

Modified Apically Repositioned Flap in the Treatment of Unerupted Maxillary Central Incisors

ST J. CREAN, B. BANU AND H. COONAR

Abstract: The successful management of labially unerupted maxillary central incisors requires a coordinated surgical, orthodontic and general practitioner approach. The key to achieving maximal eruption of these teeth is their surgical exposure, central to which is the philosophy that the surgeon must provide a functional width of attached gingiva on the labial surface. This case describes the incorporation of palatal mucosa into an apically repositioned flap, resulting in the successful establishment of an attached gingival margin, where routine flap design would have seriously compromised the eventual outcome.

Dent Update 2000; 27: 137-139

Clinical Relevance: Practitioners faced with severe impactions of maxillary central incisors will find this modified surgical approach to their exposure and subsequent eruption of interest, as it offers what appears to be a reliable method in optimizing the survival of such aesthetically vital teeth.

The maxillary central incisor is, after the maxillary canine, the most commonly labially impacted unerupted tooth^{1,2} and labial impaction accounts for 1–2% of all patients that attend for orthodontic treatment.³ Uneruption of the maxillary central incisors may be associated with the presence of mesiodens or supernumerary teeth, blocking the path of eruption, but may also be associated with delayed shedding of the deciduous predecessor. Other causes are less clear, and accredited to soft tissue obstruction, but what has been recognized is that removal of any obstruction, soft or hard, may result in spontaneous eruption.⁴ For those less favourably positioned teeth, orthodontic intervention following exposure will be required, emphasizing that successful

management requires a combination of surgical and orthodontic treatment. However, the general dental practitioner plays an essential role in maintaining a high standard of oral health during the treatment phase.

One of the key surgical issues in the management of these teeth is the exposure of the crown to allow eruption, or movement of the tooth into the arch. Exposure, however, should be performed with the intent of providing sufficient attached gingiva rather than simply uncovering the crown, which results in only alveolar mucosal attachment. Attached gingiva is essential to secure the gingival tissues to the adjacent teeth at the dentogingival junction, thus preventing loss of periodontal tissues as a result of the pull of the surrounding soft tissues and facial muscles. Attached mucosa also serves to promote tooth eruption without soft tissue obstruction and will reduce gingival recession and marginal bone loss. Non-keratinized alveolar mucosa does not provide such protection.⁵

Traditional methods of surgical

treatment include gingivectomy to expose at least one-half to one-third of the crown, apically repositioned flap (if gingivectomy does not leave enough attached gingivae) and closed eruption techniques, for teeth which are mid-alveolus or positioned high in the vestibule adjacent to the nasal spine.

Previous studies have indicated that gingivectomy can lead to a severe loss of gingiva, as can apically repositioned flaps, which may result in marginal and gingival bone loss, possibly due to accelerated passive apical migration of labial epithelial attachment. These two techniques also produce residual scarring, resulting in soft tissue bands which, for some patients, are unacceptable. Closed eruption techniques, although attempting to mimic the natural eruption process with reduced scarring following the procedure, may still result in reduced zones of attached gingivae, although this is far less of a problem than with gingivectomy or apically positioned flaps.³

A case is presented here of a method of using palatal keratinized mucosa in a modified apically repositioned flap to provide a successful marginal gingival seal for unerupted maxillary incisor teeth.

CASE REPORT

A 12-year-old girl was referred by her general dental practitioner to the department of orthodontics at the Eastman Dental Hospital. She was diagnosed as a skeletal class III with an incisor class III relationship, complicated by unerupted and labially inclined maxillary central incisors. As part of her overall treatment plan she

St J. Crean, FDS RCS, FRCS, Lecturer, B. Banu, BDS, DDS, MSc, Clinical Assistant, and H. Coonar, FDS RCS, Consultant, Department of Maxillofacial Surgery, Eastman Dental Institute, London.



Figure 1. Labial position of unerupted maxillary central incisors.



Figure 2. The completed palatal incision and the beginning of the labial sulcus extension.

was referred to the department of oral surgery for surgical uncovering of these teeth.

Examination

Both maxillary central incisors were found to be unerupted, labially inclined and displaced, although easily palpable beneath the alveolar mucosa. The mucosa on the labial side was typical, alveolar and non-keratinized, but that of the palatal mucosa was fully keratinized. Radiographs confirmed that the apices of the two teeth were closed and that there were no unerupted teeth or other pathology obstructing their eruption. The amount of space available for the two teeth in the arch was slightly suboptimal but it was felt that, after uncovering the teeth, a period of upper removable appliance therapy would move the maxillary lateral incisors distally, to accommodate the central incisors. The main surgical problem was how to provide sufficient keratinized labial mucosa for the eruption of the teeth following their surgical exposure.

