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CLINICAL REPORT

Nasal Prosthesis Rehabilitation: A Case Report

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Abstract Facial defects resulting from neoplasm, congenital malformation or trauma can be restored with facial prosthesis using different materials and retention methods to achieve life-like look and function. A nasal prosthesis can re-establish esthetic form and anatomic contours for mid-facial defects, often more effectively than by surgical reconstruction as the nose is relatively immobile structure. For successful results, lot of factors such as harmony, texture, color matching and blending of tissue interface with the prosthesis are important. The aim of the presented case report is to describe the non-surgical rehabilitation, with polymethyl meth-acrylate resin, nasal prosthesis for a patient who received partial rhinectomy as a result of squamous cell carcinoma of the nose. The prosthesis was made to restore the esthetic appearance of the patient with a mechanical retained design using a spectacle glass frame without inserting craniofacial implants.

Keywords Mechanical retention · Nasal prosthesis · Partial rhinectomy · Poly methyl meth acrylate

Introduction

Squamous cell carcinoma is an aggressive malignant neoplasm. Malignancies of the nasal septum are considered rare, and accounts for 9% of all cancers of nasal cavity [1]. Squamous cell carcinoma comprises about 66% of such lesions [2].

The quality of life after rhinectomy is severely compromised if an efficient surgical reconstruction or a prosthetic device is not provided [3]. Prosthetic management of nasal defects that result from trauma or surgery has been well-documented.

A temporary nasal prosthesis may be considered for these patients. Such prosthesis can be delivered as soon as 3 to 4 weeks after surgery providing the patient with an improved appearance. This can enable the patient to resume social interactions while permitting easy access to observe tissue bed changes during healing. The literature indicates that 3 to 5 months of post operative healing may be required to allow for contraction and organization of the tissue bed before commencing fabrication of a definitive nasal prosthesis [4].

The purpose of this clinical report is to describe a custom sculpted definitive nasal prosthesis made of acrylic resin combined with nosepiece and retained by eye glasses.

Case Report

A 60 years old woman was referred to the Department of Prosthodontics from oto-rhino-laryngeology department, SAIMS, Indore for nasal prosthesis. Patient was operated for squamous cell carcinoma of nose some 5 months ago. Sqamous cell carcinoma of the nose was treated through a partial rhinectomy. The bridge of the nose, including the nasal bones was not included in the resection (Fig. 1).

During the examination, the patient related dissatisfaction with her appearance and was especially concerned about her facial disfigurement. Various prosthetic treatment

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Fig. 1 Frontal view of patient after partial rhinectomy

modalities ranging from acrylic resin nasal prosthesis to implant retained silicone prosthesis were explained and discussed with the patient. Due to economic constraints, the patient chose a nasal prosthesis made of acrylic resin. The fabrication of a PolyMethyl Meth Acrylate (PMMA) resin nasal prosthesis was planned, and the outcome of this treatment was explained to the patient. It was decided to use a spectacle glass frame for retaining the prosthesis.

