

14. Post Palatoplasty Fistulae

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INTRODUCTION

- The three major aims of any cleft palate repair are to acquire good speech, to minimize the post-operative complications and to limit growth retardation.
- Post-palatoplasty fistula is major reason of concern as it may hamper the other two goals of a successful cleft palate surgery.
- A fistula is defined as a communication between two closed cavities, lined by epithelium. Post palatoplasty fistulae are oro-nasal communications lined by epithelium.
- They can be of various sizes and can present at various locations, which dictate the line of treatment.
- They can be recurrent as the scar causes compromise in the vascularity of tissues around the fistula.

Contributing Factors:

- Excessive tension on the suture line, either due to insufficient release of tissues or by placing sutures on the releasing incision.
- Poor handling of the tissues especially at the suture line.
- Direct trauma.
- Infection.
- Surgeon experience.
- Width of cleft, especially at the junction of hard and soft palate.
- Intentional fistula, especially anterior to incisive foramen, if the alveolar cleft is wide.

CLASSIFICATION

The Pittsburg fistula classification system is based on location of the defect.

Type I: Uvula

Type II: Soft palate

Type III: Junction of hard and soft palate

Type IV: Hard palate

Type V: Junction between primary and secondary palates

Type VI: Lingual-alveolar

Type VII: Labial-alveolar

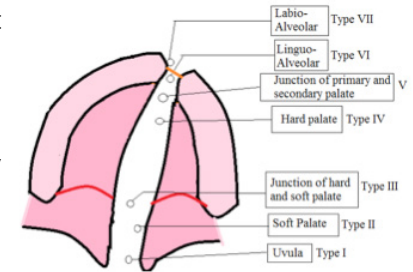


Figure 14-1. The Pittsburgh Fistula Classification System.

Graphic by G Deshpande.

Fistulae can also be classified as

1. Intentional: deliberately unrepaired alveolar clefts, only.
2. Unintentional: Fistula resulting from various reasons described above.

Also, can be classified as:

1. Symptomatic/ Functional
2. Asymptomatic/ nonfunctional

DIAGNOSIS

- Large fistulas can be easily viewed directly with proper lighting.
- Other small but symptomatic fistulas can be diagnosed with the help of speech therapist, who places a mirror in front of the nose when the patient speaks certain syllables. If there is fogging on the mirror, it is indicative of air escape through the fistula. Although this technique may not be very accurate as air can escape if the patient has VPI.
- Speech therapist can occlude the fistula and see for changes in the speech pattern. If there is improvement in the nasal emissions, the symptomatic fistula can be diagnosed fairly accurately.

NON-SURGICAL TREATMENT

- An obturator helps to occlude the fistula to separate oral and nasal cavities.

- The advantage of this method is that surgery can be avoided.
- There are several disadvantages with this appliance. First, the patient has to be very compliant to wear the appliance throughout the day. The patient may feel discomfort due to the foreign object in the mouth and may discontinue the use. Also, it needs to be cleaned at regular interval. If not, it may lead to fungal and bacterial infection (denture stomatitis). Also, sensitive patients may suffer from a gag-reflex, which again may lead to noncompliance of the appliance.
- Typically most appropriate for patients who are poor surgical candidates.

SURGICAL TREATMENT

Indications for surgery:

- Regurgitation of food and/or fluid from the nose.
- Definite improvement in speech after occluding the fistula.
- Patient not able to maintain proper oral hygiene as food may get lodged in the fistula.
- Some authors feel all fistulae should be closed as they may cause psychosocial issues, given the fact that they are not “normal”.

Timing:

- All symptomatic fistulae, where there is definite improvement in the speech should be repaired immediately.
- Certain asymptomatic alveolar fistulae can be closed during the time of alveolar bone grafting between 9-11 years of age.

