

The Use of Segmental Bone Resection to Assist in a Tension-Free Cleft Palate Repair

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Abstract

The traditional two-flap palatoplasty technique described by Veau-Wardill-Kilner is a two-flap palatoplasty suggests a posterior pushback movement of flaps should require an intact pedicle. Even a proper dissection of greater palatine vessels is done, some sort of tension burdens on the flaps due to the traction of the pedicle is inevitable. In addition to that, the right-angled flexion of the pedicle at the posteromedial bony corner of foramina palatinum majus diminishes blood flow. Particularly, in wide clefts, tight approximation of flap compromises the wound healing and resulting fistulas. A segmental bone resection from posteromedial wall of foramen palatinum majus as an outfracturing fashion is performed to assist a tension-free cleft palate repair. The more release of the pedicle from its hole loosens the flaps. It provides an easy posteromedial transposition of tissues. This maintains also most push-back movement of flaps.

Keywords: Cleft palate, osteotomy, palatoplasty, segmental bone resection, surgical technique

INTRODUCTION

A cleft palate (CP) deformity deserves the best care with multidisciplinary approach. The aim of a CP repair is not solely the simple closure of the cleft but also to obtain good speech with normal nasooral resonance, effortless production of sounds without any abnormal compensatory articulation errors, nasal reflux of food, and secretions and to prevent from iatrogenic restriction of maxillary growth and resulting malocclusion in the late period.^[1-6]

We preferred to perform Veau-Wardill-Kilner (VWK) palatoplasty technique in CP repair, regardless of whether the patient had a complete or incomplete CP. A modified segmentary triangular pyramid-shaped bone resection from posteromedial wall of foramen palatinum majus is done to release the pedicle and to loosen the flap. Contributions of this outfractured bony removal to release the pedicle for tension-free posteromedial push-back transposition of the flaps in CP repair are presented.

Preoperative considerations

The patient is placed in a supine position on the operating table usually on a shoulder roll to obtain a comfortable cervical

extension. Endotracheal intubation is done with spiral tubes, which are reinforced with wires to reduce the risk of kinking. Tube is fixed in the midline of the lower lip on the chin. Eyes are protected with ointments and eyelids are closed with a paper plaster. Intravenous antibiotics are administered, surgical site is draped, a Dingman mouth retractor is applied. Infiltration of 1% lidocaine with 1:100,000 epinephrine is done locally at least 7 min before the operation.

Surgical technique

Flaps are planned according to the VWK palatoplasty technique. It is important to place the incision at least 2 mm on the oral side along the cleft margins to ensure a suitable advancement of nasal mucosal flaps for a tension-free nasal closure at osseous cleft region. First, palatal mucoperiosteal flaps are raised in the subperiosteal plane with a sharp periosteum elevator starting from the anterior tip of the flaps. Before the posterior margin

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of the os palatinum as a transverse process of os maxilla, a gentle care is obtained to find and preserve the greater palatine artery. After arriving at the greater palatine foramen, careful dissection with a long slightly curved scissor is carried out all around the pedicle. Then, retromolar trigone is dissected to expose the musculus levator veli palatinum and tensor veli palatinum. The latter is dissected with the preservation of protuberance of os hamulus pterygoideus^[7] and no tendon transaction is done.^[8] Then, all aberrant attachments of muscle fibers are identified and freed with sharp dissection from the posterior bony edge of os palatinum. This dissection by means of cut should be done with a fine scissor starting from posteromedial edge of bony cleft and run laterally with great care to preserve an intact nasal mucosa. After that, dissection is completed through soft palate tissues to harvest to form two shelves of tissues. The nasal mucosa is also raised off carefully on the superior surface of the hard palate. All dissected flaps are checked for adequate mobility and length. Vomerine flaps are elevated on one side only in a unilateral CP but bilaterally in bilateral CPs.

The nasal layer of the hard palate is first closed with simple interrupted sutures using a 4-0 Vicryl, leaving the knots on the nasal side. Suturing is started at the middle, which is the loosest part of the nasal mucosal flaps and runs anteriorly. The nasal layer of the soft palate is then closed with horizontal mattress sutures using a 4-0 Vicryl. Uvula is closed with a 5-0 Vicryl. Vomerine flaps were used not only in wide clefts but also inappropriate clefts to decrease the tension and secure the nasal closure.

