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Cleft Palate Repair without Lateral Relaxing Incision

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Background: The goals of successful palate repair include optimization of speech and feeding, avoidance of fistula formation, and mitigation of adverse maxillary growth. However, the effects of scar formation on maxillary growth have not been discussed in detail.
Methods: Between November 2010 and December 2011, the palateplasty was performed for 24 patients with cleft palate (median age, 12 months; range, 11–18 months). In the velum, a symmetrical intravelar veloplasty with mucosal Z-plasty was performed on both the nasal and oral sides. In the hard palate, instead of lateral relaxing incisions, a 1-line mucoperiosteal incision along the cleft margins was designed with subperiosteal undermining in the entire palatine bone. The palatal mucoperiosteum was sutured together in the middle of the cleft, and the cleft was directly closed without lateral relaxing incisions. The patients were monitored for 6 months to 1.6 years.
Results: None of the cases had issues concerning flap viability, and all palate repairs healed well. Postoperative results were satisfactory, without any complications such as dehiscence, perforation, or palatal fistula.
Conclusions: The method presented in this article was effective, with successful palatal closure and without scar formation or mucosal defects along the alveolus. We conclude that minimum contracture of the hard palate was useful for not only mitigating adverse maxillary growth but also for orthodontics. *(Plast Reconstr Surg Glob Open 2017;5:e1256; doi: 10.1097/GOX.0000000000001256; Published online 13 March 2017.)*

INTRODUCTION

Cleft palate is a common congenital malformation around the world. The overall incidence of cleft palate with or without cleft lip is 3.4–22.9 per 10,000 births.[1]

Palatoplasty is typically performed not only to close the soft and hard palate but also to produce a long and mobile soft palate, thus achieving physiologic velopharyngeal function and avoiding abnormal maxillary growth after repair.

Many techniques have been described to help recover the functional structure responsible for phonation by anatomically repairing the palatal defect.[2–11] In particular, the levator muscle repositioning procedure is the most common procedure used to achieve velopharyngeal competence.[9–11]

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It is well known that palatoplasty can often cause disturbances in maxillary growth and malposition of teeth because of scar-tissue formation at the denuded bone area.[12] However, strategies to diminish the negative influence of surgery on the growth of the hard palate and maxillary alveolar process have not been discussed very well compared with those addressing velopharyngeal function.[13]

We evaluated the effects of the scar caused by the mucosal defect after lateral relaxing incision. In this study, we performed direct palate closure without lateral incision, considering the surgical technique and its advantages.

PATIENTS AND METHODS

Patients

The principles outlined in the Declaration of Helsinki were followed, and informed consent of all patients was obtained before the study.

Between November 2010 and December 2011, the procedure was performed for 24 patients (14 male and 10 female) with a median age of 12 months (range, 11–18

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months). Of the 24 patients, 16 patients had unilateral cleft palate, 6 patients, isolated cleft palate, and 2 patients, complete bilateral cleft palate. The patients were monitored for 6–18 months after the procedure.

Surgical Technique

Preoperative orthopedic treatment was completed to assess the relevant alveolar alignment. All patients were placed under general anesthesia. For local vasoconstriction during surgery, a dilute solution of lidocaine with epinephrine was infiltrated along the margins of the cleft at the junction between the oral and nasal mucosa. First, in the velum, the incision was made from uvula to the posterior nasal spine along the cleft margin. Next, the mucosa along the edges of the cleft in the hard palate was incised; however, relaxing incisions were not made along the lateral edges of the palate. Undermining was then performed, with the oral mucoperiosteal flaps and nasal flaps elevated. The oral mucosa of the velum, with the attached mucous glands, was subsequently dissected off the musculature using the scalpel. To free the levator palatine from the posterior edge of the hard palate for restoring the levator sling and allowing tension-free closure in the midline, blunt dissection was performed at the posterior border of the velum and lateral to the pterygoid hamulus. Then, the greater palatine neurovascular bundles were separated to allow the 2 separated mucoperiosteal flaps from the palatal bone and nasal mucosal edges on both sides of the cleft to be approximated in the midline. Following this approximation, the nasal layer was closed and a Z-plasty was designed in front of the levator sling for the nasal mucosa of the soft palate to obtain posterior mobilization of the muscle. The muscle was then united, usually in the posterior half of the velum to reconstruct the levator sling. Then, the oral layer was closed. For hard-palate closure, mucosa and periosteum were inserted and closed, respectively. Finally, a Z-plasty was designed above the reconstructed muscle at the oral mucosa to prevent a straight-line scar contracture of the oral mucosa (Fig. 1).