Simple closure:

- Tissues around the fistula are used to close it in two layers.
- Most applicable for fistulae types I, II, and III.
- Partial thickness incision is placed around the fistula to raise “hinge flaps” that are turned over to form the nasal layer. With adequate mobilization of the surrounding tissue, the oral layer is closed. This may involve placement of lateral releasing incisions and thorough mobilization of tissues. Failure to do so and closure under tension increases risk of recurrence.
- Marginal incision placed around the fistula to turn over the flaps.

Transposition flap(s):

- Flap(s) based on the greater palatine artery is reflected. Care must be exercised to gauge the size of the flap that will be needed after transposition, as some tissue is lost during the turning of the flap.
- If necessary, a back cut is placed behind the artery to facilitate the transposition.
- A variant of this flap is the hemi-palatal island flap, which involves the transposition of the entire hemi-palatal flap. This is very useful technique to close large fistula resulting due to hemi-palatal necrosis.

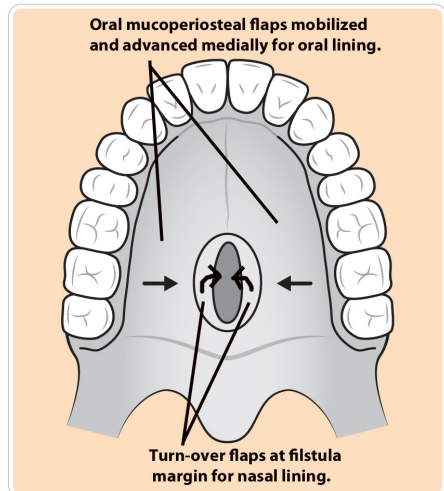


Figure 14-2. Turn over mucosal flaps for nasal lining and bilateral oral mucoperiosteal flaps for oral lining. © 2017 A Campbell, C Restrepo

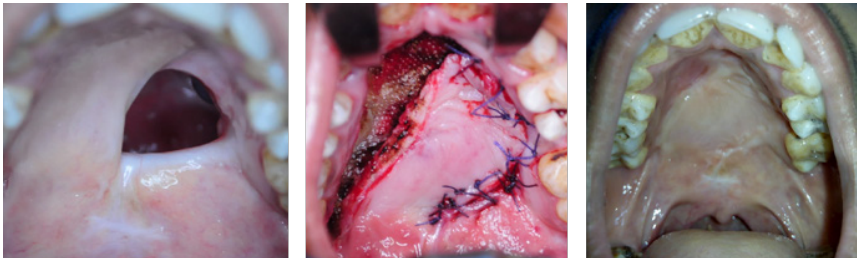


Figure 14-3. Large hemipalatal defect after hemipalatal necrosis (A). Hemi-palatal island flap rotated to close defect (B) with successful healing and closure of fistula (C). © 2017 A Campbell, C Restrepo

Key Tip: The lateral releasing incision can be given first to elevate the entire palatal flaps over the greater palatine vessel. This dissection continues till the margins of the fistula. Then the marginal incisions can be given to form the turn over flap. This can be helpful for inexperienced surgeons as it may be challenging to gauge the depth of marginal incision.

Buccal myomucosal flap(s):

- Axial pattern flap based either on the buccal or facial arteries.

- Flexible and versatile, unilateral or bilateral flaps can be used for oral and / or nasal lining.
- The flap should be 1.5-2 cm wide to preserve the blood supply and extends up towards the oral commissure.
- Flap is about 5 mm thick and comprises buccal mucosa, submucosa, and buccinator muscle, with the feeding vessels and vascular plexus.
- Best suited to treat fistulae at the junction of hard and soft palate as they can be mobilized behind the last molar tooth and can reach past midline.
- The first step is to turn over the marginal tissues around the fistula to form the nasal lining.
- The distance between the fistula and the base of the proposed flap is measured. The flap is designed to be larger and longer than the fistula due.
- These flaps are relatively easy to raise and can reach the midline.
- Once in the right plane, the flap can be easily raised taking care not to injure the parotid duct. Care also taken prevent the prolapse of Buccal fat pad, which makes dissection more cumbersome.
- The flap is then rotated to the defect, and an incision connects the fistula to the base of the flap.
- Flap is inset into the edges of the fistula. Donor site is closed primarily. This flap can also be used for lining the nasal layer in both primary and revision cases.

