

Inferior Turbinate Flap for Nasal-side Closure of Palatal Fistula in Cleft Patients: Technical Note

Amin Rahpeyma*
Saeedeh Khajehahmadi†

Summary: Residual palatal fistula after repair of palatal cleft is common. Repair of residual oronasal fistula is not always successful. Two-layer closure techniques that close these fistulas with soft tissue are a common practice. Turnover flaps are the most used flaps and often the sole method for nasal-side closure of fistula. Anteriorly based inferior turbinate flap can be used to provide soft tissue for nasal-side closure when turnover flaps will not provide sufficient tissue for this purpose. Under general anesthesia with nasotracheal intubation, inferior turbinate was released from posterior attachment. After removing the inferior conchal bone, mucoperiosteal flap was used for nasal-side closure of anterior palatal fistula in patients with cleft. Anteriorly based inferior turbinate flap was used for nasal-side closure of residual palatal fistula in 3 patients with cleft. Age of the patients was 14, 16, and 18, and recurrence of palatal fistula has not occurred. Anteriorly based inferior turbinate flap is an axial pattern flap with appropriate surface of the paddle and vicinity to the oral cavity roof. It can be used in large anterior, palatal fistula for reconstruction of nasal floor. Considering appropriate another flap for oral side coverage of such fistula is mandatory. (*Plast Reconstr Surg Glob Open* 2014;2:e265; doi: 10.1097/GOX.0000000000000239; Published online 9 December 2014)

Palatal fistula after repair of palatal cleft is common. Its incidence is reported between 20% and 40%.^{1,2} The most common site is between hard and soft palate, followed by anterior palatal fistula.³ Repair of residual palatal fistula is

not always successful. Failure rate as high as 37% is reported.⁴

Two-layer closure techniques that close these fistulas with soft tissue are a common practice. Turnover flaps for nasal-side closure and a variety of soft-tissue flaps for oral side coverage are reported. Local flaps such as palate-like bilateral pedicled flaps, rotation flaps, and occasionally island pedicled flaps are examples of used flaps when oronasal fistula occurs in hard palate.⁵ Regional flaps from tongue and buccal region are used for oral side coverage in very large fistula.^{6,7} Single-layer closure of palatal fistula has even higher failure rate.⁸

Anteriorly based inferior turbinate flap can be used to provide soft tissue for nasal-side closure when hinged flaps cannot provide sufficient tissue for this purpose.

*From the *Oral and Maxillofacial Diseases Research Center, School of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran; and †Dental Research Center, School of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran.*

Received for publication October 11, 2014; accepted October 22, 2014.

Copyright © 2014 The Authors. Published by Lippincott Williams & Wilkins on behalf of The American Society of Plastic Surgeons. PRS Global Open is a publication of the American Society of Plastic Surgeons. This is an open-access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 3.0 License, where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially.

DOI: 10.1097/GOX.0000000000000239

Disclosure: *The authors have no financial interest to declare in relation to the content of this article. The Article Processing Charge was paid for by the authors.*

METHODS

Surgical Technique

Nasal intubation is necessary through the nostril away from the fistula. Full-thickness palatal mucoperiosteal flaps were elevated with sulcular incision. The bony fistula is larger than soft-tissue fistula. Posterior attachment of the inferior turbinate was released with the end curve of a freer elevator, and the anteriorly based inferior turbinate flap was brought into the mouth. With a longitudinal incision, the inferior turbinate bone was removed (Fig. 1).

The periosteal surface was sutured to the bone holes that are created with a round bur in a straight surgical handpiece. The periosteal surface was oriented against the oral cavity, and the epithelial surface faced the nasal cavity.