RESULTS

Immediately after the operation, the mucosa of the hard palate was strained, creating a dead space between

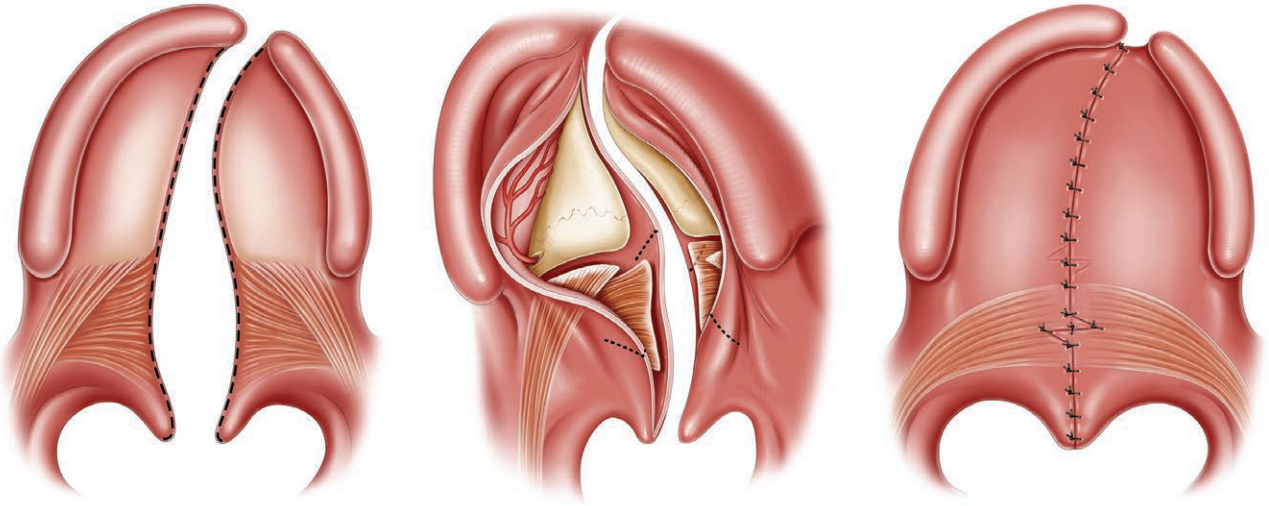

Fig. 1. The procedure of our method: (A) the incision was only along the edges of the cleft; (B) after dissecting the muscles, Z-plasty was designed for the oral and nasal layers; (C) immediately just after the operation. Note that the intravelar veloplasty was performed to reconstruct the muscle sling, and Z-plasty of the oral and nasal layers has prevented each position from being piled up.

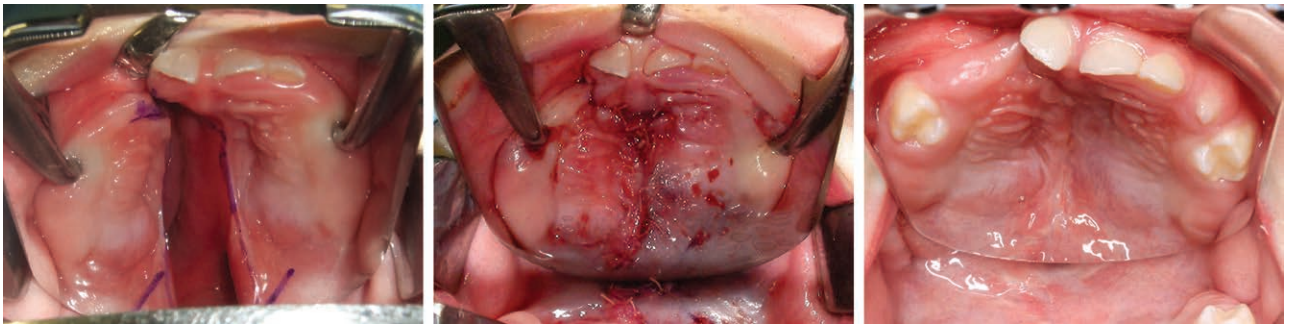

Fig. 2. Representative case of a 12-month old with right complete cleft palate. A, Preoperative view. Note that the cleft gap was 4 mm. B, View immediately just after the operation. Note that the oral mucosa was still flattened. C, View after 6 months. Note that the oral mucosa was attached to the hard palate, and natural palate arch was obtained. The palatal folds were not lost.

oral and nasal mucoperiosteum. In 5 days, the oral mucoperiosteum was tightly attached to the hard palate and the dead space disappeared.

