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## CHAPTER 11

# Repair of Soft Palate Cleft and Submucous Cleft Palate

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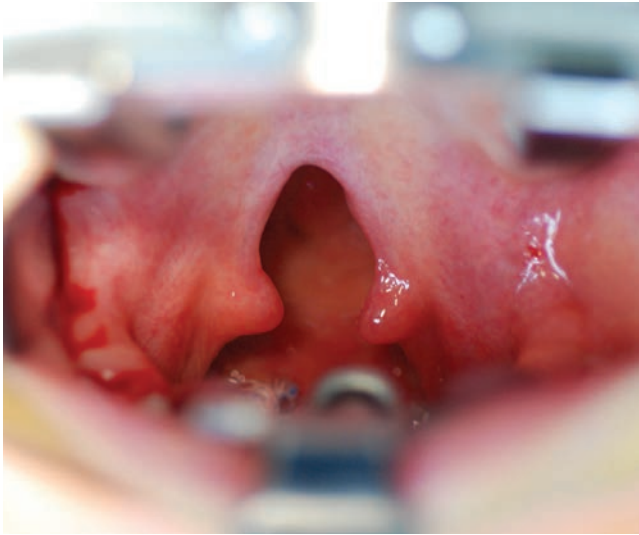
to full mobilization when utilizing this straight-line technique. No dissection is ever necessary lateral to the hamulus. This point should not be overlooked, as little or no bleeding will be encountered when all dissection is from the hamulus medially. The Furlow technique does not necessitate the need for exposure and freeing around the hamulus and neurovascular bundle. Intravelar veloplasty is completed via redirection of the musculature within the soft palate, which is accomplished with both techniques but in a different manner for each. Nasal layer closure is performed by liberally freeing nasal mucosa in both the straight-line and Furlow technique. The goal is to achieve a tension-free closure with three layers in the soft palate inclusive of nasal mucosa, oral mucosa, and muscle.

### ABSTRACT

This chapter will cover the important points related to the successful repair of the soft palate cleft and the submucous cleft palate. Avoiding tension, necrosis, and breakdown of mobilized tissue are key points in prevention of untoward sequelae. The creation of fistulae secondary to cleft palate repair should be avoided, as fistulae are more challenging to repair than the virgin deformities. This chapter will address the straight-line closure technique popularized by Von Langenbeck and the double Z-plasty technique described by Furlow. Preoperative evaluation of the defect with consideration of age, medical status, anesthesia personnel, postanesthesia capabilities, and family support are covered. The importance of organizing the operative space with proper instrumentation is emphasized, as are the specifics of multilayer closure with tension-free flaps. Mobility of the oral mucosal flaps will be achieved via isolation of the pterygoid hamulus and releasing all muscle from it and also by identifying the neurovascular bundle, releasing all muscle circumferentially, and fully skeletonizing the bundle. These are the key points

### SOFT PALATE CLEFT

A straight-line closure technique as described by Von Langenbeck is outlined. Emphasis is placed upon the specifics required for successful closure and avoidance of postoperative sequelae/fistulae. Overt palatal clefts may extend from the uvula through the soft palate and hard palate anteriorly into the alveolus (Figure 11–1). This chapter will deal only with clefts of the soft palate including the submucous variation (Figure 11–2). The Von Langenbeck technique is useful for closure of clefts of this nature. The technique allows for medial movement of palatal mucosa without detachment of tissue anteriorly. The oral mucosal flap remains attached anteriorly inclusive of the nasopalatine artery. This supplies additional blood supply to support healing and prevent avascular breakdown. Scarring is minimized, and less stress is placed upon the greater palatine vessels. Venous return is also improved for less stasis and congestion in the postoperative period.

