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Case Report

Recurrence of a Diastema Following Orthodontic Treatment Associated with the Persistence of the Upper Labial Frenum: Indication for Frenectomy in a Pediatric Patient Using an Electric Scalpel

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Abstract

The presence of a low-insertion upper labial frenum is frequently associated with the persistence or recurrence of a maxillary mid-incisal diastema, even following successful prior orthodontic treatment. In paediatric patients, particularly during the mixed dentition phase, the choice of surgical technique for frenectomy requires careful consideration of haemostasis, post-operative comfort, behavioural management and cost-effectiveness. The purpose of this article is to present a case of frenectomy performed using the electrosurgery technique (electric scalpel) for recurrence of a diastema caused by the upper labial frenum, even after orthodontic treatment, in a 9-years-old child. The indications, contraindications, techniques, advantages and disadvantages for rational application in paediatric dentistry were discussed, as well as highlighting best practices for paediatric dental management.

Keywords: *Labial Frenun; Diastema; Oral Frenectomy; Pediatric Dentistry; Electrosurgery; Orthodontics.*

Introduction

A midline maxillary diastema is a clinical condition frequently observed during stomatological development in childhood. Although in many cases it is a physiological and transient feature, the persistence of the space between the upper central incisors following orthodontic traction requires a thorough investigation of its aetiology. Anatomical assessment of the upper labial frenum allows it to be clinically classified according to its level of attachment - ranging from insertion into the alveolar mucosa to papillary and transpapillary (penetrating the papilla) insertions[1-4]. The presence of a hypertrophic frenum falling within these lower classifications is widely recognised in the literature as a mechanical barrier composed of dense fibrous tissue. This structure exerts constant traction, which acts as the primary anatomical cause for the maintenance or recurrence of the diastema, compromising the stability of the previous orthodontic alignment[1-4].

For the appropriate clinical management of this condition, an accurate diagnosis is essential. Assessment of the maxillary frenum involves standardised clinical examinations, including labial traction tests to observe ischaemia of the incisive papilla, a phenomenon that confirms the insertion of the muscle fibres[2-5]. Recent guidelines emphasise that surgical intervention becomes mandatory when this hypertrophy compromises not only the aesthetics of the smile, but also periodontal integrity and the effectiveness of orthodontic treatment[5].

In the context of paediatric dental care during the mixed dentition phase, it was previously recommended to wait for the permanent canines to erupt. However, when there is a clear orthodontic indication and the frenum is pathological, early surgical intervention, even during the mixed dentition phase, is clinically accepted. Frenectomy during this period not only accelerates the closure of the space but also acts preventively against relapse, ensuring occlusal stability and the correct development of the maxila[2-6].

Traditionally, frenectomy has been performed by excision using a scalpel (conventional technique). Although effective in completely removing the frenum, this classic surgical approach involves intraoperative bleeding, the need for sutures, and postoperative morbidity[3,6]. These factors significantly increase chair time, stress and anxiety in paediatric patients. Against this backdrop, the introduction of other technologies, such as electrosurgery (electric scalpel or electrocautery) and laser surgery, has brought about a paradigm shift[7].

From the perspective of surgical necessity, the purpose of this article is to present a case of frenectomy performed using the electrosurgical technique (electric scalpel) to treat a recurrence of diastema caused by the upper labial frenum, even after orthodontic treatment, in a 9-years-old child. The indications, contraindications, techniques, advantages and disadvantages for rational use in paediatric dentistry were discussed.

Case Presentation

A Japanese descent boy, 9-years-old, attended the dental clinic accompanied by his father, having been referred for an upper labial frenectomy by an orthodontist.

The patient had undergone orthodontic treatment six months earlier; the fixed orthodontic appliance had been removed, but the diastema had recurred, even after the gap had closed (Figures 1 to 5).

On intraoral clinical examination, the diastema caused by the presence of the superior labial frenum was observed to persist (Figure 6). The use of an electric scalpel was recommended for performing the superior labial frenectomy.

No systemic alterations were reported that would contraindicate the surgical procedure.

Under local anaesthesia, a superior labial frenectomy was performed using an electric scalpel (BE 3000™, KVN, Guarulhos, Brazil), involving the removal of the superior labial frenum and the gingival tissue present in the diastema (Figure 7). The patient was prescribed analgesics.

At the follow-up appointment, partial healing of the surgical wound was observed (Figure 8). No complaints or complications were reported. The child's father reported that his son did not require any pain relief. The VAS was used to assess pain and symptoms, with a score of 1 (very mild discomfort) recorded.

The patient was assessed 30 days after the surgical procedure and showed complete tissue repair (Figure 9). The patient was referred back to the orthodontist to continue their orthodontic treatment.

Figure 1. Intraoral clinical aspects prior to orthodontic treatment: right lateral view (A); frontal view (B); left lateral view (C).