None of the cases had issues regarding flap viability, and all palate repairs healed well. Postoperative outcomes were satisfactory, with no complications such as dehiscence, perforation, or palatal fistula.

A representative case is shown in Figure 2.

DISCUSSION

The majority of cleft palates arise because of the failure of fusion of the lateral palatine processes, the nasal septum, and/or the median palatine processes and are usually not congenital defects. Hence, they can be reconstructed by combining existing tissue anatomically without compensation. In comparison, horse-shoe type of clefts of the secondary palate or binderoid clefts are congenital defects,[8] and standard procedures are necessary to compensate for the defect, or raw tissue can be observed.

Various surgical methods of palatoplasty for cleft palate have been described. Surgical success for palate repair has been assessed predominantly by speech optimization and craniofacial growth. These 2 outcomes are associated with surgical techniques for soft- and hard-palate closures, respectively.

Fig. 3. The result of palatoplasty using the vomer flap. Note that the sulcus occurred at the vomer flap.

Techniques for hard-palate closure include von Langenbeck,[2] Veau–Wardill–Kilner pushback, and the 2-flap palatoplasty.[3,4] However, all these approaches require lateral relaxing incisions, which can lead to a denuded palatal bone. This exposed palatal bone is theoretically associated with the risk of increased anteroposterior maxillary growth restriction.[14,15]

In comparison, Sommerlad[10] reported a 1-layer closure of the anterior hard palate without lateral relaxing incisions. It was suggested that the scars formed due to the lateral incision can influence maxillary growth, but this sacrifice was necessary for fewer scars and was made with the hope that there would be less crossbite and maxillary retrusion. Although this technique has theoretical advantages, a superiorly based vomerine flap was sometimes used. The vomerine flap is not a palate tissue and hence not physiologic. Further, the vomerine flap can create a sulcus (Fig. 3). Thus, we recommend that only palate flaps be used. Furthermore, the overall fistula rate associated with this 1-layer closure has been 15%, which seems to be higher than that for standard procedures.

To perform the procedure, preoperative management by using an alveolar molding plate is important to optimize alveolar alignment. From our experience, clefts with a <5-mm gap can be closed without lateral incision, although some tension exists. To prevent fistula formation, the periosteum and mucosa are sutured.

Immediately after the operation, the oral mucoperiosteum swelled into a tent form and did not attach to the hard palate. However, within 5 days, the oral mucoperiosteum was tightly attached to the hard palate and the dead space had disappeared (Fig. 4). We believe that tongue pressure was probably involved in resolving the edematous oral mucoperiosteum.

Double-opposing Z-plasty is popular in many centers for soft-palate closure and muscle repair. However, the main disadvantage of this approach is that length is achieved at the expense of lateral tightening. We suggest that "intravelar veloplasty," consisting of levator muscle

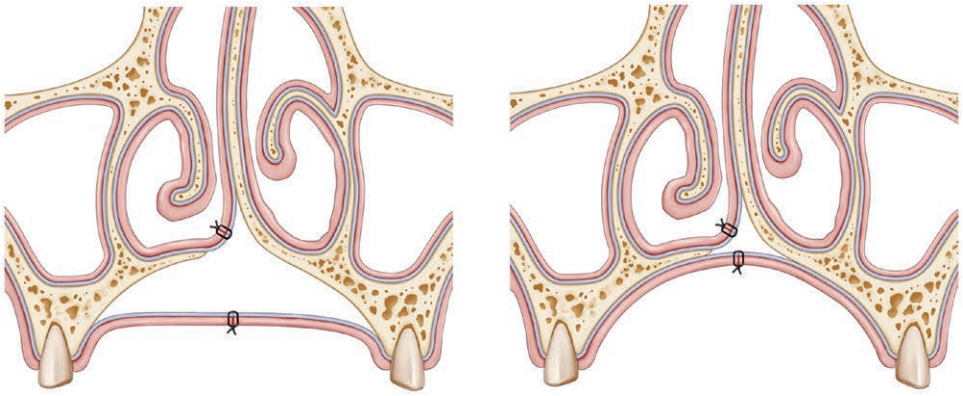

Fig. 4. The schema of hard palate and its oral mucoperiosteum: (A) immediately after the operation; (B) five days after the operation.

repositioning and levator sling reconstruction, is a critical component of contemporary palatoplasty. In addition, the double-opposing Z-plasty is advantageous for not only lengthening the velum but also preventing shortening caused by the scar contracture.

In conclusion, our procedure for palatoplasty may be more technically difficult, but we believe that it is the most physiological reconstruction method. Future research will involve follow-up for this procedure to assess speech and maxillary growth outcomes.

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