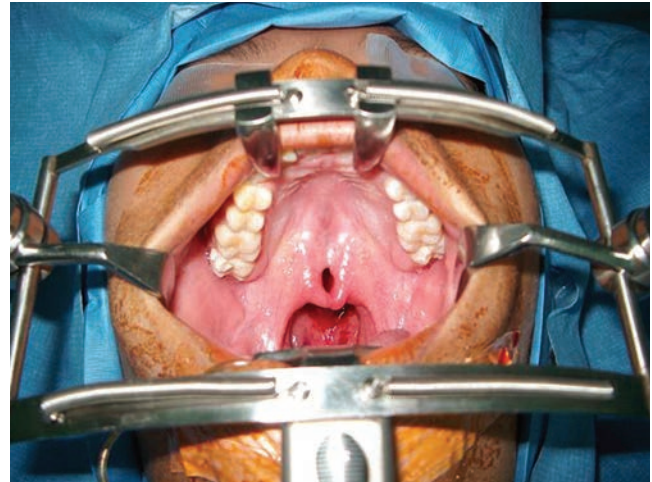


**Figure 11-1.** Overt palatal cleft extending from the uvula through the soft palate.

### SUBMUCOUS CLEFT PALATE

A submucous cleft palate consists of a notch in the posterior hard palate, diastasis of soft palate musculature in the midline (zona pellucida), and usually a bifid uvula (Figure 11-3). The incidence of submucous cleft palate is estimated at 1:1,250 to 1:6,000, occurring as an isolated anatomic deformity or as part of a syndrome.<sup>1,2</sup> The majority of patients with a submucous cleft palate are asymptomatic, but Moss et al found that up to 10% may experience velopharyngeal insufficiency (VPI).<sup>2</sup> The primary reason for VPI in this patient population is the anomalous attachment of the levator veli palatini muscles to the posterior edge of the hard palate sagittally, instead of forming a transverse sling. Several studies have noted that the severity of VPI is related to the degree of anterior displacement of these muscles.<sup>3-5</sup>

Approximately 5% to 8% of patients with an isolated cleft palate have velocardiofacial syndrome, making it one of the most common syndromes associated with cleft palate.<sup>6,7</sup> Patients with velocardiofacial syndrome and a submucous cleft palate present unique challenges because these patients may have a hypokinetic or akinetic velopharynx due to generalized hypotonia.<sup>7</sup> Furthermore, these patients may have medialized carotid arteries, often limiting them to only



**Figure 11-2.** Overt cleft of the soft palate.



**Figure 11-3.** Submucous cleft palate with zona pellucida and bifid uvula evident.

a Furlow palatoplasty for repair (Figure 11-4). Rottgers et al devised an algorithm for the use of Furlow palatoplasty in patients with velocardiofacial syndrome and suggested this technique to treat overt cleft palates and kinetic submucous cleft palates.<sup>8</sup> Patients with a hypokinetic or akinetic velopharynx were treated with a superiorly based pharyngeal flap or sphincter pharyngoplasty. Multiple studies have shown that Furlow palatoplasty is most effective in patients with a small velopharyngeal gap.<sup>9,10</sup>



**Figure 11–4.** Computed tomography with contrast showing medialization of the right internal carotid artery.

## SURGICAL INDICATIONS

Soft palate defects may extend from the uvula up to and slightly into the hard palate. The mucosa may remain intact with submucous clefting of the musculature only. It is important to fully assess the extent of the defect prior to commencing the surgical procedure. The proper choice of technique will be greatly dependent on the diligence of the differential diagnosis.

Depending upon the degree of the deformity, the Von Langenbeck or Furlow palatoplasty may be used alone or in combination with a superior pharyngeal flap or sphincter pharyngoplasty to correct for VPI in cases of submucous cleft palate. The Von Langenbeck technique described in this chapter is useful in management of the submucous cleft with one major addition. At the commencement of the surgical procedure, if the mucosa is intact (as seen with the submucous cleft palate) it will be necessary to convert this deformity into an overt soft palate cleft.

The Furlow technique utilizes double Z-plasties in the soft palate (see Chapter 22). These flaps will contain either mucosa alone or muscle and mucosa. The idea is to reposition the muscles of the soft palate into a functional and dynamic position for the purposes of speech and deglutition. This also allows for maximum lengthening of the soft palate with elimination of VPI. Furlow palatoplasty is most effective in patients with a small velopharyngeal gap and relies on a dynamic velopharynx. It may be the only feasible procedure in a patient with medialized carotid arteries.