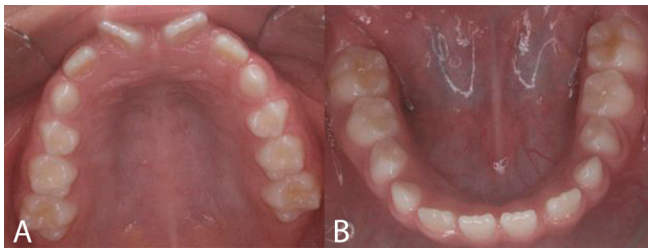

Figure 2. Intraoral clinical aspects prior to orthodontic treatment: maxillary occlusal view (A); mandibular occlusal view (B).

Figure 3. Extraoral clinical aspects prior to orthodontic treatment: frontal view (A); right lateral view (B).

Figure 4. Panoramic radiography prior to orthodontic treatment.

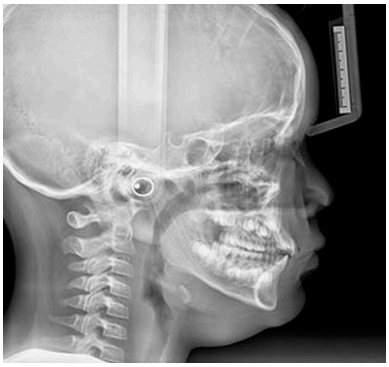

Figure 5. Cephalometric radiography, taken prior to orthodontic treatment.

Figure 6. Diastema caused by the presence of the superior labial frenum: frontal view (A); occlusal view (B).

Figure 7. Removal of the superior labial frenum and the gingival tissue present in the diastema, by the electric scalpel: frontal view (A); occlusal view (B).

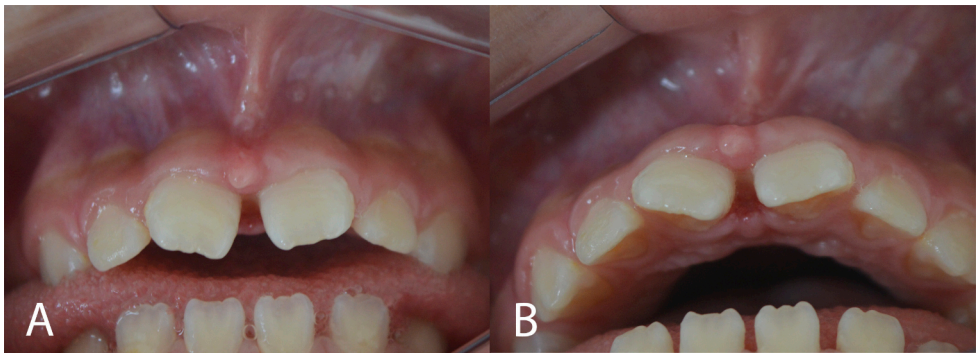

Figure 8. Partial healing of the surgical wound after 7 days: frontal view (A); occlusal view (B).

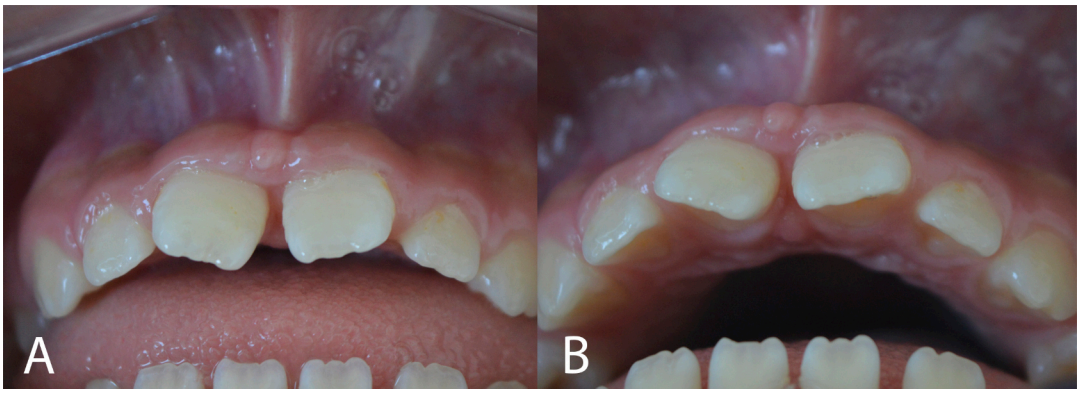

Figure 9. Complete healing of the surgical wound after 30 days: frontal view (A); occlusal view (B).

Discussion

The choice of surgical technique for the removal of the upper labial frenum in paediatric dental patients requires careful consideration of clinical efficacy, surgical morbidity, behavioural management and cost-effectiveness[3]. In the case of our patient, a 9-years-old child, the technique chosen was the use of electric scalpel.