PATIENTS

Patient 1

The patient was a 20-year-old man with longitudinal palatal fistula that extended from premaxilla posteriorly. The fistula was 2 cm in diameter. He suffered from right complete cleft lip and palate. An anteriorly based inferior turbinate flap was used for nasal-side closure and oral-side coverage, thanks to

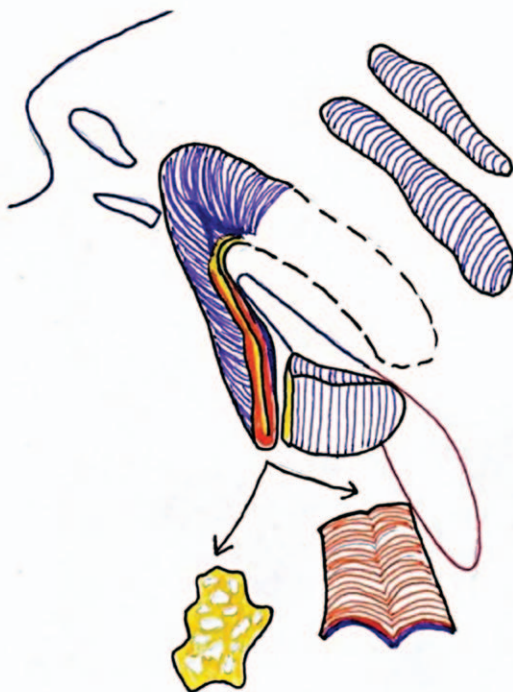


Fig. 1. Schematic picture shows anteriorly based inferior turbinate flap brought into the oral cavity through the oronasal fistula. After removing the inferior turbinate bone, it converts into the mucoperiosteal flap.

the high palatal vault obtained by small interdigitating triangular flaps from the elevated palatal masti-catory mucosa that fit each other (Fig. 2).

Patient 2

The patient was a 14-year-old boy with a remain-ing palatal fistula in anterior palate. He was oper-ated on for right alveolar cleft bone grafting when he was 12 years old. Small thin bony bridge con-nected the segments. An anteriorly based inferior turbinate flap was used for reconstruction of nasal side. A finger flap from buccal mucosa was used for oral side coverage.

Patient 3

A 16-year-old girl with palatal fistula behind the maxillary central incisors was referred to the au-thors. After full-thickness reflection of palatal muco-periosteal flaps, the inferior turbinate flap was used for nasal side reconstruction. Posteriorly based con-nective tissue flap from the palate was designed and rotated for providing oral side lining.

DISCUSSION

Management of palatal fistula in patients with cleft is difficult. Scarified and fibrotic palatal mucosa has reduced the capacity to participate in wound healing after local flap usage for palatal fistula repair.

It would not be a pleasure for both the surgeon and the patient when they confront with larger fistula after attempting palatal fistula closure in patients with cleft. In 2-layer closure techniques, there is less focus on nasal side reconstruction. Turnover flaps are the most frequently used flaps and are often the sole method.

The authors previously used the anteriorly based inferior turbinate flap for nasal-side closure in dif-ficult-to-repair alveolar cleft.⁹ We also have good experience with this technique for management of traumatic palatal fistula after palatal fracture and suction cup-induced palatal fistula. Limitations for using this flap are as follows:

- The need for full-thickness elevation of whole palatal mucosa.
- Atrophied inferior turbinate or previous turbi-nectomy. Inferior turbinate adjacent to the oro-nasal fistula is often hypertrophic but it is not the rule. History of previous rhinoplasty should alert the clinician for obtaining cone beam computed tomography (CBCT) to evaluate this structure thoroughly.
- This flap is not suitable for posteriorly located fistula (in soft palatal or junction of soft palatal with hard palate).



Fig. 2. A, Large palatal fistula in anterior palate. B, After palatal full mucoperiosteal reflection, turbinate flap was brought into the oral cavity through oronasal fistula and bone sutured. C, Results 1 week after operation. The oral side coverage is obtained by small triangular interdigitating flaps from elevated palatal mucosa.

- Bony defect should be wide enough for passage of turbinate flap, so it is not suitable for small palatal fistula.

