

Innovative Technique for Esthetic Custom-fabricated Nasal Stent for Prevention of Post-surgical Stenosis in Burn Patient: A Case Report

Sreeramulu Basapogu, Ichita Joshi*, Minal Rajmane, S. Kirthika

Department of Prosthodontics, Government Dental College and Hospital, Hyderabad, Telangana, India.

Abstract

The maintenance of patency of the nasal canal is essential for adequate breathing function, speech, esthetics, and quality of life. The collapse of nasal tissue can occur due to congenital defects, tumors, trauma, surgical procedures, and burns and often requires careful intervention for reconstruction and rehabilitation. Nasal stenosis often occurs post-burn injury, which can add to the complications. The multiple corrective surgical procedures might add to the morbidity of the patient and often lead to restenosis. Hence, non-invasive intervention at early stages is preferable. The nasal stent is a removable prosthetic device that provides a safe, convenient, and economical treatment option for the prevention of wound contracture post-surgery. This case report presents an innovative and simple prosthodontic technique for the fabrication of custom-fabricated acrylic resin intranasal stent for the prevention of post-surgical stenosis due to wound contracture.

Keywords: Burn, Customized acrylic stent, Maxillofacial defect, Maxillofacial prosthesis, Nasal deformity, Nasal stent.

BACKGROUND

Intranasal defects can result from congenital defects, tumors, trauma, burns, circumferential retraction of vestibular lining post-infection, or previous surgical procedures. The reduction in diameter of the nasal canal due to stenosis can lead to reduced efficiency in nasal breathing, asymmetrical nostrils, and increased tendency for oral breathing leading to xerostomia, susceptibility of oral mucosa to inflammation, and disturbance in cranial growth and development. In addition, the altered nostril asymmetry may have negative esthetic, functional, and psychological effects.^[1] The use of microvascular free flaps assisted in graft retention creates an immediate vascular supply to the donor tissue due to a secondary blood supply. Such advancements have played a role in enhancing the success rate of graft uptake.^[2] However, the challenge still lies in maintaining the structural integrity of the reconstructed nose during the healing phase due to collapse and contracture. The goal of the maxillofacial prosthodontist in the rehabilitation of patients with collapse in nasal tissue is to reestablish the anatomy and restore form and function for a long-term period.^[3]

A nasal stent is a removable prosthesis that is used routinely in the post-operative treatment phase. It provides a non-

invasive, convenient, and economical treatment option. Stents are available as pre-fabricated and custom-fabricated. Commercially available stents made of medical-grade silicone are the Doyle II airway nasal splint and Koken nasal splint. Custom-fabricated stents provide the advantage of an accurate fit, and ease of shaping, trimming, and polishing to a smooth surface. They may be utilized in conjunction with reconstructive surgery to widen the nasal canals before the skin grafting procedures, to minimize wound contracture following skin grafting procedures, or to counteract previously formed scar tissue.^[4]

This case report highlights the fabrication of a custom-fabricated, esthetic acrylic resin stent to prevent post-surgical contracture of the nasal canal in a patient with burn injury.

Address for correspondence: Ichita Joshi,

Department of Prosthodontics, Government Dental College, and Hospital,
Afzalgunj Road, Near Police Station, Ghansi Bazar, Hyderabad - 500 012,
Telangana, India.

Email: ichitajoshi@gmail.com

Received: Oct. 01, 2024; **Accepted:** Oct. 22, 2024; **Published:** Oct. 28, 2024

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

How to cite this article: Basapogu S, Joshi I, Rajmane M, Kirthika S. Innovative Technique for Esthetic Custom-fabricated Nasal Stent for Prevention of Post-surgical Stenosis in Burn Patient: A Case Report. *J Res Adv Dent* 2025;16(1):1-3.

Access this article online

Website:
www.jrad.co.in

DOI:
<https://doi.org/10.53064/jrad.2024.16.1.619>

CASE DESCRIPTION

A 27-year-old male patient was referred from the Department of Plastic Surgery to the Department of Prosthodontics of a tertiary-level hospital for the fabrication of a nasal stent. The stent was aimed at preventing post-surgical stenosis, which could affect the patient's breathing, function, and esthetics. The patient reported a history of deformation of nasal tissue following a localized burn accident 6 months back. He underwent the replacement of nasal tissue with skin grafting 2 months back and was due for the second surgery shortly. On clinical extraoral examination, the patient's skin graft was in the healing stage with the sutures still intact and mild crusting in the alar region (Figure 1a and b). A custom-fabricated nasal stent for constant and extended use was planned to prevent post-surgical nasal stenosis.