## GOALS

As with any palatal procedure, three-layer, tension-free closure is mandatory to:

1. Prevent passage of liquids and food into the nose by separation of the oral and nasal cavities.
2. Reposition the muscular velum (especially the levator veli palatini muscle) to allow for velopharyngeal function, important for speech and swallowing.
3. Prevent middle ear disease with consequent hearing abnormalities.
4. Allow for normal facial growth.
5. Prevent palatal fistulae and need for secondary surgery.

## Timing

For patients with clefts of the soft palate, minimal dissection of tissue off the lateral aspects of the hard palate is required, and little effect on maxillary growth will be encountered. Most centers now choose to close these clefts at 6 to 12 months of age. This provides for early velopharyngeal competency and the development of normal speech. Submucous clefts are generally repaired at 2-and-a-half years of age. This will be the case only if the patient is manifesting signs of VPI and speech is refractory to speech therapy. At a younger age it is not possible to obtain reliable speech evaluations. Interestingly, in some craniofacial centers, for patients with complete clefts of the palate, the soft palate is closed first followed several months later with hard palate closure. The theory is that early reorientation of

the levator muscle sling will allow for proper speech development while minimizing the potential deleterious effect on maxillary growth.

### SURGICAL EQUIPMENT AND TOOLS

- Dingman retractor and three blades
- Leibinger side retractor and two blades
- Towel clips
- Jeter needle holder (Lorenz)
- Jeter dissectors (Lorenz)
- Long straight needle holder with fine tip
- Short snaps (one straight and one curved)
- Long snaps (one straight and one curved)
- McKesson type suction tip (4-mm tip × 7")
- Frazier tip suction (#10)
- Small double skin hook
- Small single skin hook
- Senn retractor (blunt, three prongs)
- Small retractor (Ace)
- Minnesota retractor
- Dental aspirating syringe
- Periosteal elevators
- Curved Freer elevator
- Small awl (Ace)
- Small curved Allis
- Dental mirror
- Long pickups (one with teeth, one without)
- Short Adson pickups (one with teeth, one without)
- College pliers (curved)
- Semken tissue forcep
- #7 knife handle
- #5 round style handle with angle
- #12 Locklin scissor (16 cm)
- Iris scissor (delicate tip, curved)
- Reynold's curved scissor
- Curved Metzenbaum scissor 14.5 cm
- 16-cm curved Kelly scissor
- Bandage scissor
- Small bite blocks (small adult and child)
- Bone file
- Pediatric extraction forcep
- Small rongeur
- Large rongeur
- Small mallet
- Set of seven small osteotomes
- Dental extraction elevator
- Olsen–Heger needle holder
- 12.5-cm Ryder vascular needle holder

- 15.5-cm Ryder vascular needle holder
- Curved probe with eye
- Joseph nasal scissors, curved
- Fine caliper (0 to 40 mm)
- Bishop–Harmon tissue forcep

### ANESTHESIA

- An oral Rae® tube facilitates good access to the nose and alveolar cleft itself. At times, a nasal intubation may be considered in the noncleft naris.
- The patient is placed in Trendelenburg position with a shoulder or neck roll utilized to hyperextend the head for enhanced visualization of the defect.
- Inject entire soft palate with local anesthetic containing a vasoconstrictor.
- Wait 7 to 10 minutes for full vasoconstrictor effect.

### SURGICAL PROCEDURE

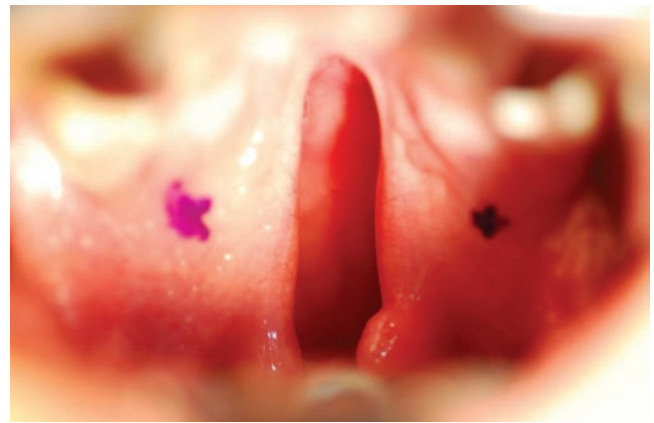
#### Repair of Soft Palate Cleft (Video of Repair of Soft Palate Cleft with Midline Technique)