Tongue Flap

- Work horse for closure of large palatal fistulae, especially in the anterior palate.
- Anteriorly based flaps for anterior fistulae.
- Posteriorly based flaps for posterior fistulae, though alternative techniques often favored for this region.

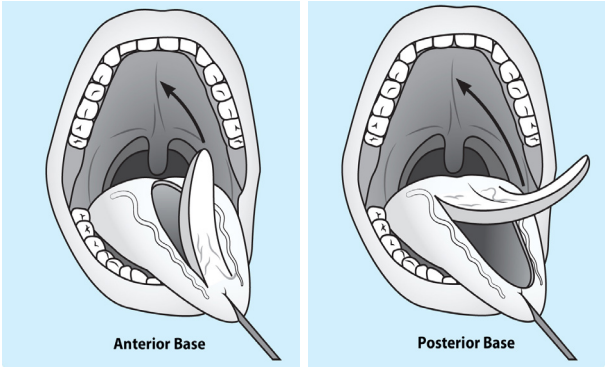


Figure 14-4. Tongue flap designs. © 2017 A Campbell, C Restrepo

- Two stage surgical procedure with elevation and inset of tongue flap during first stage, and division of flap at second stage.

First Stage (flap elevation and inset):

- Nasal layer closed if possible with turn over mucosal flap(s) and vomer if available.
- Once the nasal layer is closed, the defect usually increased in size as marginal tissues utilized for the nasal layer closure.
- Size of the fistula measured. These fistulae are usually oval in shape, so will have a antero-posterior and transverse dimensions.
- The A-P size will be closed by the length of the tongue flap and the transverse size will be closed by the width of the flap.
- When the tongue flap is designed, the author's preference is to keep the length 2.5-3 times the A-P size of the fistula. Care is exercised to keep the apex of the flap anterior to the circumvallate papillae. Also the width should be designed marginally larger than the transverse dimension of the fistula.
- After local anesthesia with 1:200,000 epinephrine is injected into the tongue mass, the flap is raised from posterior to anterior.
- The ideal depth of the flap is to raise mucosa and a cuff of muscle, which is very important for the survival of the flap. Very thin flaps may either separate or necrose.
- Once the correct plane has been gauged, dissection continues with scissors and the flap is reflected to leave an ample anterior base.
- The donor site can be closed primarily with Vicryl® 4-0.
- Now the flap is ready to be inset to the margins of the fistula.
- The suturing is started posterior to anterior. Horizontal mattress sutures are preferred.
- Complete circumferential suturing is not possible during this time. The base of the flap at the most posterior area contains the blood supply and is not inset. Complete circumferential suturing may lead to strangulation of the flap, resulting in flap loss.
- At the conclusion of the first stage the patient remains with tongue attached to the roof of the mouth for the subsequent several weeks until division.

Second Stage (division and final inset):

- The author prefers to do the division after 3 weeks of the first stage.
- The division of the flap is generally done first under local anesthesia. This will open the mouth and help the anesthetist to intubate the patient for the inset of the flap.
- After infiltration of LA and 1:200,000 epinephrine, the base of the flap is divided using a cautery tip (Colorado tip). Doing this step with cautery helps to keep the bleeding to minimum. The patient is anesthetized and prepared for the inset by placing Dingman mouth gag.
- After thorough irrigation, the posterior edge of the flap is trimmed as needed and sutured to the edge of the fistula. Also, a careful inspection is done to note any areas of dehiscence that can be re-sutured.
- The raw surface on the tongue is sutured.

Advantages:

- This is a very sturdy flap and can be used in large defects, especially in areas where there is paucity of tissues.
- Relatively simple to master.