The primary intranasal impression was made using interdental toothpicks (Kohinoor Toothpicks, Kohinoor Group, Mumbai, India) as a framework, which were sterilized using surgical spirit (MediSurg Surgical Spirit, Gufic Biosciences Ltd., Mumbai, India) and trimmed to an appropriate length. Admix technique suggested by McCord and Tyson by kneading softened impression compound (Dental products of India [DPI] Pinnacle, The Bombay Burmah Trading, India) and green tracing stick compound (DPI Pinnacle Tracing Sticks, Mumbai, India) in the ratio of 3:7 parts by weight was adapted on the

toothpick and an impression of the nasal canals were made (Figure 2a).^[5] The primary impression was retrieved and the excess material was trimmed carefully (Figure 2b). This was followed by a secondary impression using light body addition silicone (Elite HD+, Zhermack India Pvt. Ltd., Mumbai, India) and putty (Aquasil; Dentsply, Dentrax, Germany) over the impression of the nasal region. The impression was carefully retrieved as one unit, checked for accuracy, and disinfected (Figure 2c). The master cast was poured with Type IV dental stone (Kalrock, Kalabhai Karson Pvt. Ltd., Mumbai, India) after boxing the impression (Figure 3a). An infusion catheter tube (Polymed Infusion Set, Polymed Medical Devices, Haryana, India) was used as a framework to provide a channel for breathing. This was followed by adapting self-cure clear acrylic resin (DPI; Mumbai, India) around the framework, which was shade-matched with the patient's skin using extrinsic stains (FE-199, Ramya Artificial Limbs Solution Inc., Ghaziabad,



Figure 1: (a) Grafted nasal region in the frontal profile view of the patient, (b) Pre-prosthetic view of the nasal opening with intact sutures and wound healing depicted by crusting of surgical site

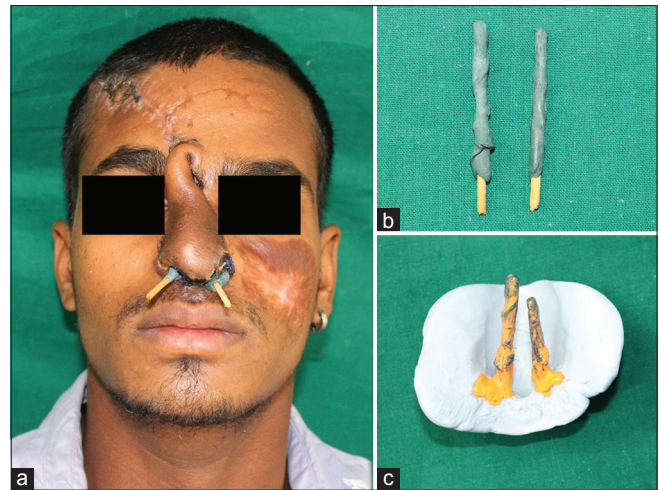


Figure 2: (a) Intraoral primary impression made with admix loaded on sterilized toothpicks, (b) Primary impression of right and left nasal canals, (c) Final impression of nasal canals with putty over the impression



Figure 3: (a) Master cast of the nasal impression, (b) Customized nasal stent prosthesis with patent channels for breathing, (c) Post-operative frontal view with nasal stent shade matched with patient's skin

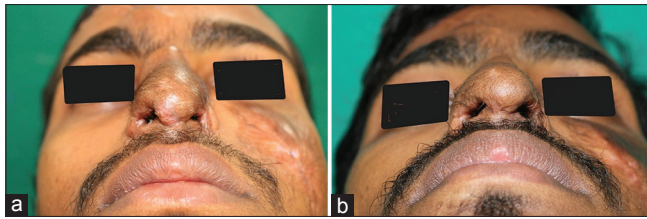


Figure 4: (a) 1-month follow-up view of nasal canals showing asymmetry with the left canal smaller in diameter, (b) 6 months follow-up view of nasal canals showing symmetry and successful healing

India) to enhance the esthetics. The two nasal canal components were joined in the columellar region, with an embedded 21-gauge stainless steel wire (G and H Orthodontics, G and H Wire Company, Mumbai, India) for strength reinforcement. The acrylic was extended bilaterally around the alar region for additional retention and stability (Figure 3b). The stent was carefully trimmed, finished, and polished on the external, as well as intaglio surface to prevent impingement to the tissues and growth of microorganisms. The insertion was done within 48 h of the second surgery, where the patient reported satisfactory adaptation, retention, and no difficulty in breathing (Figure 3c). The patient was instructed to wear the prosthesis continuously, with short periods of removal during the cleaning procedure. A follow-up of 48 h, 1 week, 1 month, 3 months, and 6 months was done. On evaluation at the 1-month follow-up appointment, the left nostril appeared smaller in diameter than the right nostril (Figure 4a). Hence, the nasal stent was relined using self-cure clear acrylic to a larger diameter. On the completion of the healing phase after 6 months, the patency of the nasal canal was well maintained with satisfactory nasal diameter and symmetry (Figure 4b). The patient reported improvement in nasal breathing, esthetics, and comfort. Hence, this custom-fabricated esthetic nasal stent was successful in preventing the post-surgical stenosis of the nasal tissues.

