ELIMINATION OF PALATAL FISTULA AFTER THE MAXILLARY SWING PROCEDURE

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Abstract: Background. The maxillary swing procedure has been used as an anterolateral approach to expose the nasopharynx, the central skull base, and its vicinity. The reported incidence of postoperative palatal fistula has ranged from 20% to 25%. The oronasal incompetence especially associated with a large fistula has adversely affected normal speech, eating, and swallowing functions. We describe a modified palatal incision to reduce the incidence of palatal fistula associated with the maxillary swing procedure.

Methods. Fifteen consecutive patients who underwent maxillary swing procedures for salvage resection of recurrent nasopharyngeal carcinoma after radiotherapy had the modified palatal incision. The flap was raised as described, and the outcome was analyzed.

Results. Fourteen patients’ palatal wound healed uneventfully. One patient experienced partial flap necrosis, which healed with conservative treatment. All 15 patients tolerated oral feeding 1 week after the surgery. No palatal fistulas occurred.

Conclusion. The modified palatal incision as described has effectively prevented palatal fistula formation after the maxillary swing procedure. © 2005 Wiley Periodicals, Inc. Head Neck 27: 608–612, 2005

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The maxillary swing procedure has been used as an anterolateral approach to expose the nasopharynx, the central skull base, and the nearby region. After the transfacial skin incision and appropriate osteotomies, the maxilla attached to the anterior cheek flap is swung laterally as an osteomyocutaneous flap.1 With this approach, the nasopharynx and the paranasopharyngeal space are widely exposed, allowing oncologic resection of lesions within this region.2 After the operation, the maxilla and its anterior cheek flap from which it obtains its blood supply can be returned and fixed to the original facial skeleton with mini-plates and screws.

Acceptable morbidities of this procedure include facial scar and some degree of trismus. The reported incidence of postoperative palatal fistula has ranged from 20% to 25%, especially in cases in which the patients had radiotherapy before the surgery.2–6 A small palatal fistula can be treated conservatively with a dental plate, whereas a large fistula may require further surgical procedures. Surgical repair frequently fails, especially in patients who had previous irradiation around this region. Moreover, the speech, eating, and swallowing functions were affected.

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in the presence of palatal fistula, significantly contributing to psychosocial distress and poor quality of life assessment during the rehabilitation period.7–10

We have modified the palatal incision during the maxillary swing procedure aiming to eliminate palatal fistula.

MATERIALS AND METHODS

Anatomy. Anterolaterally, the hard palate is bounded by the alveolar processes and the gingiva. Posteriorly, it is continuous with the soft palate. The hard palate is covered with mucoperiosteum, which is closely adhered to the palatal bone.

The hard palate receives its blood supply mainly from the greater palatine branch of the internal maxillary artery. This vessel descends through the greater palatine foramen medial to the third molar tooth and enters the undersurface of the hard palate mucoperiosteum. The nasopalatine branch of the sphenopalatine artery, which pierces the incisive foramen, also contributes partly to the blood supply of the palate.

Muscles of the soft palate, namely the tensor veli palatini and the levator veli palatini, together with the palatine aponeurosis, enter at the posterior edge of the hard palate.

Operative Technique and Patients. The incision in the hard palate mucosa starts from the opposite lateral incisor and goes along the inner margin of the upper alveolus on the side of the maxilla that is to be swung, keeping 3 mm intact mucosa from the inner border of the gingiva. Posteriorly, the incision is extended onto the soft palate and gently curved behind the maxillary tuberosity onto the adjacent buccal mucosa (Figure 1). The hamulus of the medial pterygoid plate lies posterior to this incision.

The incision is deepened until it reaches the bone of the hard palate. By use of the periosteal elevator, the mucoperiosteum is dissected off from the bony surface of the hard palate. The dissection begins anteriorly, and the flap is raised posteromedially toward the soft palate and the midline. Strong ligament attachment may be encountered near the median raphae, and attention should be paid to keeping the flap intact. The nasopalatine vessels passing through the incisive foramen are coagulated when encountered. The flap is elevated up 1 cm across the midline to avoid being caught by the oscillating saw during the midline osteotomy on the hard palate. Dissection across the midline should be limited to safeguard the contralateral greater palatine vessel and to maintain vascularity of the underlying hard palate.

At the level of the last molar, the greater palatine vessel on the side of the swing can be seen piercing through the greater palatine foramen (Figure 2). After division of this vessel between clamps, further posterior retraction can be carried out to expose the soft and hard palate junction. The soft palate musculoaponeurosis is separated from the hard palate border to enter into the nasopharynx.

Dissection of tissue behind the maxillary tuberosity exposes the fissure between the maxillary tuberosity and the pterygoid plate. Under direct vision, a curved osteotome is placed in the fissure to detach the pterygoid plate from the maxillary tuberosity (Figure 3).

On completion of the palatal incision, the mucoperiosteal palatal flap is lifted from the hard palate from the side where the maxilla will be swung. The opposite palatal mucoperiosteum is kept intact, and the contralateral greater palatine vessel is not disturbed.

