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Prosthetic Rehabilitation of Postsurgical Nasomaxillary Hypoplasia for a Patient Following Reconstructive Surgery: A Clinical Report

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Keywords
Nasal clefts; bilateral cleft lip and palate; nasal pyramid; stent materials.

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Previously presented at the 37th Indian Prosthodontic Society Conference, Thrissur, Kerala, India, November 5, 2009.

Accepted May 18, 2010

doi: 10.1111/j.1532-849X.2011.00690.x

Abstract

Repairs of the cleft nose, lip, and palatal deformity remain challenging endeavors for reconstructive surgeons. Postsurgical nasomaxillary hypoplasia is a common finding in patients with extensive clefts. This complex deformity has a pronounced impact on the social behavior and self image of the subject. Esthetic and functional rehabilitation of this postsurgical defect is scarcely reported in the literature. Support in the form of prostheses or stents to prevent tissue collapse is usually required in these patients following surgery. This clinical case presentation discusses the fabrication of an internal nasal stent for a cleft nose, lip, and palate patient following surgical reconstruction. Two prostheses using two prosthetic materials (Polymethyl methacrylate, flexible resin) were prepared to compare their efficacy. The final prostheses improved the patient's appearance, making the postsurgical defect less conspicuous.

Congenitally acquired clefts of the nose are fortunately rare. These nasal clefts are reported to occur either alone or in association with types 0, 1, 2, and 3 of Tessier craniofacial cleft classification.[1] The nose is critically involved in appearance, and its defects are readily apparent due to its central location and plane of projection.[2-4] Surgical correction of these defects is the primary treatment modality rendered.[4] Residual nasomaxillary hypoplasia following surgery is a common occurrence in extensive clefts. Little is written regarding the prosthetic management and long-term follow-up of patients with such defects. Tissue support by prostheses or stents is usually required to maintain facial integrity in these situations. This clinical report highlights the prosthetic rehabilitation of residual nasomaxillary hypoplasia in a female patient.

Clinical report

An 18-year-old female patient was referred to the Department of Prosthodontics, Sri Ramakrishna Dental College and Hospital, Coimbatore, India, for prosthetic rehabilitation.

Medical history

The patient's medical history revealed congenital nasal cleft associated with bilateral cleft lip and palate. The patient had undergone a series of reconstructive surgeries for lip and nasal defects. The lip repair and external nasal surgical repair were performed when the patient was 6 months old. Internal nasal reconstruction was done at 18 years (Fig 1). Postsurgically, the patient exhibited residual nasomaxillary hypoplasia with midfacial depression compromising facial appearance.

Examination

Extraorally, the patient presented a concave facial profile, collapsed nasal pyramid, drooping of the upper lip, and a protuberant lower lip (Fig 1B). Intraorally, oronasal fistula, the absence of nasal septum, and partial edentulism due to missing maxillary central and lateral incisors corresponding to ACP PDI classification (American College of Prosthodontists Prosthodontic Diagnostic Index) Class III[5] were evident (Fig 2). These defects significantly affected the patient's esthetics, phonetics, and function.

Treatment options

The treatment options given for the patient were:

1. Correction of nasal defects
   a. Surgical or

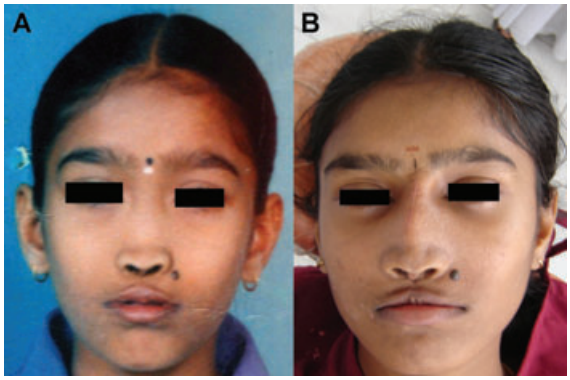

Figure 1 Extraoral frontal view of the patient. (A) Presurgical. (B) Postsurgical.

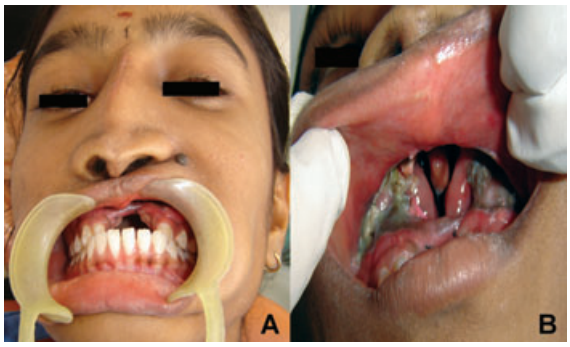

Figure 2 Intraoral view highlighting the defect.

   b. Prosthetic—Prosthesis retained using implants/magnets/adhesives/tissue undercut.
2. Closure of palatal defect
   a. Surgical closure or
   b. Prosthetic management using obturators.
3. Management of partial edentulism
   a. Removable partial denture (RPD)
   b. Fixed partial denture (FPD).