The child was fit and healthy, the only finding of significance being that she reported an allergy to penicillin.

Treatment

Under endotracheal anaesthesia the area was surgically exposed. The procedure was planned to incorporate a sufficient amount of the palatal mucosa to reconstruct the attached gingival margin on the labial aspect of the exposed teeth.

A palatal incision was made 0.5 cm behind the unerupted crowns of the maxillary incisors and carried into the labial sulcus to complete a three-sided flap (Figures 1 and 2). The flap was then raised *in toto*, taking care to preserve the palatal keratinized mucosal cuff, which would be used to create the labially attached gingival margin. The palatal aspect was then transferred onto the labial side, uncovering the two crowns. Before setting the flap in its new position, the anterior nasal spine was trimmed to remove any bony bulbosity (Figure 3). The flap was then sutured into its new labial position with 3/0 interdental Vicryl sutures (Figure 4), with the former palatal mucosa occupying the area of the attached gingiva.

A short postoperative course of metronidazole (400 mg for 5 days) was prescribed and the patient was reviewed after one week, where no problems were encountered.

Follow-up

The patient successfully completed a short period of appliance therapy, to create sufficient space for the eruption of the central incisors and by six months a very good result was obtained, with good periodontal health, 5 mm of attached gingiva and a gingival pocket of only 1 mm (Figure 5).

DISCUSSION

Unerupted maxillary central incisors, although not common, may present practitioners with management

problems. This case has emphasized the importance of maintaining an attached marginal gingiva on the labial surface of all such teeth during their eruption following surgical exposure. Some authors have suggested that 2 mm is the desired width to maintain gingival health,⁶ although the role of attached gingiva has been disputed.^{7,8} The literature does suggest, however, that failure to provide an adequate zone of attached gingiva may result in the loss of periodontal tissue attachment, with subsequent marginal bone loss and potential shortening of the life of the tooth. This case illustrates that in certain situations tissues with histologically similar characteristics, such as palatal mucosa, can be used in flap design for the creation of gingival attachments on the labial surface of teeth. Palatal and attached gingivae have similar characteristics, with dense collagenous bands firmly attached to close surrounding hard tissues, a relative lack of elastic fibres contributing to overall immobility and a covering keratinized epithelium.⁹ Indeed, palatal mucosa has been used as a donor site for free grafting of denuded labial mucosa.⁴ It seems logical therefore that palatal mucosa could perform some of the functions of attached gingiva when required (alveolar mucosa is unable to function as attached gingiva because it is prone to marginal recession and loss of periodontal attachment).

Mucogingival problems following apical repositioning of flaps have been reported, but are avoidable with proper marginal tissue placement, absence of

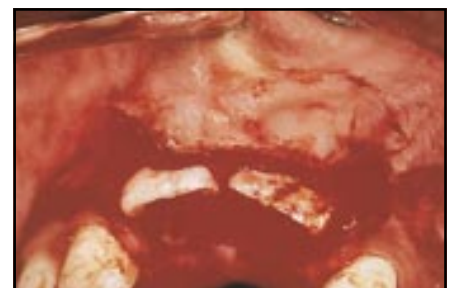


Figure 3. The elevated flap, now repositioned on the labial aspect of the exposed crowns of the maxillary incisors.

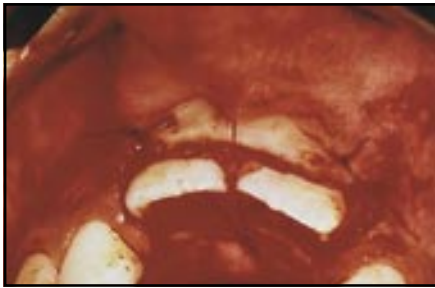


Figure 4. Flap sutured into its final position.

inflammation, careful, atraumatic surgery and ensuring that correct gingival attachment during any subsequent tooth movement is achieved. If inflammation is noted following these surgical procedures, any periodontal root planing or curettage should not be overzealously performed in an attempt to prevent any further damage to the epithelial attachment.

The standard approach to labially impacted teeth is to make an incision along the edentulous ridge. Of course, this approach will be successful only if there is a sufficient band of attached gingiva that can be apically repositioned. In the case described, the labial inclination was such that a crestal incision (coronal incision in this patient) would have resulted in the absence of any keratinized mucosa, and so the decision was taken to advance the incision to the palatal mucosa to incorporate this tissue into the apically repositioned flap.