Disadvantages:

- Two stage procedure.
- Mouth opening is restricted for 3 weeks.
- Not a very feasible option in very young patients.
- Chances of flap detachment and necrosis are high if mouth opened forcible.

Precautions:

- Airway has to be monitored for at least 2 days after surgery.
- Tongue stitch must be in place
- Liquid diet for 3 weeks.
- Instruction to prevent forcible mouth opening, either voluntarily (shouting, eating, crying, etc) and involuntarily (yawning, sneezing, etc)

Facial Artery Musculomucosal (FAMM) flap:

- The facial artery exits the submandibular region of the neck and ascends over the inferior border of the mandible through the antegonial notch at the anterior border of the masseter muscle.

- The facial artery follows an ascending and tortuous route toward the medial angle of the eye.
- The facial artery passes laterally to the buccinator (deepest layer) and medially to the risorius, zygomaticus major, and superficial lamina of the orbicularis oris.
- The FAMM flap includes mucosa, submucosa, part of the buccinator, and the underlying facial artery and submucosal venous plexus.

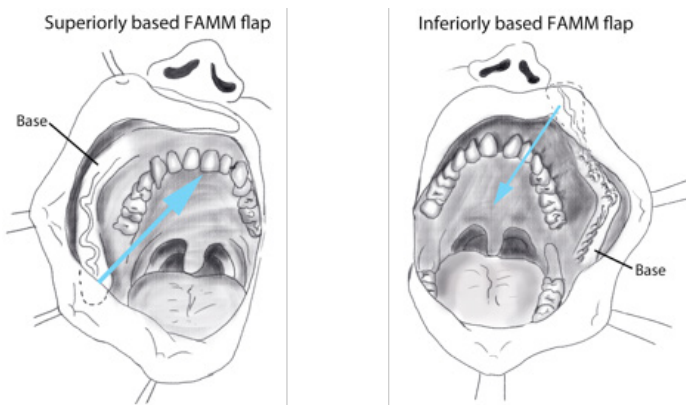


Figure 14-5. Facial artery myomucosal (FAMM) flap. © 2017 A Campbell, C Restrepo

- A Doppler can be helpful in identifying and outlining the intraoral course of the artery.
- The FAMM flap is designed over the facial artery trajectory with an oblique orientation, from the retromolar trigone to the level of the ipsilateral labial sulcus at the alar margin. Typical width 1.5 to 2 cm.
- Venous drainage relies on a submucosal plexus. Therefore, identification and preservation of the facial vein is not mandatory, and the base of the flap needs to be wide enough (approximately 2 cm) to ensure a good venous drainage.
- The FAMM flap can be inferiorly based (antegrade flow) with the arc of rotation based at the retromolar trigone, or superiorly based (retrograde flow) with the arc of rotation based at the gingival labial sulcus.
- Dissection starts with the localization of the facial artery. It can be done through an incision in the most distal part of the flap to di-

rectly locate the facial artery.

- The initial incision is done through the mucosa, submucosa, and buccinator. The facial artery is identified and ligated. The flap is then elevated and should include the facial artery, the overlying buccinator, and a small portion of the orbicularis oris close to the oral commissure.
- The donor site is closed in two layers, buccinator and mucosa.
- Superiorly based flaps useful for closure of defects in anterior palate, alveolus, nasal floor, and upper lip. Inferiorly based flaps useful for defects in posterior hard palate, soft palate, alveolus, floor of the mouth, and lower lip.

