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Closure of palatal fistulae

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The occurrence of palatal fistulae in children with a cleft palate deformity after primary palatoplasty remains a relatively common complication. Symptomatic fistulae may cause problems with nasal air escape, nasal regurgitation, decreased speech intelligibility, articulation errors, and halitosis. A thorough understanding of the multiple reconstructive options, ranging from local flaps to free tissue transfer, is important in obtaining good patient outcomes. In this article, we describe some of the most commonly used methods for palatal closure.

Introduction

In the treatment of patients with cleft lip and palate, important goals include separation of the oral and nasal cavity, creating velopharyngeal competence, and allowing for normal speech development. Palatal fistulae remain a common complication of primary repair of a cleft palate, with an incidence in the recent literature between 0.8% and 36%,[1-10] but rates as high as 61% have been noted in remote literature.[11] Fistulae occur at a higher rate in patients with a history of bilateral cleft lip and palate when compared with those with unilateral cleft lip and palate or an incomplete cleft palate.[5] Failure to obtain successful closure of a fistula after an initial reconstructive attempt occurs in 3.6%-37% of patients.[1-4,6,8,12] As with most complications in surgery, the best mechanism to deal with palatal fistulae is prevention and requires a multilayered, tension-free primary palatoplasty.

Several attempts have been made to describe oronasal fistulae by size, location, and functionality in an attempt to create standardized assessments of fistulae for discussion and reporting of outcomes. When discussing treatment options, it is helpful to consider the size of fistula as small (1-2 mm), medium (3-5 mm), or large (>5 mm).[1] More complex classification systems defining fistulae type based on location and functionality exist, such as the Pittsburgh Fistula Classification System.[13] At a minimum, the location and size of the fistula should be documented in the medical record. Additionally, determining whether a fistula is functional or symptomatic is a key part of the preoperative assessment of a patient with cleft deformities and affects the intervention chosen. Symptomatic fistulae may cause problems with nasal air escape, nasal regurgitation of liquids or solids, chronic inflammation, decreased speech intelligibility, and halitosis.[14] Most of the fistulae occur in the hard palate or at the hard-soft palate junction based on several large retrospective series.[8,13] It should be noted that discussions of fistula location do not typically include incisive fistulae that are intentionally left open until a planned repair at the time of alveolar bone grafting.

Fistulae may result from tension on the closure with resulting wound dehiscence, wound infection, vascular compromise, flap trauma, intraoperative problems (eg, tears in the tissue or dead space), fevers, airway compromise, or hematoma.[1,3,8,12,13] Other associations include cleft width,[3,6,9,10] type of cleft,[5-7] surgeon experience,[1,2,5] age

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at repair,[2,6,11] underlying health of the patient, and 1-stage vs 2-stage repair.[6] Repair technique also affects rates of fistula development. Losken et al[7] initially noted a 35.8% overall fistula rate with the highest rates when a Furlow repair was performed followed by a von Langenbeck, then Bardach 2-flap technique. Rates were higher in Veau IV patients. The authors subsequently limited the Furlow repair to narrow clefts and used the Bardach 2-flap technique for wide clefts with a focus on tension-free closure, aggressive mobilization of the pedicles, and an intravelar veloplasty. The fistula rate reduced to 1.6% overall. Good surgical technique with a tension-free closure remains important to minimize complication rates.

Indications

Patients should be assessed for the location of the fistula and the effect it has on function. Functional impairments include nasal air escape, speech distortion, and nasal regurgitation. A fistula that is asymptomatic may not need to be repaired. In a series, the overall incidence of clinically significant fistulae was 2.0%.[8] Phua and de Chalain[5] noted that although there was an overall 12.8% rate of fistula formation in their study, reoperation for functional impairment was required in only 8.1%. Similarly, another series noted an overall fistula rate of 2.9% in patients treated with presurgical nasoalveolar molding before palatal closure; however, repair was required in only 0.7%.[15] Patients should be monitored by a surgeon, dentist, and speech therapist as part of a cohesive cleft team and assessed for functional deficits associated with the presence of a fistula. An in-depth analysis by a speech pathologist is critical in differentiating the contribution the existing fistula has on speech errors from those due to velopharyngeal insufficiency or other developmental deficits. Consideration should be given to the presence of an associated syndrome, degree of tissue inflammation, and oral hygiene.

