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Prosthetic rehabilitation of a patient with total rhinectomy and partial maxillectomy with magnet-retained oral-nasal combination prosthesis: A case report

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ABSTRACT

Nasal cavity malignancies tend to make local aggressive growth. There are two possibilities for rehabilitation after a total rhinectomy: Operative reconstruction or a nasal prosthesis. Since the introduction of microvascular free flaps, most facial defects are now rehabilitated surgically and there are many available surgical options, however, for large deficiencies, regional as well as local flaps are definitely not cosmetically ideal. Moreover, patients requiring extensive midfacial prosthetic reconstruction will invariably have had previous radiotherapy, making placement and retention of implants more problematic and liable to fail. In this situation prosthetic rehabilitation can be an attractive alternative to the surgical reconstruction of the nose. This clinical report explains a step by step facial and intraoral prosthetic rehabilitation of a patient with total rhinectomy and partial maxillectomy with magnet-retained oral-nasal combination prosthesis.

Keywords: Rhinectomy, Prosthetic Rehabilitation, Maxillectomy.

Introduction

Nasal cavity malignancies, squamous cell carcinoma in specific, tend to make local aggressive growth. Appropriate removal of a tumor, if needed with total or partial exterior nose resection, is essential, however, it might be associated with overwhelming psychosocial sequelae as well as modification of the outward appearance [1]. There are two possibilities for rehabilitation after a total rhinectomy: Operative reconstruction or a nasal prosthesis. Although it is "artificial", there are various advantages that are apparent in nasal prosthesis: Limiting hospital and surgery time, early rehabilitation, small preliminary expenses, and especially the simplicity in the assessment of the region for diagnosing a possible recurrence [2].

Since the introduction of microvascular free flaps, most facial defects are now rehabilitated surgically. However, not every patient is a candidate for a surgical reconstruction. Nose reconstruction presents various challenges, therefore, the decision among prosthetic or autogenous reconstruction is contingent on numerous factors [3]. There are many available surgical options, however, for large deficiencies, regional as well as local flaps are defi-

nitely not cosmetically ideal. Checking the area that was operated on for additional relapse is challenging, due to the fact that the site will be buried [4]. For example, squamous cell cancers have metastatic potential, so periodic visual inspection of the oncologic defect is important [5]. Therefore, prosthesis use for extensive defects is suggested.

Patients requiring extensive midfacial prosthetic reconstruction will invariably have had previous radiotherapy, making placement and retention of implants more problematic and liable to fail [6]. Teichgraeber and Goepfert recommended a 2-year wait before any surgical reconstruction because the cancer recurred in 45 of 147 patients (30.6%), and two-thirds of all recurrences were seen within 2 years. Also, the complexity of the nose makes surgical reconstruction difficult [7]. Multiple surgical reconstructive procedures are needed to achieve an acceptable looking nose, and postoperative radiation therapy can delay wound healing and increase the risk of flap complications [8-10].

Prosthetic rehabilitation can be an attractive alternative to the surgical reconstruction of the nose. Since the advent of endosseous dental implants, patients have shown great acceptance of oral-nasal prostheses, with excellent recovery of oral and nasal function; the prosthodontics community has also shown satisfaction with such prostheses [11].

This clinical report explains a facial and intraoral prosthetic rehabilitation of a patient who initially presented with squamous cell carcinoma of the nasal septum, floor, lateral wall, vestibule, and maxilla. He underwent a total rhinectomy, anterior partial maxillectomy, local excision of the upper lip, split thickness graft, and full-mouth extraction. He was then treated with concurrent radiation and chemotherapy.

Case Presentation

A 47-years-old fully edentulous man was referred to Oral and Maxillofacial Prosthodontics Department of Tehran University of Medical Sciences for facial and intraoral prosthetic rehabilitation. The patient was formerly treated with chemotherapy, anterior partial maxillectomy, radical radiotherapy, as well as a total rhinectomy as parts of his squamous cell carcinoma treatment (Figure 1).

The patient needed a nasal and an obturator prostheses because of the surgical defects. Prosthetic rehabilitation with different retention methods (adhesives, implants and magnets) was recommended and the pros and cons were carefully described for the patient. Due to the financial concerns of the patient, the selected treatment plan was adhesive retained medical-grade silicon nasal prosthesis, manufactured with an acrylic resin base to embed magnets in combination with a magnet containing maxillary definitive acrylic obturator for the edentulous upper jaw and a conventional complete denture for the lower jaw.