It is important, following the flap elevation, that any connective tissue is removed from the surface of the labial

aspects of the tooth and that any bone impeding further eruption or setting of the flap should be trimmed. It is recommended by many authors that bone is not removed from the cemento-enamel junction as it is in this area that the attached gingiva is required to gain its attachment if successful grafting is to be achieved. Ideally, the flap should also cover 2–3 mm of the crown. As a result of this position, optimal tissue attachment to radicular and cemental tissues is achieved, junctional epithelial seals are protected and—even in those cases where teeth move long distances—there is ability for some marginal migration, but continuing protection of underlying bone.

With the crown now exposed and with a functional gingival attachment, the tooth will either spontaneously erupt into its correct position, as in this case, or will require orthodontic intervention, such as fixed appliances, or upper removable appliances with attached brackets and elastic ligatures. This emphasizes the need to coordinate the orthodontic and surgical services in the management of such cases. The role of the general practitioner should also be emphasized, as it is vital to maintain periodontal health of this newly positioned mucosa if long-term success is to be expected.

ACKNOWLEDGEMENTS

The authors would like to thank Alison Elmes for her help with the completion of this manuscript and Susan Cunningham for her expert advice in reviewing the text.

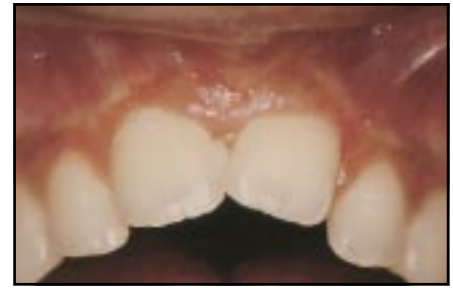


Figure 5. Clinical appearance six months after surgery.

REFERENCES

1. Kokich VG, Vermette ME. Surgical and orthodontic management of impacted teeth. *Interdiscipl Periodont Surg* 1993; **37**: 181–204.
2. Stafne EC, Gibilisco JA. Oral roentgenographic diagnosis. In: Stafne EC, Gibilisco JA, eds. *Oral Roentgenographic Diagnosis* 4. Philadelphia: B. Saunders Co., 1975; pp.40–50.
3. Vermette ME, Kokich VG, Kennedy DB. Uncovering labially impacted teeth: apically positioned flap and closed-eruption techniques. *Angle Orthod* 1995; **65**: 23–32.
4. Di Biase D. Mucous membrane and delayed eruption. *Dent Pract Dent Rec* 1971 Mar; **21**(7): 241–250.
5. Vanarsdall R, Corn H. Soft tissue management of labially positioned unerupted teeth. *Am J Orthod* 1977; **72**: 53–64.
6. Lang N, Loe H. The relationship between width of keratinized gingiva and gingival health. *J Periodontol* 1972; **43**: 615–625.
7. Dorfman H. Mucogingival changes resulting from mandibular incisor tooth movement. *Am J Orthodont* 1978; **74**: 286–297.
8. de Trey E, Bernimoulin JP. Influence of free gingival grafts on the health of the marginal gingiva. *J Clin Periodontol* 1980 Oct; **7**(5): 381–393.
9. Ochsenbein C, Maynard JG. The problem of attached gingiva in children. *ASDC J Dent Child* 1974 Jul/Aug; **41**(4): 263–272.

ABSTRACTS

THERE MAY BE A SCIENTIFIC REASON FOR FAILED LOCALS!

Failure of Inferior Alveolar Nerve Block in Endodontics. P. I. Bajrovic and F. Bajrovic. *Endodontics and Dental Traumatology* 1999; **15**: 247–251.

Clinical studies have shown that, even when a proper technique is employed,

Inferior Alveolar Nerve Blocks (IANB) may fail in between 30% and 45% of cases. This very interesting paper considers anatomical considerations and abnormal physiological responses in the presence of inflammation which may explain such failures. Using radiopaque dyes, it was determined that even when the solution is deposited next to the nerve, anaesthesia may not always result. Some of the reasons postulated are: anxiety and fear by the patient; accessory innervation; the type

of anaesthetic solution selected; the concentration of both the anaesthetic solution and the vasoconstrictor; alteration of the resting potentials and excitability thresholds of nerves in the presence of inflammation.

The authors are unable to explain the reasons for the phenomenon fully and conclusively, but some valuable facts are presented to impress your patients next time it happens to you!

Peter Carrotte
Glasgow Dental School