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Technical Note
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Tunnel technique through three vertical buccal incisions to reduce nasolabial changes due to surgically assisted rapid palatal expansion

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Abstract. The aim of this technical note is to present a minimally invasive approach to the maxilla for segmental Le Fort I osteotomy in surgically assisted rapid palatal expansion (SARPE). This approach reduces the nasolabial changes that occur with the traditional circumvestibular approach.

Key words: surgically assisted rapid palatal expansion (SARPE); intermaxillary suture; tunnelling technique; nasolabial area.

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While the effectiveness of the surgically assisted rapid palatal expansion (SARPE) procedure is well-documented[1], it has also been associated with postoperative changes in the surrounding soft tissues, most particularly widening of the nasolabial complex[2–6].

The standard Le Fort I osteotomy is generally performed by means of a full-thickness maxillary vestibular incision. This type of incision severs the periosteal attachments causing the affected muscles to shorten and retract laterally. These secondary changes manifest as flattening and thinning of the upper lip, flaring of the alar base, and opening of the nasolabial angle, and may also result in an impairment of facial mimics[6–9].

The first description of a tunnel approach to the maxillary osteotomy was related by Hall and West in 1976, who recommended two vertical incisions located in the premolar area to combine the anterior and posterior maxillary osteotomies along with the palatal approach, thereby promoting minimal postoperative change in lip morphology[3]. An additional vertical midline incision, a modification to the Hall and West technique, was described in 1984 by Tomlak et al. for some cases of combined anterior and posterior maxillary osteotomies[3]. Herford et al. proposed a midline vertical incision plus two horizontal lateral incisions for SARPE[8], and MacIntosh et al. reported the use of five vertical incisions – two bilateral and one midline – plus a palatal flap for total maxillary alveolar osteotomy[9].

To reduce the associated nasolabial soft tissue changes mentioned in the available literature, the present authors have developed a technique that combines the available tunnel approaches to conduct a minimally invasive segmental Le Fort I osteotomy for the SARPE procedure, as outlined below.

Three vertical interproximal incisions were made with a number 15 surgical

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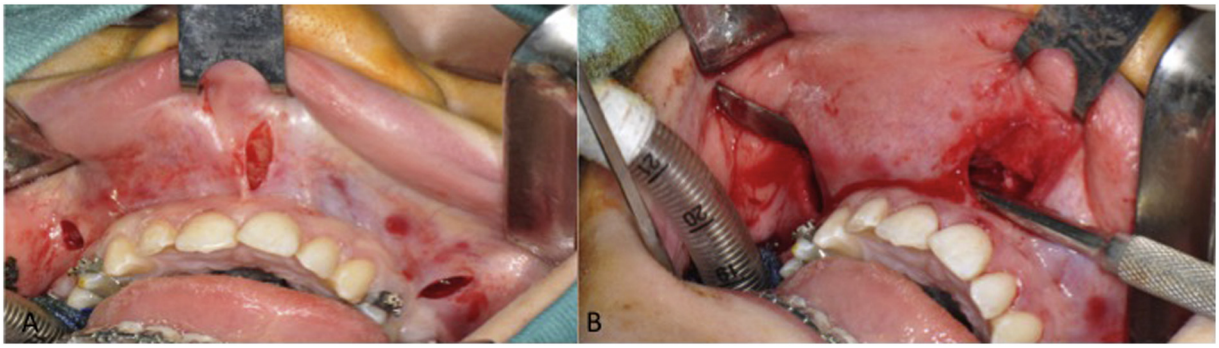

Fig. 1. (A) Three vertical interproximal incisions. (B) Soft tissue tunnelling procedure.

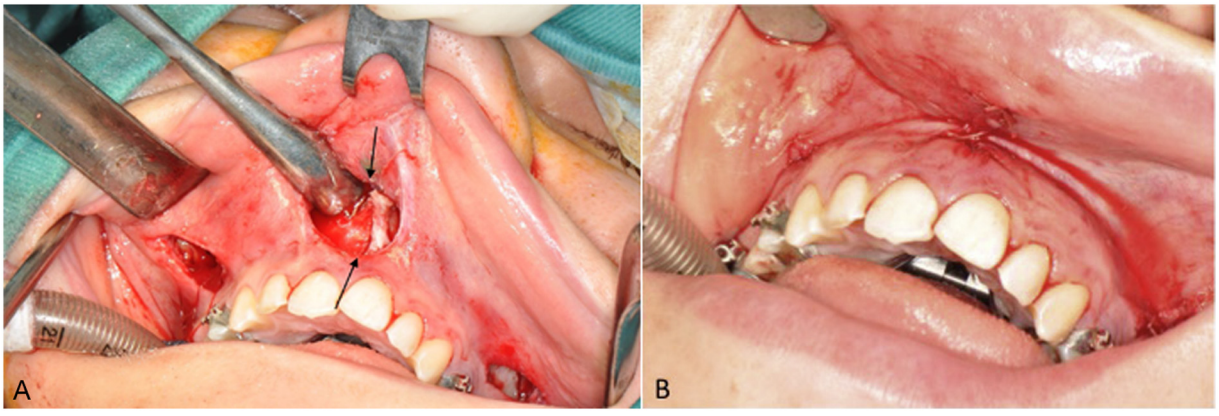

Fig. 2. (A) Nasal septum and nasal spine exposure. Osteotomy of the midline (arrows). (B) Final closure.

blade below the interdental papilla on the buccal aspect of the maxilla, along the midline between the upper central incisors and distal to the first premolars (Fig. 1A). These incisions were then used to perform the soft tissue tunnelling procedure (Fig. 1B). With the aid of an Aufricht nasal retractor, a routine Le Fort I osteotomy was done first. In all cases, the subtotal Le Fort I osteotomy was performed with pterygoid plate disjunction and the maxillary disjunction itself. Subsequently, the groove below the anterior nasal spine (ANS) was exposed for the osteotomy of the midline (Fig. 2A). To minimize the risk of damage to the roots, a bur or saw was not used. After the groove between the central incisors below the ANS had been identified, a piezoelectric device (Piezotome with tip MT1S-10; Piezosurgery Inc., Columbus, OH, USA) with a tip thickness of 0.35 mm was used for the osteotomy; this very thin tip avoids injury to the roots of the teeth. The nasal septum osteotomy was then performed (Fig. 2A). Final adaptation of the flap margins was accomplished by horizontal mattress sutures (Fig. 2B).

According to recent studies reported in the literature[4–9], the static and dynamic changes to the facial contour depend on whether the facial muscles are transected or detached from their origin. Vercruysse et al.[7] added that in the case of exclusively mucosal suturing without muscular closure after the surgery, three typical issues in soft tissue re-draping can be encountered: (1) changes in the width of the alar base of the nose and nasal tip projection; (2) changes in upper lip flattening; and (3) dropping of the corners of the mouth.

In accordance with these considerations, we have chosen to perform a flap design modification during the SARPE procedure. Through the three vertical incisions of the mucosa and subsequent tunnelling, transection of the muscles of the nasolabial area is avoided, reducing the static and dynamic effects on the facial contour. However, although this technique provides perfect suture of the muscles when SARPE surgery is completed, the effects of the muscle shrinking during healing, which will determine the nasolabial changes, need to be considered.

Funding

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Competing interests

None.

Ethical approval

The ethics committee required patient consent for this technical note.

Patient consent

Patient consent was obtained to publish the clinical intraoral photographs without any patient identification.

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