

Tongue Flap as Salvage Procedure for Recurrent and Large Palatal Fistula after Cleft Palate Repair

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Abstract

Background: Recurrent palatal fistula is a common complication of cleft palate repair. The main causes are poor surgical technique or vascular accidents and infection. Local flaps are not adequate for larger and recurrent fistula. The aim of this study is to analyze the utility of tongue flap in recurrent and large palatal fistula repair. **Materials and Methods:** From January 2008 to July 2016, 18 patients with recurrent palatal fistula were included in the study. All the patients had undergone repair of cleft palate and fistula previously. Tongue flap repair of the recurrent palatal fistula was performed in all 18 patients. The flaps were divided after 3 weeks and final inset was done. Flap viability, fistula closure, residual tongue function, esthetics, and speech impediment were assessed. **Results:** In all the patients, fistula could be closed primarily by tongue flap. None of the patients developed flap necrosis while flap dehiscence and bleeding were observed in one patient each. No functional deformity of the tongue and donor-site morbidity was seen. Speech was improved in 80% cases. **Conclusion:** The central position, mobility, excellent vascularity, and versatility of tongue flap make particularly suitable choice for the repair of large fistula in palates scarred by previous surgery. It is very well tolerated by children. We, therefore, recommend tongue flap for large and recurrent palatal fistula in children.

Keywords: Cleft palate, palatal fistula, recurrent fistula, tongue flap

INTRODUCTION

Primary treatment of cleft palate should result in an intact palate with separation of the oral and nasal cavities in addition to good speech. Any failure of achieving complete structural integrity of palate is labeled as an oronasal (palatal) fistula with persistent passage between oral and nasal cavity. The term, palatal fistula, is normally used for residual nonrepaired cleft palate or result of breakdown of repaired palate.^[1] The incidence of palatal fistula ranges from 4% to 35%.^[2]

Most often, the palatal fistula is located at the junction of the hard and soft palate closure or between the premaxilla and secondary palate.^[3] They have been classified according to their size as small (<2 mm in diameter), medium (2–5 mm), and large (>5 mm).^[4] The symptoms depend on the size, position, and general velopharyngeal competence. The most common symptoms requiring surgical correction include uncontrolled regurgitation of fluid and food into the nasal cavity leading to poor oral hygiene with foul smell and hypernasality of speech due to nasal escape of air.^[1]

Breakdown of primary palatal repair is one of the major causes of palatal fistula, which is related to tension at the site of closure, necrosis, and injury to greater palatine vessels during elevation of the flaps. Hematoma or mechanical trauma before elevation of flaps can also lead to palatal fistula.^[3] Surgical repair of palatal fistula is technically challenging, most often due to the paucity of local tissue for closure or excessive scarring in the same area as a result of the previous repair. Various treatment options available are local tissue flaps, regional flaps, namely, buccal mucosal flaps, pharyngeal flaps, tongue flaps, microvascular free tissue transfer (radial forearm flap), and prosthetic rehabilitation.^[5-8]

Attempts aimed at achieving closure of palatal fistula with local tissue alone often result in repeated failure. This is so because thick, immobile, and scarred mucoperiosteum of previously repaired palate leads to closure under tension resulting in flap

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necrosis and wound dehiscence subsequently.^[3] Tongue flaps were introduced for intraoral reconstruction by Lexer in 1909.^[9] In cleft palate surgery, the large volume of tissue and excellent vascularity have rendered tongue flaps particularly suitable for the repair of large fistula in palates scarred from previous surgery.^[3] This study was performed to quantitatively analyze the feasibility, advantages, and the outcomes of tongue flap in closure of recurrent palatal fistula.

MATERIALS AND METHODS

The purpose of this study is to evaluate the versatility of tongue flap in closure of palatal fistula. We analyzed 18 patients with residual or recurrent palatal fistula who were treated with anteriorly based tongue flap between January 2008 and January 2016. Seven patients have undergone primary palatal repair in our institution and rest 11 were operated elsewhere.

