

Original Article

## DORSAL TONGUE FLAP: A RELIABLE SOLUTION IN RECALCITRANT SECONDARY PALATAL FISTULAS

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**Objective:** To determine the efficacy of Dorsal Tongue Flap in repair of palatal fistula in terms of closure of fistula.

**Material & Methods:** It was a descriptive study which was carried out in the department of plastic surgery, Services institute of Medical Sciences, Services Hospital Lahore over 12 months from 16th July 2010 to 15th July 2011. Forty patients who were having recurrent palatal fistula included in this study. All underwent palatal fistula repair by dorsal tongue flap. Each patient was followed after one month of operation for fistula closure.

**Results:** In this study 65.0 percent of the patients were males. 21 (52.5%) of the patients belonged to age group 10-15 years, while 14 (35.0%) of the respondents were 16-20 years of age and remaining 5 (12.5%) of them were 21-30 years of age. 90 percent patients had overall efficacy in terms of complete fistula closure.

**Conclusion:** Tongue flap is an effective and reliable treatment for palatal fistula closure in recurrent and resistant cases.

**Key words:** Tongue flap, Palate, Fistula, Nasal regurgitation.

### Introduction

Isolated cleft palate shows a relatively constant ratio of 0.45-0.5/1000 births.<sup>1</sup> The goals of cleft palate repair are complete isolation of the nasal and oral cavities, repair of velopharyngeal valve, assisting normal growth of face and provide growth background for the teeth in the cleft zone.<sup>2</sup>

Palatal Fistula is the commonest complication associated with cleft palate surgery.<sup>3</sup> A palatal fistula is an abnormal communication between oral cavity and nose that occurs after surgical repair of a cleft palate. These fistulas more frequently occur in the hard palate.<sup>4</sup> The problems caused by palatal fistulas depend on their size and patient's ability to accommodate the smaller ones. Fistula symptoms include nasal regurgitation of food or liquid, which may be socially embarrassing; fetor oris; chronic inflammation; and hearing loss as well. Nasal secretions enter mouth causing bad taste and breathe resulting in poor oral hygiene.<sup>4</sup> Reported speech symptoms include nasal escape, hyper nasal resonance, and velopharyngeal incompetence.<sup>5</sup> Postpalatoplasty fistulas remain a challenge even in expert hands. Recurrence rates are approximately 4 to 37 percent.<sup>6</sup> A variety of factors have been reported to increase the incidence of palatal fistulae, including tension along the palate repair, upper respiratory infection, hemorrhage, absent multi layer closure, and increasing cleft severity.<sup>5</sup> These fistulas may vary greatly in size and location, ranging from small defect

in buccal sulcus to a large opening that extends most of the length of the palate. Small fistulas are asymptomatic whereas larger ones produce various symptoms including regurgitation of fluid into nasal cavity and interference with normal speech.<sup>7,8</sup> A large number of inappropriately treated patients require revisional surgery.<sup>9</sup>

The repair of a recurrent palatal fistula is much more difficult than it seems and is a formidable challenge even among skillful cleft surgeons. This is due to the fact that previous palatal surgery has caused scarring of adjacent palatal muco-periosteum, resulting in insufficient healthy tissue for fistula closure. Due to this problem an extensive operation is needed to resolve even a small defect. The tongue flap is indicated for closure of a large persistent palatal fistula, in heavily scarred palates and in cases where previous attempts have been unsuccessful. Fistula correction with local flaps often fails in these sort of cases. Tongue flap owing to its muscular bulk and excellent vascularity is claimed to be effective in occluding even large palatal fistulae. Guerrero-Santos and Altamirano<sup>10</sup> in 1966 were first to describe the use of tongue flap to close palatal fistulae secondary to cleft palate repair. Depending on the site of fistula, it may be posteriorly or anteriorly based.<sup>4</sup> Subsequently, in 1972, Cadenet et al<sup>11</sup> described the rich submucous vascular plexus in the tongue and demonstrated that tongue flaps could be raised safely in any direction. Efficacy of tongue flap

closure is 85-90 percent.<sup>12</sup> This study focuses on efficacy of dorsal tongue flap in patients having secondary palatal fistulae. By using this technique those patients which remained untreated due to large fistula size can be treated.

## Material & Methods

This study was conducted in plastic surgery department, Services Hospital, Lahore. 40 patients were included from 16th July 2010 to 15th July 2011. It was descriptive case series and sampling technique was Non probability purposive sampling.

Inclusion criteria and Exclusion criteria:

Patients aged 05 to 30 years of either sex with at least one failed operation and having fistulae size between 1.5 cm to 4 cm were included.

Patients with palatal perforation due to heroin addiction, leprosy or cancrum oris and Diabetics (type I) were excluded from study.