1. The patient was draped and petroleum jelly was applied to the patient's eyebrows and eyelashes. Moist gauze was packed to prevent the flow of material into the undesired areas of the defect, an impression was made of the defect and adjacent tissues using a putty consistency poly vinyl siloxane (Exaflex; GC, America USA, Inc) in a semi-upright position in order to minimize tissue bed distortion. (Fig. 2).
2. The impression was then poured with the type III dental stone (Kala Stone; Kala Bhai Pvt Ltd., Mumbai, India) to achieve a cast. A model of prosthesis was sculpted on the facial cast with No. 2 dental modelling wax (MDM Corporation; Delhi, India). Taking into account the patient's general appearance and previous photographs, the esthetic contours was developed. (Fig. 3).
3. The wax pattern adaptation on the patient's faces was checked especially in the border areas. Tissue texture and relevant contours were evaluated on the face of the patient. The remaining anatomic landmarks were used as a reference augmented by a pre-operative photograph of the patient.
4. In order to get the maximum adaptation with the underlying tissues, functional wax (Correcta wax; Kerr Corp, Ca, USA) was added to the borders.
5. The wax model was placed into a flask. After dewaxing, the nasal prosthesis was processed using a clear PMMA resin material (DPI Heat Cure; Dental Products of India, Mumbai, India). Intrinsic coloring was done using an acrylic based paint (Fevicryl; Pidilite Industries Ltd., Mumbai, India) to match the basic skin tones.
6. The prosthesis was evaluated on the patient face. Extrinsic coloration was done to further match with the skin tone of the patient (Fig. 4). This coloration was made water resistant by painting it with mono-poly using camel hairbrush.
7. After the final contouring and matching, the superior margin at the bridge of the nose was adapted as closely as possible to the point of contact with the eye glass frames. The eyeglasses were used to maximize retention and to mask this margin of the prosthesis. Glass frame was modified in the bridge area (Figs. 5, 6).
8. Finally, to customize the prosthesis nose piece was attached to the prosthesis (Fig. 7).
9. The placement of the prosthesis was demonstrated to patient, and was then delivered. Detailed instructions regarding care and use were provided to the patient.

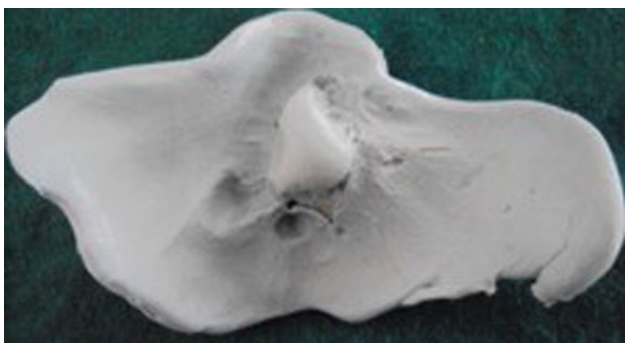

Fig. 2 Polyvinyl siloxane impression of defect

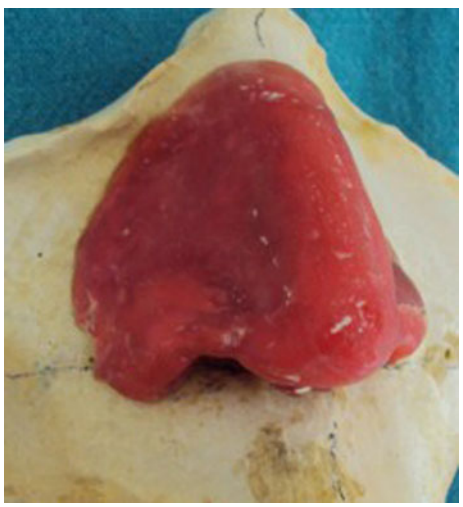

Fig. 3 Wax pattern carved on working model in baseplate wax

Fig. 4 Prosthesis after extrinsic coloring

Fig. 5 Nasal prosthesis with glass frame and intaglio surface view

Fig. 6 Patient with nasal prosthesis attached to glass frame

The patient was scheduled for the first post-insertion adjustment 1 day after the insertion to ensure health of the tissues and to relieve the prosthesis for pressure areas on the tissues.

At the follow-up evaluation after 4 weeks, the prosthesis appeared to be functioning within normal limits. The patient indicated that she was satisfied with the results of treatment and felt comfortable attending the social event while wearing the prosthesis.

Fig. 7 Patient with customised nasal prosthesis with nose piece

Patient was then asked to come for recall visit once in every 3 months for evaluation of prosthesis and observation of any recurrence.

Discussion

Facial defects result in multiple functional and psychosocial difficulties. Surgical reconstruction techniques, prosthetic rehabilitation or a combination of both the methods to restore these facial disfigurements may improve the level of function and self-confidence for patients [5]. The site, size, and etiology of the defect, patient's age, general medical condition and desire are used to determine the methods of reconstruction.

It has been reported previously that the nasal bones should be included in a surgical resection of the nose even when they are disease free [4], but in our case report, the nasal bones and the associated soft tissues were intentionally left intact. This was done to improve the support of the eyeglasses at the bridge of the nose and to increase skin surface contact to enhance adhesive retention of the prosthesis.