For patient selection, the following criteria were considered: (1) fistula present in anterior and midpalate, (2) large size of the residual palatal fistula not amenable for local flap closure, (3) history of repeated failed attempts to achieve the closure of the palatal defect, and (4) scarred palate and adjacent tissue.

Patients' clinical photographs, clinical records, and speech analysis were recorded preoperatively. Size of the fistula was measured intraoperatively.

Following fistula closure, patients were assessed serially for a period of 6 months. Each patient was assessed on various parameters during follow-up visits which included (1) flap viability, (2) adequacy of fistula closure, (3) residual tongue function and esthetics, and (4) speech impediment.

Surgical technique

The operation was performed under general anesthesia with endotracheal intubation. Incision lines of the fistula were injected with 2% lidocaine with 1:200,000 adrenaline for homeostasis and ballooning of the tissues for ease of dissection.

Incision was performed around the fistulous tract and mucosalized edges were excised [Figure 1]. The nasal layer

was identified and meticulously dissected and mobilized. The nasal floor was reconstructed using 4-0 Vicryl. The tongue flap was used to provide the oral lining. Length of flap was adjusted long enough to fill anteroposterior dimensions of fistula and an additional 1 cm to allow smooth turning of flap [Figure 2]. The width of the flap was dictated by the width of the defect plus 20% but never exceeded more than 2/3rd the tongue width. Flaps were raised with up to 5–7 mm thickness of muscle in order to protect the underlying submucosal plexus [Figure 3]. Donor-site closure was done with Vicryl 4-0 interrupted sutures taking care not to close it too tight near the pedicle, thus protecting the vascularity of the flap [Figure 4]. The tongue flap was then rotated forward and sutured to the raw edges of the palatal defect anteriorly and laterally using 4-0 Vicryl [Figure 5]. Proper edge-to-edge approximation of the flap margins to the mucoperiosteal margins was done. The tongue flaps were routinely divided after 21 days postoperatively [Figures 6-8]. Resuturing of the tongue and inseting of flap were performed wherever required. In one patient, the detachment and inseting had to be done on the 9th postoperative day because of bleeding from one of the edges. All the patients were assessed serially on follow-up on various aforementioned parameters [Figures 9 and 10].

RESULTS

This study comprised of 18 patients, 8 females (44.4%) and 10 males (55.6%). The age range was 2.5–18 years. The size of the fistula varied from 2 cm × 1.5 cm to 5.0 cm × 3 cm with majority in the range of 2–2.5 cm in size. All the 18 patients were operated for cleft palate previously; 6 (33.3%) patients were operated twice previously and 5 (27.7%) patients underwent surgery more than two times in attempts to close the fistula. Out of 18 patients, 16 (88.9%) had severely scarred palatal tissue adjacent to fistula due to previous surgery, and 2 (11.1%) had no significant scar tissue. Complete closure of the fistula by tongue flap was achieved in all the 18 patients. All flaps in 18 patients proved to be viable in the long