DISCUSSION

Successful rehabilitation of the nasal tissues plays an important role in the quality of life as it impacts the esthetics and breathing function of the patient. Intranasal stents provide a conservative and preventive technique to prevent the circumferential contracture of the scar bands post-surgery.^[6] In the current case report, the nasal stent was successfully used to expand, as well as maintain the diameter of the nasal canal.

Various materials such as medical-grade silicone, acrylic resin, stainless-steel wires, and suction tubes were used in the literature for custom-fabricated nasal stents.^[7,8] Our novel and innovative technique has the advantages of being non-invasive, cost-effective, tissue tolerant, and having ease of availability of materials in a prosthodontic setting. The infusion tube used is made of biocompatible medical-grade plastic and helps maintain the uniform, smooth, and hollow nature of the airway channels. Using self-cure resin helped in the ease of relining and future modifications of the nasal stent as the healing phase proceeded. However, the disadvantage of self-cure acrylic resin is that it

might lead to tissue irritation due to excess monomer in a few cases and cannot be used in patients allergic to monomer.^[9] The esthetics of the nasal stent were enhanced by shade matching with the patient's skin by incorporation of extrinsic colors. This simple yet effective esthetic feature was found to be lacking in previously mentioned techniques in the literature.^[6-10] The Columellar bridge was reinforced with 21-gauge stainless steel orthodontic wire to reinforce strength and prevent accidental posterior displacement of the nasal stent. The limitation of this technique is that it cannot be used in small and tortuous nasal canals due to the lack of flexibility of the acrylic resin.

CONCLUSION

The sequelae of burn injuries have a major impact on the individual's psychological and social status. The custom-fabricated nasal stent discussed here was self-retentive, atraumatic, esthetic, and conformed well to the internal nasal passageway. This technique is not only conservative but also serves to prevent further complications such as restenosis of the nasal passageway due to extensive wound contraction in the long run.

CLINICAL SIGNIFICANCE

The nasal stent is a removable prosthetic device that provides a safe, convenient, and economical treatment option for the prevention of wound contracture post-surgery. This customized, removable, novel, innovative, economical, and easy-to-fabricate nasal stent can be used to prevent and treat post-surgical nasal stenosis in patients with burn injuries.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this case report.

REFERENCES

1. Bajaj PS, Bailey BN. Stenosis of the nostrils: A report of three cases. *Br J Plast Surg* 1969;22:269-73.
2. Kim SK, Cha BH, Lee KC, Park JM. Primary correction of unilateral cleft lip nasal deformity in Asian patients: Anthropometric evaluation. *Plast Reconstr Surg* 2004;114:1373-81.
3. Harsha BC. Complications of rhinoplasty. *Oral Maxillofac Surg Clin North Am* 2009;21:81-9, vi.
4. Seals RR Jr, Bohnenkamp LG, Parel SM. Intranasal prostheses, splints, and stents. *J Prosthet Dent* 1988;60:595-601.
5. McCord JF, Tyson KW. A conservative prosthodontic option for the treatment of edentulous patients with atrophic (flat) mandibular ridges. *Br Dent J* 1997;182:469-72.
6. Brooks MD, Carr AB, Eckert SE. Nasal stent fabrication involved in nasal reconstruction: Clinical report of two patient treatments. *J Prosthet Dent* 2004;91:123-7.
7. Zarrati S, Fathesami S, Manafi A. Custom nasal stent and columellar reconstruction after a rhinoplasty complication: A clinical report. *J Prosthet Dent* 2022;128:823-6.
8. Daya M. Nostril stenosis corrected by release and serial stenting. *J Plast Reconstr Aesthet Surg* 2009;62:1012-9.
9. Rashid H, Sheikh Z, Vohra F. Allergic effects of the residual monomer used in denture base acrylic resins. *Eur J Dent* 2015;9:614-9.
10. Jindal S, Bhatnagar A, Singh A, Soni R, Singh BP. Prosthetic management of post-surgical nasal skin graft contracture. *J Indian Prosthodont Soc* 2013;13:358-61.