Following the closure of the nasal layer, a segmentary triangular pyramid-shaped bone resection was done at posteromedial prominent corner of the bony wall of the foramina palatinum majus. This is done under direct vision with angled tipped 2 mm sharp osteotome. The passive angled tip of osteotome is placed toward the vessels to preserve the pedicle. After two osteotomies were done, middle bone segment was outfractured with gentle push from inside to posterior (gentle click posteriorly from the foramina/canal). Outfractured triangular pyramid-shaped bone piece is removed. Pedicle is gently released from its osseous canal [Video 1].

Intravelar veloplasty is performed on previously dissected soft palate musculature, which is sutured to create a horizontal sling with a 3-0 Vicryl sutures utilizing an interrupted mattress fashion.

After then, careful hemostasis is achieved with bipolar cautery, the oral layer is closed with simple interrupted sutures starting at the base of the uvula and moving anteriorly with 4-0 Vicryl. When the hard palate is reached, a switch is made with vertical mattress sutures to capture some of the nasal mucosa to obliterate the dead space. If there still is some oozing of blood, a microfibrillar collagenous hemostatic agent is placed in the open defects laterally.

DISCUSSION

CP repair is the greatest challenge in the field of plastic surgery. The need for speech therapy, proactive middle ear management, esthetic dental restoration, and advanced orthognathic surgery are the sequences for the standard of care as a state of art for a CP. Successful primary palatoplasty in terms of normal wound healing is very valuable in this spectrum because fistulas worsen the speech results.^[1-6]

In VWK technique with the help of clear exposure of tissues, easy dissection can be performed in right tissue plans, with secure closure of nasal mucosal flaps at hard palate level, true alignment of soft palate musculature, tension-free medial apposition of oral mucoperichondrial flaps, and finally posterior transposition of reconstructed tissues as push-back maneuver.^[4-6] Posterior push-back movement of mucoperiosteal flaps requires an intact pedicle. Even when a proper dissection of greater palatinum vessels is done, some sort of tension on the flaps due to the traction of the pedicle is inevitable. In addition to that, the right-angled flexion of the pedicle at the posteromedial bony corner of foramina palatinum majus may diminish blood flow. Finally, particularly, in wide clefts, tight suturing of flaps compromises the wound healing, which may cause in fistulas, resulting in impaired functional recovery.^[9]

A greater palatine osteotomy as an outfracture fashion is first described by Limberg in 1927 to ease the approximation of the flaps in wide clefts. Oh and Wong offered to use a guarded osteotome for outfracturing of the greater palatine foramen.^[10] Seibert described a slightly less destructive technique that focused on the creation of an incomplete osteotomized channel medial to the neurovascular pedicle using a rongeur or drill.^[11] According to our experiences, it is not as easy as described by Seibert, since insertion and a secure use of a rongeur or drill type device is very difficult through the limited oral opening. Pezas *et al.* described utilization of a straight osteotome to create a complete bony channel through the junction of the posterior edge of the maxillary bone and anterior edge of the palatine bone into the free medial margin of the cleft to allow greater medialization of the oral mucoperiosteal flaps.^[12] To form such a narrow osseous channel with sharp edges has a great potential for pedicle injury which is the main disadvantage of this technique.

We preferred to do a segmentary triangular pyramid-shaped bone resection with an outfracture fashion from posteromedial wall of foramen palatinum majus to release the pedicle and loosen the flap. This bone resection can be done easily after the completion of the dissection of oral mucoperiosteal flaps and before push-back movement to increase the range of motion of flaps. Osteotomies are very simple, safe, and quick procedures and do not require specialized instruments. They can be achieved with a simple straight nonguided angled tipped 2 mm thin sharp osteotome. A great care that is needed to preserve the pedicle is the main drawback of this technique.

We do not perform any infracturing of protuberance of os hamulus pterygoideus and tendon transaction not only to escape the potential side effects on eustachian tube function but also we do not need any tendon-related relaxation.^[7,8] Late effects of outfractured segmental bony resection on the elevation of mucoperiosteal flaps on midfacial growth are also discussed since the growth centers are located on the buttresses, which are placed more laterally at tuberosity level and our osteotomy is located medially to this bony tuberosity. Therefore, no osseous growth center is disturbed by the bone resection as described.^[10]

CONCLUSION

It is advised as an adjunct to the operation in wide clefts to more posteromedial transposition of flaps, to facilitate wound healing and prevent wound detachment through reducing tension on flaps, resulting in less fistula formation ratios.

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Conflicts of interest

There are no conflicts of interest.

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