1. Successful palatal surgery starts with adequate staffing, equipment, instruments, supplies, and positioning of the patient on the OR table.
2. The patient is placed in Trendelenburg position with a shoulder roll to hyperextend the head for improved visibility of the operative field. The top of the patient's head should be at the edge of the operating table.
3. The endotracheal tube must be positioned exactly in the midline and stabilized with strong anesthesia tape. If an oral Rae® tube is used, the bend of the tube must be exactly at the edge of the lower lip. Failure to position it as such could result in pushing the tube deep into the right main stem bronchus while activating the Dingman mouth gag.
4. The surgeon sits or stands at the head of the table and wears a headlight.
5. The Dingman retractor is placed with the largest blade possible (sizes 1 to 3 available) to retract the tongue but not impinge upon the posterior pharyngeal wall. Visibility of and access to the operative field are the objectives.

6. A moist throat pack is placed under the Dingman tongue blade. An additional towel can be placed under the Dingman blade handle to further tilt the head and improve operative field visibility.
7. Observe the full extent of the soft palate cleft (Figure 11-5) and infiltrate the soft tissues with local anesthetic solution containing epinephrine. Wait at least 7 to 10 minutes for maximal hemostatic effect. Good visibility of the operative field is paramount in successfully completing the technical aspects of palatal surgery. Diligent attention to items 1 to 7 will enhance the chances of accomplishing this feat.
8. Sound the palate with a needle to establish where the bony palate ends prior to marking your incisions. Incisions are then marked with a marking pen. This will prove most important as the cutting of incision lines becomes technically challenging, and the markings assist in continued orientation of the blade. An angled blade handle improves access to the difficult anterior aspects of the cuts. The location of the hamulus is marked first (Figure 11-6), followed by the marking of the medial and lateral aspects of the flaps (Figure 11-7). The medial incision lines will cross in a "V" shape over the bony margin of the hard palate (Figure 11-8). This allows for improved manual control of the medial aspects of the flaps during the dissection phase.
9. Make the medial incisions (split thickness) first by splitting the mucosa into two layers with oral and nasal sides. This will be done from the uvula anteriorly to the midline of the cleft. This is repeated on the contralateral side. Use sharp scissors to facilitate the splitting of the mucosa into the two layers.



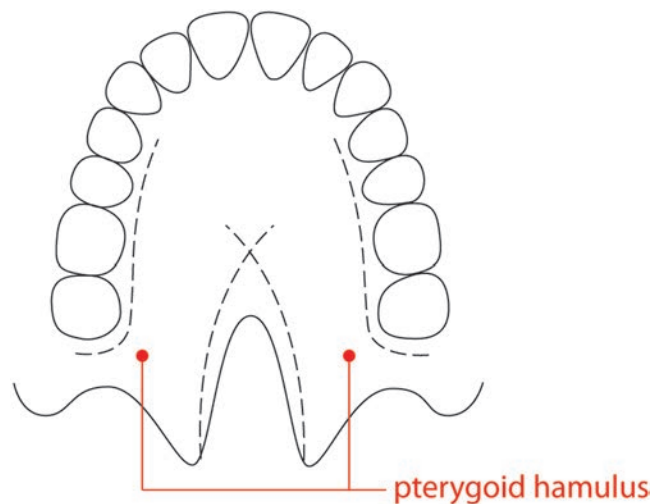
**Figure 11-5.** Soft palate cleft extending partially into hard palate.



**Figure 11-6.** Location of the hamulus is marked first.



**Figure 11-7.** Medial and lateral aspects of the flaps are marked.



**Figure 11-8.** Medial incision lines cross in "V" shape over the bony margin of the hard palate.