Surgical Techniques:

General anesthesia was given through endotracheal tube to all patients. Head was positioned in hyper-extension, palate was fully exposed with a Dingman mouth gag. The operative field was infiltrated with 0.5 percent xylocaine with 1:200,000 dilution of epinephrine to reduce bleeding followed by a waiting time of 7 minutes. After tissue blanching has occurred, the margin of the fistula was incised to separate the oral from nasal mucosa. The nasal layer of mucosa from both sides was brought together to establish separate nasal and oral cavity although it was not possible in every case. The nasal mucosa around the fistula was also freed in preparation for suturing the tongue flap along its margins. A transverse incision was made on the palate flap proximal to the rim of the fistula. This created a sling for the suspension of the tongue pedicle. Regarding tongue flap, the base of the flap should measure 2.5 to 3.0 cm in width and length may be extended up to 6 cm while carefully preserving as much of the tongue tip as possible. Generally flaps are 5 to 7 mm thick, and include mucosa and sub adjacent muscle; however thin flaps e.g 3 mm may also be used when contouring is also required. Principal gustatory papillae in flap design and hematoma formation at the donor site should be avoided with attention to hemostasis and obliteration of dead space. Once the tongue flap is raised, it may be widened by dividing the muscle on the undersurface of the flap with short incisions in a longitudinal direction. This is a two-stage procedure. Detachment is done on the 14th to 21st postoperative day. Children tolerate the flap quite well and usually there is no need to put a naso-gastric tube

for feeding. The donor area is almost always closed primarily and there is no residual defect of the tongue or any speech problem.

Data Collection:

Forty (40) patients acceded to informed written consent who met the inclusion criteria were analyzed. Fistula size was measured by measuring tape and documented. After proper assessment dorsal tongue flap was employed for fistula repair in all patients. Mean and standard deviation was calculated for the quantitative variables like age. For qualitative variables like gender, complete closure of fistula and correction of the nasal regurgitation and overall efficacy, frequencies and percentages were calculated. Data was stratified for the size of fistula ( $<3\text{cm}^2$ ,  $3\text{cm}^2$ ,  $>3\text{cm}^2$ )

## Results

Out of the total of 40 patients frequency of male gender was 26 (65%), while female frequency was 14 (35%). 21 (52.5%) of the patients belonged to age group 05-15 years, while 14 (35.0%) of the respondents were 16-20 years of age and remaining 5 (12.5%) of them were 21-30 years of age. Mean age of the patients was  $16.20 \pm 4.183$  years (**Table 1**). 90 percent (out of 40) of the patients had complete fistula closure (**Table 2**). 90 percent patients had overall efficacy in terms of complete fistula closure. A significant number of the patients i.e. 27 (67.5%) had less than  $3\text{cm}^2$  fistula size, while 6 (15.0%) of them had  $3\text{cm}^2$  and 7 (17.5%) of them had more than  $3\text{cm}^2$  size of palatal fistula (**Table 3**). Association between complete fistula closure and size of palatal fistula was found significant ( $p=0.003$ ). It was found that 27 (67.5%) patients had less than  $3\text{cm}^2$  fistula size and all of them had complete fistula closure. On the other hand 6 patients had  $3\text{cm}^2$  fistula size, among them 5 (12.5%) had complete fistula closure. Seven patients (17.5%) had more than  $3\text{cm}^2$  fistula size, among them 4 (10.0%) had complete fistula closure (**Table 4**) showing a highly significant ( $p = 0.003$ ) association between overall efficacy and size of palatal fistula (**Graph-1**).

## Discussion

Repairing of recurrent palatal fistula is one of the most challenging and difficult problems faced by cleft surgeons. Previous literature showed the recurrence rates of approximately 4 to 37 percent.<sup>6</sup> This high recurrence rate in palatal fistulas required a meticulous attention in management planning. Different options are cited in literature for the

management of ONF.

Although small fistulae of the hard palate can often be repaired by local flaps., large palatal fistulae require the transfer of non-palatal flaps e.g. regional intraoral, extraoral flaps and free flaps. Prosthetic obturators is another option when patients do not want to have any further operation.

Use of tongue flap in palatal fistula management was first described by Guerrero-Santos and Altamirano<sup>10</sup> in 1966. Subsequently Cadenat et al<sup>11</sup> in 1972 described the rich submucous vascular plexus in the tongue and demonstrated that tongue flaps could be raised safely in any direction. It has wide clinical application in reconstruction of oral structures e.g. lips, floor of mouth, palatal and tonsillar defects. The tongue with its rich blood supply is a suitable and convenient source of such tissue.<sup>13</sup> Tongue flap closure for recurrent palatal fistula is associated with a high success rate in

**Table-1:** Gender Frequencies and age group.

Gender	Frequency	Percentage
Male	26	65.0
Female	14	35.0
Total	40	100.0
<b>Age category (in years)</b>		
05-15	21	52.5
16-20	14	35.0
21-30	05	12.5
Total	40	100.00

**Table-2:** Complete Fistula Closure and overall efficacy.

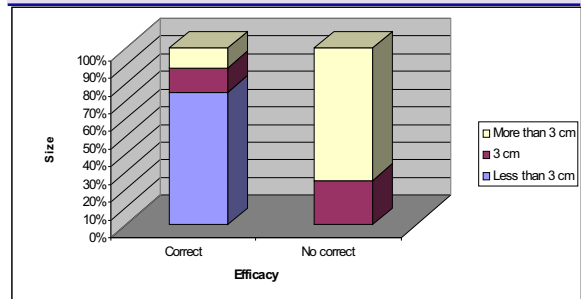
Variables	Yes		No		Total	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Complete fistula closure	36	90.0	4	10.0	40	100.0
Efficacy	36	90.0	4	10.0	40	100.0