Figure 1: Incision around the palatal fistula

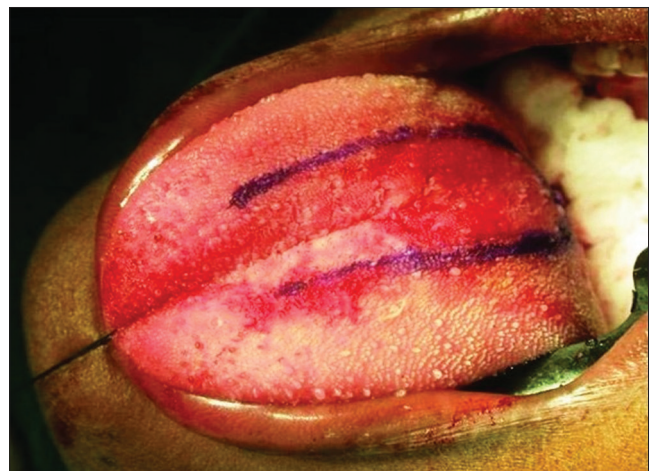


Figure 2: Marking for anteriorly based tongue flap

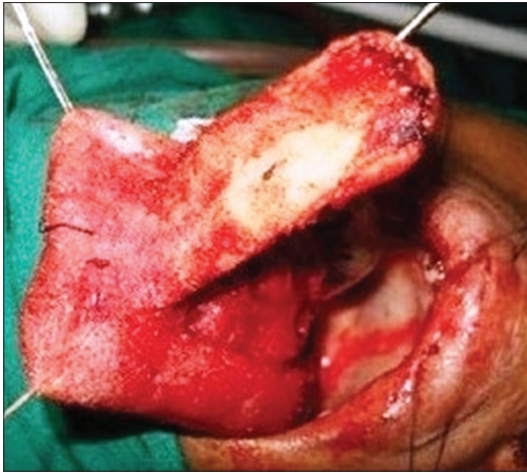


Figure 3: Elevation of tongue flap

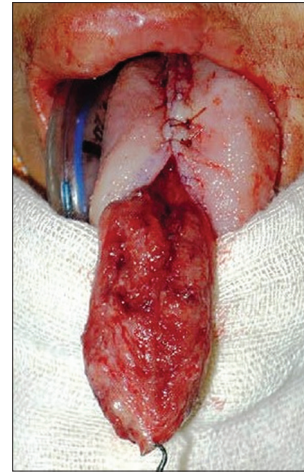


Figure 4: Primary repair of donor site



Figure 5: Fixation of tongue flap to fistula

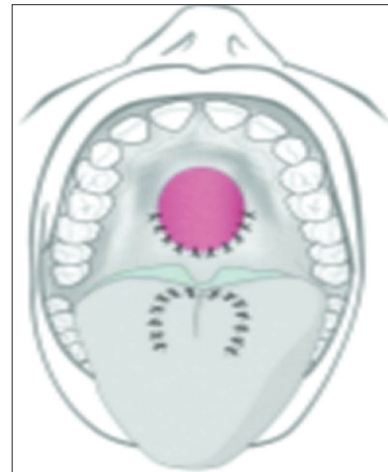


Figure 6: Division of flap after 21 days

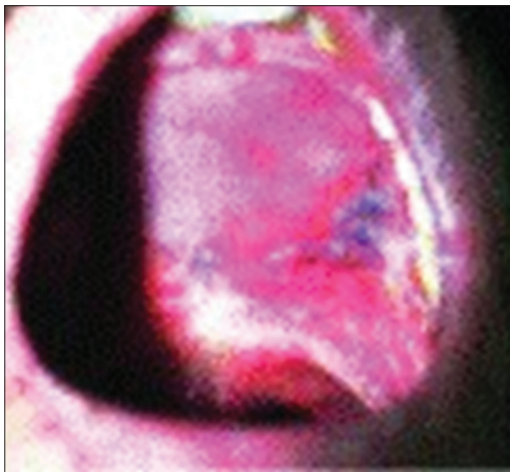


Figure 7: Fistula site after flap division

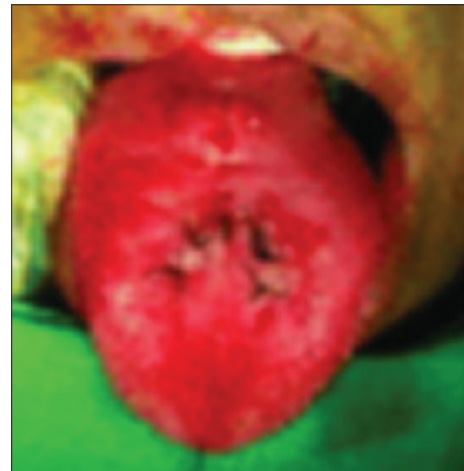


Figure 8: Donor site after flap division

term although one flap required resuturing, which showed satisfactory results over long-term follow-up.