Treatment plan

Considering the extent of the defect and previous surgeries performed, the dental team discussed the treatment options with the patient and opted for prosthodontic management for rehabilitation. The prosthetic treatment plan consisted of fabrication of a prosthesis to restore facial harmony and nasal breathing, to obturate the oronasal communication, and to replace the missing teeth.

Treatment steps

An interim nasal stent made of impression compound was placed postsurgically to stabilize the surgical site. Limitations of this interim stent were failure to restore nasal contour and obstruction of the patient's airway, forcing her to mouth breathe. Therefore, a definitive prosthesis to allow patient function had to be fabricated. The treatment steps planned were:

1. Impression making of the defect;
2. Wax pattern fabrication;
3. Try-in of the wax pattern with acrylic teeth; and
4. Processing and insertion.

The patient's existing interim stent was duplicated to fabricate the wax pattern for the definitive stent. Irreversible hydrocolloid (Tulip, Cavex, The Netherlands) was used as the duplicating material using the split-mold technique. Modeling wax (Surana, Mangalore Dental Corporation, Mangalore, India) was used to develop the wax pattern. As the path of insertion of the stent was through the oronasal defect, a decision was made to use the same to obturate the communication. Therefore the prosthesis played three roles—as a nasal stent, an obturator, and an RPD. Each portion was individually developed by repeated insertions of the wax pattern in the reconstructed site, and finally acrylic teeth were arranged to restore anterior esthetics and lip support. As per the surgeon's instructions, care was taken not to leave the surgical site without support for more than 15 minutes for the fear of tissue collapse. Openings were provided in the wax pattern to aid in nasal breathing (Fig 3). Final wax try-in was assessed based on esthetics and phonetics and processed with heat-polymerizing denture base resin (SR Triplex Hot, Ivoclar Vivadent AG, Schaan, Liechtenstein). An acrylic definitive nasal stent was inserted (Fig 4). The patient was instructed to continuously wear the prosthesis to avoid tissue collapse. An attempt was made to use flexible resin (Valplast, Long Island City, NY) for fabricating an additional prosthesis. The flexible resin is a thermoplastic resin material to which acrylic teeth can be mechanically bonded and processed by injection molding technique. This processing technique minimizes polymerization shrinkage and can provide better tissue adaptation. The existing definitive acrylic stent was duplicated to develop the wax pattern and processed with flexible resin using the injection molding process. It was finished and polished (Fig 5). The patient was trained to insert and remove the

Figure 3 Wax pattern with provision for nasal breathing.

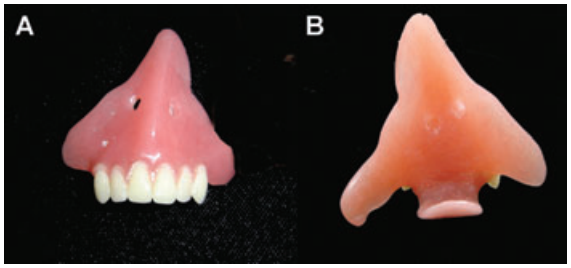

Figure 4 Definitive nasal stent in acrylic —front (A) and back (B) view showing three-plane extension.

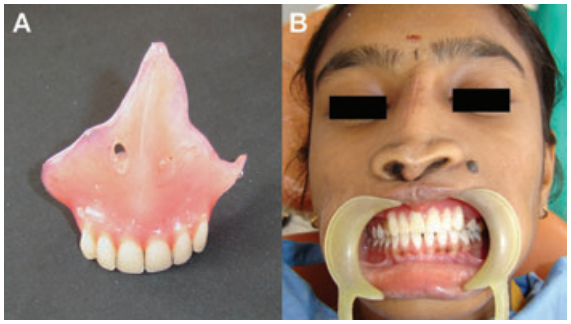

Figure 5 (A) Flexible nasal stent; (B) Final insertion of flexible nasal stent.

prosthesis. The cleansing regimen prescribed was to use a denture brush for cleaning the acrylic stent and chemical cleansing method (Val Clean, Valplast) for the flexible stent. Added to this, the patient was instructed to soak both the stents in an antiseptic solution (Clohex Plus, Dr. Reddy's Laboratories Ltd, Hyderabad, India) for 5 to 10 minutes every other day to prevent microbial colonization. The definitive prostheses made a marked change in the patient's appearance, speech, and confidence (Figs 6 and 7).