**Table-4:** Complete fistula closure vs size of palatal fistula.

Complete Fistula Closure	Size of palatal fistula			Total Percentage
	Less than 3 cm <sup>2</sup>	3 cm <sup>2</sup>	More than 3 cm <sup>2</sup>	
Yes	27	5	4	36
	67.5 %	12.5%	10.0%	90.0%
No	0	1	34	4
	0 %	2.5%	7.5%	10.0%
Total	27	6	7	40
	67.5 %	15.0%	17.5%	100.0%

**Table-3:** Size of palatal fistula.

Size of palatal fistula	Frequency	Percentage
Less than 3 cm <sup>2</sup>	31	77.5
3 cm <sup>2</sup>	19	47.5
More than 3 cm <sup>2</sup>	08	20.0
Total	40	100.0



*Chi-square = 11.69 P-value = .003\*\**

**Graph-1:** Comparison between overall Efficacy and size of palatal fistula.

Pictorial representation of some patients



**Figure 1 and 2:** This 5 years old male patient had anterior palatal fistula of 1.5cm x 2cm size. He had

right complete cleft palate. Post palatoplasty fistula resulted due to distal flap necrosis. Dorsal single layer tongue flap was used for correction of defect.



**Figure 3 and 4:** This 13 years old female patient had recurrent palatal fistula of 2cm x 3cm size. Anteriorly based tongue flap was used to close the fistula. Nasal layer was formed by turn over of oral mucosal layer.



**Figure 5 and 6:** This 10 years male patient had 2.5cm x 3.5cm palatal defect. due to right sided total mucoperiosteal flap necrosis distal to soft palate. Wide dorsal tongue flap was implemented.

children and adults.<sup>14</sup> In our technique the flap is designed on the dorsal surface of the tongue in the midline. To close hard palate defects, an anteriorly based flap is created. The flap length and width is kept a little more than the dimensions of the fistula. The results of our study have confirmed the reliability of tongue flap in recurrent palatal fistulae. The success rate in complete fistula closure in our study was 36 of 40 (90 percent). This compares favorably with series reported by Guerrero-Santos and Altamirano in which success rate was 70 percent.<sup>10</sup> Pigott et al<sup>13</sup> described success rate in fistula closure as 85 percent and Enrina Diah with colleagues claimed the success rate of 90.5 percent.<sup>8</sup> Some authors claimed that closure of nasal side of the fistula is an essential part of the repair.<sup>6</sup> Others have contested this issue<sup>15,16</sup> and observed that even when the nasal side of the repair is not sealed in a watertight fashion, healing of the fistula is still possible as tongue flap on the oral side

encompasses the defect beyond the limits of the fistula. Oronasal fistula has been reported to be associated with type and severity of cleft.<sup>17</sup> In our study failure of fistula closure was more in larger defects. Four patients out of 40 ended in recurrence of fistulation and three of them had larger size fistulae (more than 3cm<sup>3</sup>).

Wound dehiscence was the major problem which was noted in three cases and partial flap necrosis in one case. Previous literature described that extensive use of the diathermy<sup>15</sup> can result thermal injury to the recipient and flap margins. This may affect healing process. Extensive tongue movements is another contributory factor in wound dehiscence. Limitation of speech is encouraged to avoid undue tension on the pedicle.<sup>14</sup> Various authors described different methods of tongue fixation in order to avoid such mishaps. Guerrero-Santos and Fernandez<sup>18</sup> used wire sutured to the tongue tip, passed through and tied to the upper lip. Kruchinsky<sup>19</sup> described fixation of side of the tongue to the premolars. Guerrero-Santos et al placed a kirschner wire placed through the angle of mandible, transfixing the body of the tongue. In our case series we used vicryl suture to tie the tongue flap in palatal defect. The flap may be thick enough to include several millimeters of muscle to protect the submucosal vascular plexus<sup>15</sup> We raised a large flap (56 cm long) to ensure its vascular viability and allow considerable tongue movement without undue tension on the pedicle.<sup>14</sup> This also eliminated the need of different tongue fixation procedures. In addition, aggressive palatal shelf exposure around the defect allowed both a watertight oral-side closure and an increased surface area for in growth of new blood vessels before flap division. Single layer closure of fistula by the pedicled tongue flap is therefore indicated for repair of recurrent palatal fistulae that cannot be successfully treated by other local or distant flaps because of the size and/or position of the defect.<sup>20</sup>

### Conclusion

The results of this study showed tongue flap is reliable as well as has higher success rate in the management of large, recurrent and recalcitrant palatal fistulas. It is used not only in fistula closure but also in correction of nasal regurgitation as well. The tongue remains as efficient as it was before in term of movements and articulation. By this technique patients, having recurrent palatal fistula which remained untreated previously can be treated.

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