Interventions

Treatment options for patients with oronasal fistulas include observation, nonsurgical therapy, and surgical intervention. A period of observation is appropriate for small, early postoperative oronasal fistulae, as these may close spontaneously. Asymptomatic fistulae should continue to be monitored for conversion to symptomatic fistulae. These may become symptomatic after orthodontic palatal expansion. Palatal appliances by way of a removable obturator are appropriate for patients who are poor candidates for surgery based on health status, excessive palatal scarring, multiple failed attempts at fistula closure, patient or family preference, or as a temporary intervention during orthodontic palatal expansion.[15]

Symptomatic fistulae should be repaired with at least a 2-layer, tension-free closure. Many surgical techniques exist to repair fistulae, and the type of closure used depends on size and location of the fistula, quality of the surrounding tissue, number of prior attempts at closure, and surgeon experience or preference. In a review of treated patients, Murthy[14] found that 72% of fistulae are amenable to repair with local flaps and 28% required tongue flaps for closure. A myriad of surgical approaches to the closure of oronasal fistula exist. We discuss a range of surgical treatments, although a detailed description including every variation is beyond the scope of this article. In addition, the alveolar cleft is often intentionally left open during primary palatoplasty and may not be functionally significant. These are routinely closed at the time of alveolar bone grafting. Alveolar fistulae are therefore not discussed here.

Several algorithms for closure of palatal fistulae have been proposed.[12,14] Murthy recommends that perialveolar nonfunctional fistulae be closed at the time of alveolar bone grafting or lip revision based on degree of scarring, availability of local tissue, presence of symptoms, and location. Prealveolar symptomatic fistulae may be addressed with a local mucosal flap. Symptomatic alveolar or postalveolar fistulae may be closed with either an alveolar extended palatoplasty or a tongue flap. For hard palate fistulae, the authors recommend repair with a revision 2-flap palatoplasty or alveolar extended palatoplasty, tongue flap, or free flap. Fistulae at the soft-hard palate junction should be targeted with revision palatoplasty or facial artery myomucosal (FAMM) flap. Finally, symptomatic soft palate fistulas may be addressed with the Furlow or pharyngeal flap procedure. Diah et al[12] used a 2-flap or the von Langenbeck technique in 45.3%, local flap repair in 25%, a tongue flap in 20.3%, and a Furlow palatoplasty in 9.4% of oronasal fistulas, including recurrent fistulas. They proposed an algorithm where all symptomatic fistulae were closed after a thorough speech evaluation. If partial improvement was found but there was persistent velopharyngeal insufficiency, closure was performed with concomitant speech surgery (eg, pharyngeal flap or sphincter pharyngoplasty). If there was a large fistula or a severely scarred palate, they recommend closure by a tongue flap or free tissue transfer.

Reconstructive techniques

Successful closure of palatal fistulae requires a tension-free closure of at least 2 layers including reconstruction of the nasal and oral layers. Single-layer closure of a fistula, such as single-layer primary palatoplasty, too often results in another fistula and is therefore not recommended. Many different techniques have been discussed in the literature, ranging from local flap repair with marginal turnover flaps combined with local rotation flaps; region flaps from the tongue, pharynx, or buccal region; and free tissue transfer. Many authors also advocate the use of a 3-layered closure in which a middle layer of material such as human acellular dermal grafts, cartilage grafts, or bone grafts are sandwiched between the oral and the nasal closures. A detailed description of the myriad of techniques is beyond the scope of this article; however, a discussion of some of the more frequently used maneuvers is provided.