The replacement of lost parts caused by ablative cancer surgery is never easy to achieve by reconstructive surgery, especially when the initial operation is extensive and destructive. It would further subject the patient to another trying period. Prosthetic rehabilitation can be preferred due to probability of recurrence, complexity of the surgical reconstruction procedure, radiation therapy, esthetic importance [6]

and it is easy to reproduce the former shape, size and color of the tissues.

Patient education is perhaps, the first step in the rehabilitation [7]. Prior to surgery, it is important to familiarize the patient with the functional and cosmetic expectations and limitations of the maxillofacial prosthesis.

Providing adequate retention and airway in nasal prostheses should be considered as it can improve the patients function and comfort. The prosthesis should be lightweight.

Most facial prostheses like nasal prostheses are retained with adhesives and mechanisms including anatomic undercuts, eyeglasses attachments, attachment to maxillary obturators [6], magnets [8–10], and prosthetic connections to endosseous implants [11–13]. Each of these methods has its own advantages and disadvantages.

When suitable conditions are provided, mechanical retention obtained by anatomic undercuts is the most advantageous. The presence of moisture, mobile soft tissues, or lack of stable tissue support affects the retention; these are disadvantages of anatomic retention [14].

Mechanical devices such as eyeglass frames as used for this patient are not useful in patients with a flat residual tissue bed and gravity may cause vertical displacement. In patients with a flat tissue bed and insufficient anatomic undercuts, using two acrylic resin extensions into the nasal floor can provide more retention and support for the nasal prosthesis [15].

Adhesives may be irritating and damage the thin margins of the prosthesis during removal [10].

Implants cannot be used in children and unpredictable tumor sites [16].

Biomaterials such as polymethyl methacrylate and silicone have been used for prosthetic rehabilitation for facial defects. PMMA resin is one of the oldest materials to be used in maxillofacial prosthodontics [17]. It is recommended as one possible material for use in fabricating a temporary nasal prosthesis [4] but can also be used for making a definitive prosthesis like in the present case report. It has been suggested that the ease of marginal readaptation using chair side denture lining makes this a useful material during the period of post healing scar contraction and wound organization. However, PMMA resin results in a prosthesis that feels much less life-like because of the rigidity and opacity. Also PMMA lacks color stability but the color stability can be increased by using mono-poly as the top layer of the prosthesis. Monopoly is syrup made by combining 10 parts of type I, class I (heat cure) acrylic resin monomer to 1 part of type I, class I clear acrylic resin polymer by weight. The monomer is poured into a Pyrex beaker and placed in a pan of boiling water. When the monomer is warm, the polymer is sifted slowly into the monomer while stirring continuously with a glass rod. After 10 min, the solution obtains the viscosity of light oil. After the mono-poly has cooled to room temperature, it is poured into a dark glass bottle and refrigerated [4].

The advantages of this prosthesis are that the technique is non-invasive, tissue tolerant, aesthetic, comfortable to use, and easy to fabricate and clean. Additionally, this prosthesis is often preferred by the patients because the weight and the cost of such prosthesis are low.

Traditionally facial prosthesis has been made by hand worked sculpted wax or clay pattern. Recently, the computer-aided design of a nasal prosthesis based on preoperative virtual laser scanning of the affected site was virtually adapted to the post-operative laser-scanned surface. The mould for the nasal prosthesis was rapid prototyped using a computer-aided design and manufacturing (CAD-CAM) procedure, increasing the quality of the final product [18].

With this protocol, the eyeglasses have also been digitized, and the relative position of the nasal prosthesis was planned and evaluated in a virtual environment without any try-in appointment have also been used [19].

There have been pertinent technological advances in computerized shade selection, three-dimensional digital photography, virtual surgical planning, surface scanning, and three-dimensional imaging to obtain the wax pattern.

The noncontact optical impression procedure eliminates the patient's discomfort. Three-dimensional data imaging allow visualization of a whole face without distortion, but all these technologies are still in its infancy stage and are beyond the reach of many patients in country like India.