Buccal Fat Pad:

- Commonly used in oral surgery for closing oral-antral fistulae, maxillectomy defects, etc.
- Well vascularized flap with robust blood supply from transverse facial branch of superficial temporal artery, facial artery and buccal and temporal branches of maxillary artery.
- BFP is composed of a central body with four extensions: pterygoid, buccal, superficial, and deep temporal.
- The incision is made in postero-superior to tuberosity and opened using a blunt hemostat.
- With this maneuver, the BFP is teased out gently, as it is very important to preserve the thin capsule that surrounds the flap.
- Sufficient length to reach the midline may be obtained without compromising the blood supply.
- This flap is a good alternative to buccal mucosal flap as it has more predictable blood supply.
- For closing of the midline fistulae, it is prudent to create a submu-

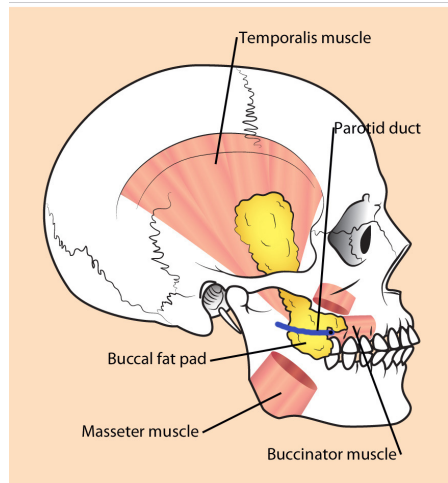


Figure 14-6. Buccal fat pad. © 2017 A Campbell, C Restrepo

cosal tunnel through which this flap can be passed and sutured to the edge of the fistula.

Advantages:

- Easy to harvest
- Robust blood supply
- Complete mucosalization in few weeks
- Less donor site morbidity

Disadvantages:

- Midline reach may sometimes be difficult, especially with large fistulae.

Author's preferred techniques for different locations of fistulae:

1. Uvula (type I)- In this case, the patient generally also has VPI. So the closure of the fistula can be accomplished with simultaneous VPI surgery. This may be a redo intervelar veloplasty (IVVP) or Furlow's repair.
2. Soft Palate (type II)- In case of small sized fistula, with no VPI, simple closure works the best. If patient has VPI, either a redo (IVVP) or Furlow's palatoplasty done.
3. Junction of hard and soft palate (type III): If the fistula is small, simple closure with lateral releasing incisions to mobilize the oral layer works well. In the case of large fistula, the nasal layer is formed by the turn over flap and both mucoperiosteal flaps are raised over greater palatine artery. These flaps are then sutured in the midline. Another good option is buccal mucosal flaps for nasal and/or oral lining.
4. Hard palate (type IV): Small fistula can be repaired by simple closure in layers. Moderate sized fistula can be closed by mucosal turn down flaps for nasal lining and transposition of the mucoperiosteal flap(s) for oral lining. Tongue flap is an excellent option if local tissue is not available due to flap loss during the primary surgery.
5. Junction of primary and secondary palate (type V): Local tissue often scarce. Tongue flap is an excellent option for significant anterior fistula in this region. FAMM flap also a good option.
6. Alveolar (types VI and VII): These are typically closed during alveo-

lar bone grafting. Labial mucosal flap can be utilized for a water tight closure.

PREVENTION OF FISTULA:

“Prevention is better than cure” applies best to the occurrence and management of fistula. The repair of fistula can be very unpredictable even in experienced hands due to scarring, loss of vascularity, patient compliance, importance of early closure for proper speech development and maxillary growth retardation due to repetitive surgeries.

Simple principles that are followed during the primary cleft palate repair and during fistula repair can minimize the formation of fistula as described below:

- Adequate mobilization of the mucoperiosteal flaps for a tension-free closure.
- No attempt is made to suture the lateral releasing incisions under tension. These sutures tend to pull the flaps apart causing tension on the midline.
- Gentle handling of the tissues. Minimizing the use of electrocautery and pick-up forceps, especially on the medial edges of the flaps.
- Skeletonisation of the pedicle to assure adequate medial mobilization of the flaps in wide clefts.
- Liquid diet for a minimum of two weeks and semisolids for two additional weeks. Nutrition is paramount after surgery for good wound healing.
- Patients instructed in the language best understood regarding the post-operative care and oral hygiene.

KEY READING

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