, and so on.

Conclusion

Glass ionomer cements offer the following advantages over conventional dressings for surgically exposed impacted teeth, whether a radical surgical exposure or an apically shifted flap operation is used:

- The surgical technique is simple, gentle, and conservative.
- Both the cement and the bonding procedure are biocompatible.
- Postoperative discomfort and complications are rare.
- Soft tissue healing is clinically acceptable.
- The frequency of loose or lost dressings is low during the initial healing period and subsequent orthodontic treatment.
- The orthodontic bonding procedure is simplified. □

FIGURES

Fig. 1 Radiograph of impacted maxillary canine in 14-year-old male patient (different x-ray angles showed that canine was impacted buccally).

Fig. 2 Surgical exposure of canine in Figure 1: mucoperiosteal flap raised, and impacted canine localized.

Fig. 3 After removal of bone and soft tissue covering half of buccal enamel, including tip of impacted canine.

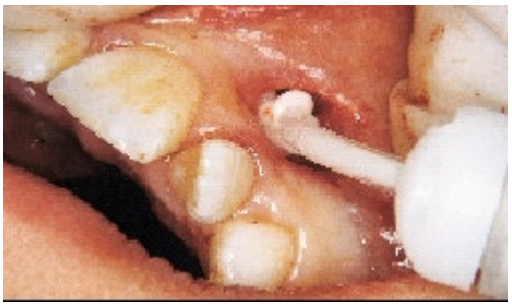

Fig. 4 Application of Ketac-Fil after cleaning and drying of exposed enamel.

Fig. 5 Mucoperiosteal flap shifted apically and sutured in new position

Fig. 6 Glass ionomer dressing still firmly in place 12 days after surgery, with excellent healing (primary canine was extracted).

Fig. 7A Three months after surgery, glass ionomer dressing still firmly in place, with bracket bonded to cement for orthodontic traction. Healing is excellent.

Fig. 7B Eight months after surgery, dressing has been removed for bonding of attachment to exposed canine.

Fig. 8 Two years after surgery, normal marginal conditions are present (keratinized gingiva with no pocket formation or gingival recession).

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FOOTNOTES

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