There were no donor-site morbidity and no interference with the functioning of tongue. In all the cases, postoperative esthetics

of the donor tongue site were found to be satisfactory. Tongue esthetics were assessed based on the symmetry on either side of the suture line after complete healing. There was no interference with speech despite the use of the tongue as a donor site. Oral hygiene



Figure 9: Postoperative result after 3 months



Figure 10: Postoperative result after 6 months

and mastication were unimpaired. Taste sensation and swallowing reflex were normal in all the cases. Cessation of regurgitation of food/fluids from nose was 100%, and improvement in the nasality of speech was observed in 75% cases. The complications noted in postoperative period were bleeding in one case and flap dehiscence in one case. Bleeding was controlled with local hemostatic measures while flap dehiscence required resuturing both the flaps survived with no residual fistula. There was difficulty in feeding in 3 patients for the first 2 days. No other major morbidity or complication was observed. The procedure was very well tolerated by children of all ages.

DISCUSSION

Palatal fistula is very common complication after cleft palate repair; still, there is a paucity of literature regarding the guidelines of their management. Symptomatic fistulas are usually associated with nasal regurgitation of food and hypernasality of speech both of which are important indications for surgery. A highly variable incidence of palatal fistula ranging from 4% to 35% has been observed in different studies across the globe.^[2] Despite this wide variation in incidence, the primary cause of palatal fistula in majority of patients remains the same, i.e. closure under tension. The principle of repair of such fistula is apposition of well-vascularized tissue without tension. A recurrence rate of around 25% has been reported for these fistulas.^[10] With better technique and skill, the incidence and recurrence rate of both can be minimized drastically.

Management of cleft palate fistula requires multidisciplinary approach and proper evaluation of speech, dentition, and local tissues.^[1] This approach helps in deciding the proper timing and appropriate technique for surgical repair. Before attempting the structural surgical repair, it is essential to evaluate the local tissue and address the functional aspect of the fistula properly. While deciding on the type of repair, various factors, namely, previous surgical procedure, scarring and shortage of tissue, oral hygiene, and availability of local issue should be taken into consideration.^[1]

Different techniques, starting from local flaps to free tissue transfer, have been employed to repair palatal fistula depending

on its site, size, and tissue available. Tongue flap has been found to be very suitable for difficult palatal fistula with shortage of tissue.^[1] Buccal flap is also useful for junctional fistula if there is shortage of tissue. This flap also helps to lengthen the palate for velopharyngeal incompetence correction at the same time.^[11,12]

Other less commonly used flaps are temporalis muscle flap and microvascular free flaps which are mainly utilized in closing noncleft palatal reconstruction.^[8,13] Prosthetic cover for fistula can be applied in certain situation such as failure of multiple attempts of fistula repair, refusal for surgery by patients, and associated demands for tooth prosthesis. The drawbacks with these prostheses are they can never provide natural barrier such as tissue repair and also have implications on oral hygiene and dental health.^[1]

Closure of a palatal fistula after cleft palate surgery using only local transposition flaps usually does not achieve the desired success, and development of small oronasal fistula later is a common occurrence. Repeated attempts to gain closure with local tissue alone often result in repeated failure as thick and immobile scarred palatal mucoperiosteum leads to closure under tension with subsequent flap necrosis and wound dehiscence.^[3] Tongue flap has been a workhorse for difficult palatal fistulas with shortage of local tissue.^[1] The use of the lingual flap for repair of hard palate fistulas was first reported by Guerrero-Santos and Altamirano.^[6] The rich vascular supply from the lingual artery and its four branches which form an extensive anastomotic network with the contralateral side contributes significantly to the versatility of the tongue flap.^[14] Good amount of tissue available from the tongue can be used for effectively closing even large palatal fistula. Success rate of the tongue flap has been reported between 85% and 95.5%.^[1,15-18] Success depends on proper flap elevation, tension-free nasal layer closure, and edge-to-edge approximation of the flap with palatal tissues and not very tight closure of the donor area near the base of the flap.^[19]