Turbinate flap is an important aid in reconstructions of the palate. Previous studies have introduced and described superior, middle, and inferior turbinate flaps for reconstruction of skull base and nasal septum perforations.^{10,11} Inferior turbinate can be used in closure of oronasal fistula because of vicinity to oral cavity.¹² Inferior turbinate has dual blood supply¹³: posteriorly from posterolateral nasal artery, which is a branch of sphenopalatine artery (from maxillary artery), and anteriorly from branches of superior labial artery (from facial artery) and anterior ethmoid arteries. Therefore, it can be used as anteriorly or posteriorly based pedicled flap.¹⁴

Anteriorly based inferior turbinate flap is more appropriate to reach the palatal fistula located in anterior maxilla.

CONCLUSION

Anteriorly based inferior turbinate flap is an axial pattern flap with appropriate surface of the paddle as well as vicinity to the oral cavity roof. It can be used in large anterior, palatal fistula for reconstruction of nasal floor. Considering appropriate another flap for oral side coverage of such fistula is mandatory.

Saeedeh Khajehahmadi
Dental Research Center of Mashhad
University of Medical Sciences, P.O. Box: 91735-984
Vakilabad Boulevard, Mashhad, Iran
E-mail: khajehahmadis@mums.ac.ir

REFERENCES

1. Reidy JP. The other 20 per cent: failures of cleft palate repair. *Br J Plast Surg.* 1962;15:261-270.
2. Shimizu M, Shigetaka Y, Mizuki H, et al. Oronasal fistulae in repaired cleft palates. *J Craniomaxillofac Surg.* 1989;17(Suppl 1):37-38.
3. Amaratunga NA. Occurrence of oronasal fistulas in operated cleft palate patients. *J Oral Maxillofac Surg.* 1988;46:834-838.
4. Muzaffar AR, Byrd HS, Rohrich RJ, et al. Incidence of cleft palate fistula: an institutional experience with two-stage palatal repair. *Plast Reconstr Surg.* 2001;108:1515-1518.
5. Denny AD, Amm CA. Surgical technique for the correction of postpalatoplasty fistulae of the hard palate. *Plast Reconstr Surg.* 2005;115:383-387.
6. Fassio E, Laure B, Durand JL, et al. [The facial artery-buccinator musculo-mucosal flap for reconstruction of the palate]. *Rev Stomatol Chir Maxillofac.* 1999;100:221-225.
7. Ashtiani AK, Bohluli B, Kalantar Motamedi MH, et al. Effectiveness of buccal fat in closing residual midpalatal and posterior palatal fistulas in patients previously treated for clefts. *J Oral Maxillofac Surg.* 2011;69:e416-e419.
8. Charan Babu HS, Bhagvandas Rai A, Nair MA, et al. Single layer closure of palatal fistula using anteriorly based dorsal tongue flap. *J Maxillofac Oral Surg.* 2009;8:199-200.
9. Rahpeyma A, Khajehahmadi S. The last resort for reconstruction of nasal floor in difficult-to-repair alveolar cleft cases: a retrospective study. *J Craniomaxillofac Surg.* 2014;42:995-999.
10. Zhang M, Ma L, Sun W, et al. The role of the superior turbinate flap in skull base reconstruction. *J Clin Neurosci.* 2012;19:1602-1604.
11. Chen MY, Hua YJ, Wan XB, et al. A posteriorly pedicled middle turbinate mucoperiosteal flap resurfacing nasopharynx after endoscopic nasopharyngectomy for recurrent nasopharyngeal carcinoma. *Otolaryngol Head Neck Surg.* 2012;146:409-411.
12. Penna V, Bannasch H, Stark GB. The turbinate flap for oronasal fistula closure. *Ann Plast Surg.* 2007;59:679-681.
13. Orhan M, Midilli R, Gode S, et al. Blood supply of the inferior turbinate and its clinical applications. *Clin Anat.* 2010;23:770-776.
14. Padgham N, Vaughan-Jones R. Cadaver studies of the anatomy of arterial supply to the inferior turbinates. *J R Soc Med.* 1991;84:728-730.