Conclusion

Defects resulting from diseases like squamous cell carcinoma can be rehabilitated using prosthetic rehabilitation so that the patient more comfortably and confidently resumes the regular daily activity. In countries like India, where cost of the treatment is still a primary concern for the patient, PMMA resin can be used as a material for definitive prosthesis.

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References

1. Fradis M, Podoshin L, Gertner R, Sabo E (1993) Squamous cell carcinoma of the nasal septum mucosa. Ear Nose Throat J 72:217–221
2. DiLeo MD, Miller RH, Rice JC, Butcher RB (1996) Nasal septal squamous cell carcinoma: a chart review and meta-analysis. Laryngoscope 106:1218–1222

3. Brunski JB, Puleo DA, Nanci A (2000) Biomaterials and biomechanics of oral and maxillofacial implants: current status and future developments. Int J Oral Maxillofac Implants 15:15–45
4. Beumer J, Curtis TA, Marunick MT (1996) Maxillofacial rehabilitation: prosthodontic and surgical considerations, 2nd edn. Ishiyaku Euroamerica, St Louis, p 404
5. Guttal SS, Patil NP, Shetye AD (2006) Prosthetic rehabilitation of a midfacial defect resulting from lethal midline granuloma—a clinical report. J Oral Rehabil 33:863–867
6. Harrison DF (1982) Total rhinectomy—a worthwhile operation? J Laryngol Otol 96:1113–1123
7. Levin AC (1984) Maxillofacial prosthetics, chapter 10. In: Million RR, Tassisi NJ (eds) Management of head and neck cancer. A multi-disciplinary approach. JD Lippincott co, Philadelphia, pp 115–126
8. Javid N (1971) The use of magnets in a maxillofacial prosthesis. J Prosthet Dent 25:334–341
9. Udagama A, King GE (1983) Mechanically retained facial prostheses: helpful or harmful? J Prosthet Dent 49:85–86
10. Dumbrigue HB, Fyler A (1997) Minimizing prosthesis movement in a midfacial defect: a clinical report. J Prosthet Dent 78:341–345
11. Beumer J, Curtis TA, Marunick MT (1998) Maxillofacial rehabilitation: prosthetic and surgical considerations. Ishiyaku Euro America, St. Louis, pp 387–408
12. Parel SM, Branemark PI, Tjellstrom A, Gion G (1986) Osseointegration in maxillofacial prosthetics Part II: extraoral applications. J Prosthet Dent 55:600–606
13. Nishimura RD, Roumanas E, Moy PK, Sugai T (1996) Nasal defects and osseointegrated implants: UCLA experience. J Prosthet Dent 76:597–602
14. Branemark PI, Tolman DE (1998) Osseointegration in craniofacial reconstruction. Quintessence, Chicago, pp 95–102
15. Asadi Gelareh, Mirfazaelian Ali, Amir A (2009) Mangoli. A technique for the fabrication of a more retentive nasal prosthesis. J Prosthet Dent 9:36–38
16. Gurbuz A, Kalkan M, Ozturk AN, Eskitascioglu G (2004) Nasal prosthesis rehabilitation: a case report. Quintessence Int 35:655–656
17. Phillips RW, Margetis PM, Urban JJ, Leonard F (1972) Materials for the fabrication of maxillofacial prosthesis. In: Chalian VA, Drane JB, Standish SM (eds) Maxillofacial prosthetics. The Williams and Wilkins Company, Baltimore, pp 63–88
18. Ciocca L, Bacci G, Mingucci R, Scotti R (2009) CAD/CAM construction of a provisional nasal prosthesis after ablative tumor surgery of the nose: a pilot case report. Eur J Cancer Care (Engl) 18(1):97–101
19. Ciocca L, Fantini M, De Crescenzio F, Persiani F, Scotti R (2010) New protocol for construction of eyeglasses-supported provisional nasal prosthesis using CAD/CAM techniques. J Rehabil Res Dev 47(7):595–604