Anteriorly based flaps are useful in the treatment of defects of the hard palate, anterior buccal mucosa, lips, and anterior floor of the mouth. Busić *et al.* used anteriorly based dorsal tongue flaps for closing large palatal defects and concluded that anteriorly based dorsal tongue flap is a safe and effective method for closure of

large palatal defects. The parameters for success were sufficient length of the flap (5–6 cm), a flap width slightly larger than the defect, and a flap thickness of nearly 0.5 cm.^[20] Assuncao reported experience with thin (3 mm) tongue flaps to close large anterior palatal fistulas. The results of this series confirm that the thin tongue flap is a safe and reliable technique for the closure of large palatal fistula even when tailored to fit irregularly shaped defects.^[21] Posteriorly based flaps, on the other hand, are indicated when treating defects of soft palate, retromolar region, floor of the mouth, and posterior buccal mucosa.

While raising the tongue flap, optimum thickness of the muscle should be 5–7 mm to avoid a bulky flap which may result in difficulty in swallowing and articulation problems.^[19] We performed the flap flush with the adjacent palatal tissues in all our patients, and none complained of any difficulty due to bulky flap. Nasal layer should be properly and widely undermined and raised so as to help in tension-free closure.^[19] In our patients, we used mattress sutures to achieve proper apposition of margins. Similar to Mahajan *et al.*, the success rate in our series was 100%. Only one patient had flap dehiscence, but resuturing salvaged the flap. None had a residual fistula. All the patients had cessation of nasal regurgitation, and improvement in the nasality of speech was observed in 80% of the cases. All the patients reported significant reduction in social embarrassment with gross improvement in their psychological attitude, which is in accordance with previous studies.

To restrict tongue movement, some authors have recommended mandibulomaxillary fixation or suture fixation of the tongue.^[22] The tongue flap is safe and well tolerated by children, and there is no need to put nasogastric tube for feeding.^[10,19] In our study, 35% population were children below 5 years of age, and we neither fixed the tongue with any suture nor did we put any nasogastric tube for feeding.

Flap division has been done by various authors varying from 10 to 21 days.^[1,10] In our series, we opted to do flap division after a period of 3 weeks in accordance with previous Indian studies. The reason suggested for flap division at 3 weeks is marginal necrosis of the flap usually heals spontaneously by 3 weeks. In addition, while inseting, some flap thinning or raising a part of the already healed flap may be required which is safe after 3-week period.^[19]

Tongue flap does not result in any significant donor morbidity. Major complications include hematoma formation, sloughing of the graft, epistaxis, and flap dehiscence. There is no impairment of speech or movement, and there may be only transient loss of tongue sensation and taste. The only residual defect of the procedure seems to be a slightly narrower tongue.^[3] No functional deformity of tongue was observed in any of our patients. Taste sensation and swallowing reflex were also found to be normal in all patients.

CONCLUSION

The tongue flap has proved to be a reliable easily obtainable and safe flap in children. In cleft palate surgery, the excellent vascularity and the large amount of tissue have rendered these flaps particularly appropriate for the repair of large fistulas in

palates scarred by previous surgery. In our study, the tongue flap was not only useful in closure of fistula but also there was marked improvement in the speech with minimal morbidity. The authors strongly support the use of tongue flap in children in light of its safety, easy acceptability, excellent outcome, minimum complications, and good cosmesis. We recommend the use of tongue flap for closure of large palatal fistula particularly recurrent palatal fistula with scarring and scarcity of local tissue for repair.

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Conflicts of interest

There are no conflicts of interest.

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