The maxilla is swung out after the osteotomies in the midline (Figure 4) over the anterior maxilla and the zygoma. The palatal flap remains attached to the posterior edge of hard palate by sutures passing through holes drilled along its posterior border. The maxilla attaching to the anterior cheek flap is...
returned and fixed to the original facial skeleton with the miniplates and screws.

Hemostasis of the undersurface of the flap is done with bipolar diathermy to avoid postoperative hematoma. The palatal flap is returned to lie on the bony surface of the hard palate, and sutures are applied to the posterior part of incision only (Figure 5). The anterior portion of the flap is contoured with the palate, thus holding it in position with the prefabricated dental plate. Suturing at the anterior edges of the palate is avoided, because these may tense up the flap. The gap between the wound edges, if any, will quickly re-epithelialize. The dental plate will maintain the flap in position and can be removed the next day. Oral feeding is usually allowed on the third day after the surgery.

RESULTS

From February 2004 to July 2004, in the Department of Surgery of Queen Mary Hospital, 15 consecutive patients who underwent maxillary swing procedures for recurrent nasopharyngeal carcinoma after radiotherapy had their palatal flap raised as described. In 14 patients the flaps healed uneventfully. In one of the early patients, partial flap necrosis at the anterior edge was noted. This was due to tension that resulted from stitching the edges of the palatal flap to the mucosa on the gingiva. After removing the

FIGURE 2. The greater palatine vessels (arrow) descend through the greater palatine foramen and need to be divided.

FIGURE 3. After elevation of palatal flap, the soft palate muscle (S) was detached from the hard palate border. The curved osteotome was inserted into the fissure behind the maxillary tuberosity (arrow).

FIGURE 4. The palatal flap was raised across the midline of maxilla, providing adequate space for a midline osteotomy using the oscillating saw.

FIGURE 5. The palatal flap was returned, and stitches were applied on the posterior part of incision (arrow).
necrotic portion of the flap, the exposed bone of the anterior part of hard palate quickly became mucosalized. No palatal fistulas occurred in any of the 15 patients, and all were able to resume normal oral feeding.

**DISCUSSION**

The procedure of maxillary swing provides wide exposure of the nasopharynx, the paranasopharyngeal space, and the central skull base for oncologic resection of disease in the region. The procedure had been used to remove recurrent nasopharyngeal carcinoma with or without para- nasopharyngeal extension, skull base chordoma, trigeminal nerve neuroma of the mandibular branch, and recurrent deep lobe parotid tumor in the parapharyngeal space.

In the original description of the procedure, the palatal incision coincided with the course of the midline osteotomy, and its lateral extension went along the junction between the hard and soft palates. The incidence of postoperative palatal fistula formation after the maxillary swing procedure was close to 25% and was highest when this approach was used for nasopharyngectomy for recurrent nasopharyngeal carcinoma, and this is probably related to radiotherapy. Moreover, it is difficult to apply sutures to reattach the soft palate to the posterior edge of the hard palate in the presence of some degree of trismus.

Although small fistulas can be managed conservatively with a temporary dental plate, large palatal fistulas create significant oronasal incompetence and warrant surgical repair. Reconstruction options are limited in this region, and because most patients have had radiation therapy, the outcome of repair is not optimal. Managing the fistula with an obturator also has problems. A tight seal obturator to prevent leakage of liquids causes pain and sometimes ulceration at the edge of the palatal fistula. Speech intelligibility is reduced, and voice quality is poor for patients while wearing an obturator.

This has significantly contributed to poor psychosocial adjustment and low quality of life as evaluated globally.

The palatal flap has been used for many years for the repair of cleft palate, alveolar cleft, and oroantral fistula. The palatal flap is a very robust flap; the entire flap remains viable as long as one pedicle is kept intact. Miles and Persky made an intrasulcular incision to raise the entire palate to gain exposure to the nasopharynx. Lee et al described a random palatal flap based on an adequate length/width ratio. Its application in an irradiated field might be risky; we thus consider it essential to preserve the contralateral pedicle as described here.

Raising the palatal flap as described, the palatal incision and osteotomy site do not overlap each other. The palatal flap is lifted from one side and hinged on the opposite side, providing space for the midline osteotomy. The mucoperiosteum and the hard palate are kept as one unit; there is no wound over the soft and hard palate junction where fistulation is common. Attention should be paid to avoid damage to the flap from blunt dissection near the midline, where ligament attachment is strong. The flap cannot withstand tissue tension, and watertight closure, especially in the anterior aspect, is not advisable and, in fact, not necessary. Wearing a dental plate can maintain the adherence between soft tissue and the palatal bone to ensure optimal healing. The denuded palate remains vascularized through the anterior cheek flap, and there was no osteonecrosis in any of the 15 patients.

The area exposed after the maxilla is swung is the same as when a midline palatal incision was used, allowing adequate dissection in the region.

**CONCLUSION**

By use of a modified palatal incision, a mucoperiosteal palatal flap is raised during the maxillary swing procedure. The procedure is simple and reliable; the flap effectively eliminates the postoperative palatal fistula formation after the maxillary swing procedure.

**REFERENCES**

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