Conventional surgery has always been the technique of choice for labial frenectomy and is still in use today. The classic approach, often described as the diamond-shaped excision technique (or Archer's technique), ensures direct access to the periosteum, allowing for the complete release of the muscle fibres[3,6]. With advances in surgery and with the aim of preventing scar formation and loss of the interdental papilla, various modifications have been introduced, ranging from Z-plasty and V-Y incisions [1] to contemporary flap techniques with papilla preservation[3,6,8].

Although recent modifications - such as the papilla-preserving flap technique - have improved aesthetic and periodontal outcomes[3,6], the inherent disadvantages of the cold-cutting instrument remain. The conventional method invariably results in considerable intraoperative bleeding, obscuring the surgeon's visual field, and requires primary closure with sutures[3,6,8,9]. For a 9-years-old child, the prolonged time in the dental chair, the sight of blood, and the tension of the suture threads on the labial tissues during speech and chewing represent considerable psychological stress and postoperative morbidity, with painful symptoms[10].

In this context, with the advancement of new laser technologies, the use of laser surgery has been widely publicised[8-11]. In paediatric patients, the diode laser demonstrates high predictability, haemostasis and excellent acceptance. The diode laser works very well on soft tissues and facilitates cutting through thermal interaction, resulting in immediate coagulation of blood vessels[12]. The diode laser has previously been used in labial and lingual frenectomy in paediatric patients, in our Study Group[13,14], including a 60-day-old infant[15].

The CO_2 laser has a high affinity for water and excellent haemostatic properties, but acts strictly on soft tissues[8,10,11,16]. The Er,Cr:YSGG laser, on the other hand, acts via photoablation (micro-explosions of cellular water) and is capable of interacting with both soft and hard tissues, causing less collateral thermal damage at the wound edges and promoting better-quality re-epithelialisation[10,11,16].

Other types of lasers, such as the Nd:YAP laser, have already been used in frenectomy procedures on paediatric patients, also in our Study Group, offering benefits such as reduced anaesthetic requirements, a clear surgical field, no need for sutures, and excellent tissue repair[17].

However, the superiority of laser technology must be analysed with scientific pragmatism, distinguishing between genuine physiological benefits and aggressive marketing and commercial “preciosism”. The purchase of laser equipment imposes a very high running cost on the dental practice and requires a complex learning curve[18].

From this perspective, electrosurgery presents itself as an option offering extremely high clinical efficacy. Electrosurgery has been validated as an effective technique for frenectomy and other surgical procedures on soft tissue. The main advantage of the electric scalpel lies in its ability to perform cutting and haemostasis simultaneously. Immediate coagulation of blood vessels not only creates a clean surgical field with excellent visibility but also frequently eliminates the need for sutures. By eliminating active bleeding and the suture needle, the electric scalpel drastically reduces surgical time and the child patient’s fear, providing far greater post-operative comfort than a conventional scalpel[5,7].

In daily clinical practice, the electric scalpel delivers intraoperative results (haemostasis and the absence of sutures) that are extremely similar to those of the laser, but with vastly superior accessibility and cost-effectiveness. The electric scalpel is fully capable of ensuring aesthetic, painless and predictable secondary-intention healing[9,10], as observed in the present report. As in the study by Onur[11] (2021), the Visual Analogue Scale was used to assess post-operative pain and discomfort, with a very low response rate.

In summary, regardless of the type of thermal energy-based cutting tool used (whether electric or laser), the complete removal of fibrous tissue at the optimal age is the key factor for success. Longitudinal follow-up shows that the removal of this mechanical barrier not only facilitates the closure of the diastema but also ensures the long-term stability of the gingival architecture, preventing recurrence[5,18]. In the case presented, electrosurgery proved to be a robust and perfectly suitable tool for achieving these objectives in the paediatric patient. The timely removal of pathological frenun, whether labial or lingual, not only prevents local orthodontic problems (diastemas) but also avoids the perpetuation of anatomical and functional limitations into adulthood[19].

Conclusions

Frenectomy is an essential surgical procedure for preventing the recurrence of a median diastema following orthodontic treatment, and the mixed dentition phase is the ideal biological time for performing it. Although the conventional technique using a cold-blade scalpel is effective in removing the fibrous barrier, its intra- and post-operative disadvantages - notably bleeding and the need for sutures - make it a choice associated with higher morbidity in complex paediatric dental management. The present study demonstrates that electrosurgery (electric scalpel) acts as a clinical tool of excellence for resolving this condition. By providing immediate haemostasis, clear visualisation of the surgical field and painless secondary intention healing without the need for sutures, the electric scalpel far surpasses the limitations of the conventional technique. Furthermore, when compared to laser technologies, electrosurgery establishes itself as an extremely pragmatic clinical choice. It delivers intraoperative and final aesthetic results comparable to those of the laser, but with a vastly superior cost-benefit ratio and greater accessibility. It can be concluded that the judicious use of the electric scalpel demystifies technological snobbery in modern Dentistry, ensuring excellence in paediatric care and full orthodontic success without the need for exorbitant investment.

Conflict of Interest

The authors declare no conflict of interest.

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