Discussion

The most frequently encountered sequel to surgical reconstruction of midfacial defects, especially involving the nose, is nasomaxillary hypoplasia, collapse, and contracture of reconstructed tissues.[6] This poses a challenge in maintaining the structural integrity of the reconstructed nose. Burget and Menick emphasize the importance of nasal support during this critical healing period.[7,8] Prosthetic rehabilitation attempts to restore these facial disfigurements and improve the level of function and self-esteem for these patients.[9] This report elucidates the rehabilitation of nasal, alveolar, and dental defects of a cleft patient. The definitive prosthesis camouflaged the nasal disfigurement and restored nasal patency. The prosthesis extended vertically through the oronasal defect engaging the soft tissue undercut, sagittally closing the palatal defect and horizontally engaging the labial prominences of the abutment teeth. This three-plane extension greatly increased prosthesis retention. Stent materials commonly reported in the literature are impression compound for interim use and acrylic and silicone materials for definitive use.[10–14] In the present case,

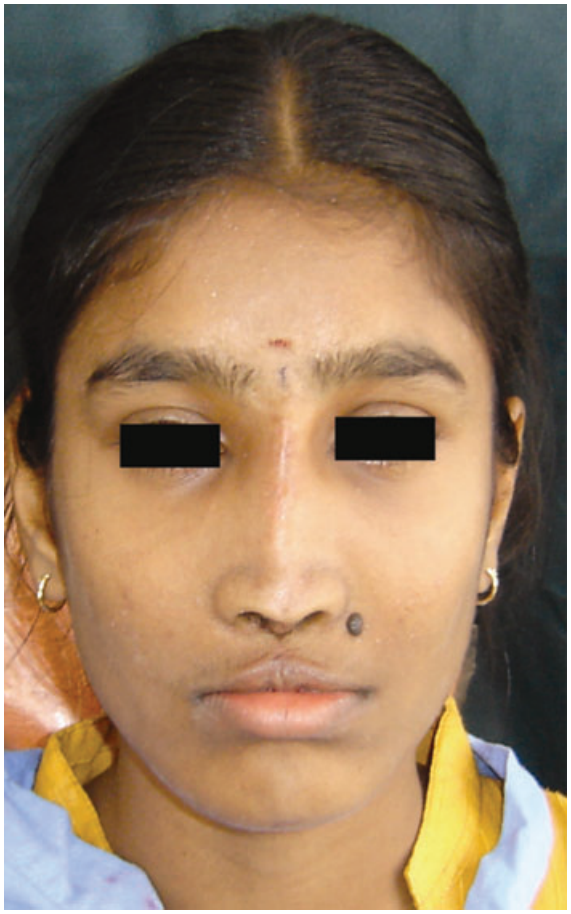

Figure 6 Postprosthodontic phase (refer to Fig 1 for pre-prosthodontic phase).

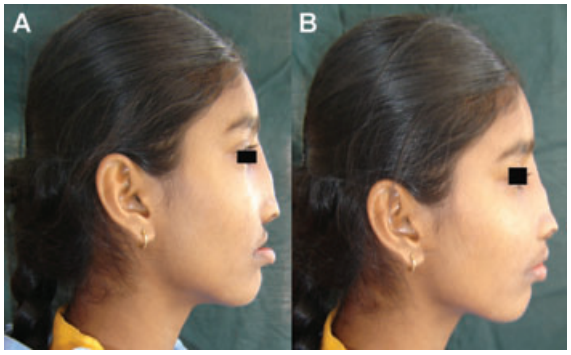

Figure 7 Extraoral lateral view of the patient. (A) Postsurgical. (B) Postprosthodontic phase.

due to patient request, two prostheses were fabricated. Polymethyl methacrylate (PMMA) resin and flexible resin were employed. Functional and esthetic results of both the materials were accepted as satisfactory by the patient. Flexible resin is mostly used as a partial denture fabricating material. There is lack of evidence of it being used as a maxillofacial prosthetic material. The efficacy of flexible resin over PMMA was appreciated better by the patient due to ease of insertion and handling,

flexibility, excellent surface finish, reduced bulk, better tissue adaptation, and retention. Regular follow-up is scheduled to understand the long-term behavioral changes of this flexible resin material. An interim nasal stent placed immediately after surgery does not completely rehabilitate the patient esthetically and functionally. The definitive prosthetic treatment plan designed for this patient helped in accomplishing the basic objectives of oral rehabilitation:

1. Tissue support—the prosthesis restored the nasal contour and midface integrity.
2. Function—the palatal closure by the prosthesis reduced nasal regurgitation, improved mastication and deglutition, and allowed nasal breathing through the openings provided in the prosthesis.
3. Phonetics—restored palatal contour and reduced hypernasal resonance.
4. Esthetics—the prosthesis greatly improved patient appearance by camouflaging the nasal and dental defects.

Acknowledgments

The authors wish to acknowledge Dr. C.N. Ramasamy, plastic surgeon GKNM Hospitals, Coimbatore, who had performed the surgical reconstruction and referred the patient for prosthetic rehabilitation; and Dr. P.C. Ajitha, BDS, for assisting in the clinical management of the present case.

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