Denture design and placement

Preliminary intraoral impressions were made with irreversible hydrocolloid for the fabrication of custom trays. At the patient's next appointment the maxillary and mandibular custom trays were evaluated clinically, and green modeling plastic impression compound (Kerr Impression Compound; Kerr Corp, California, USA) was used for recording the functional borders of the vestibules. For the intraoral defect in the anterior region of the maxilla, special attention was paid to record the limited movements of the remaining tissue of the upper lip. Final impression was made with zinc oxide eugenol (Cavex Holland BV, Haarlem, Netherlands).

Record bases were placed in the mouth and adjusted to accommodate the patient's anatomy. The occlusal rims were adjusted according to the vertical dimension of occlusion of the patient, esthetics, and phonetics, while surgical scars of upper lip confined adequate lip support. There cording of the maxillomandibular relation was done in an upright position with polyvinyl siloxane occlusal registration material. A mold guide (Blue Line; Ivoclar Vivadent Inc, Schaan, Liechtenłstein) was then used to select the appropriate denture teeth and arrange them in lingualized occlusion. Once the denture teeth were tried and approved, they were processed using heat-polymerized polymethyl methacrylate (Lucitone 199; Dentsply Intl, Pennsylvania, USA). A vertical acrylic process formed in the defect area of the maxillary master cast during muffling, was later used for embedding the magnets. At the patient's next appointment, the maxillary and mandibular dentures were delivered. The vertical process was projected to the base of nasal cavity and it was carefully adjusted until the patient was comfortable with the new prostheses. (Figure 2) After 24 hours recall, the design and fabrication of the nasal prosthesis began.

Nasal prosthesis fabrication procedure

The impressed area was circumscribed in order to attain the defect impression. Before making the defin-

itive impression of the nasal defect and surrounding tissues, undesirable undercuts were blocked out with damp gauze, vaseline was applied to eyebrows and eyelashes and the patient was instructed to breathe through his mouth during the whole impression procedure.

While the maxillary obturator was placed in the mouth of the patient, The Medium body polyvinyl siloxane obtained the facial expression as help for the light body impression material; the use of wooden sticks (Dalian Good wood Medical Care Ltd, Liaoning, China) was done for additional support to avoid impression distortion.

A self-curing acrylic resin base plate was formed against the vertical process of the maxillary obturator over the definitive cast with the aim of embedding the magnets. This acrylic base plate was later become the back section of the silicon prosthesis. On the plaster model, a wax pattern shaped like a nose was sculpted. The mold was adequately adjusted to the morphology of the face, consulting with the patient and his photographs. The wax pattern was located and tested on the patient's faceand the marginal contours were adapted. Two shallow depressions where sculpted on the lateral surfaces of the wax pattern as seating bases for eyeglasses.

Once the fit and the esthetics had been optimized and confirmed, for the base of the muffle, type III plaster was used. Once the plaster was set, and was able to place the counter-muffle and incorporate type IV plaster (Vel-mix, Kerr corp., California, USA), two layers of plaster-acrylic separator were applied. The muffle was put in a press and taken to a pot of boiling water and boiled for about 15 min, after the muffle plaster set. Then, the press was removed and the muffle was released so the molten wax could pour out. Additional detergent with hot water was used, and the two muffle counterparts were brushed by using a plastic bristle. With the presence of the patient, color of skin and characteristics as well as moles and discolorations of the face were duplicated using intrinsic colors (Functional Intrinsic II, Factor II Inc., AZ, USA). The selected silicon mixture (Platinum RTV Silicon Elastomer, Factor II Inc., AZ, USA) was inserted into a syringe, injected into the mold and the achievement of intrinsic characterization was done by using synthetic fibers, which imitates the essential skin tone. In accordance to the area that needed to be replicated, different shades were made, to be put in place later according to the preferred effect.

The muffle was then closed joining both counter-sections and taken to a 350-400 kg pressure hydraulic press to then be left to vulcanize for 24 h. In order to trim and continue with extrinsic characterization, the silicon prosthesis was retrieved. The use of acrylic monomer as well as oil paints undertook this characterization to dilute. By use of brushes, they were painted on the prosthesis to deliver the specifics of the patient's skin color. Finally, when the prosthesis color was considered satisfactory, to seal the used color and prevent color fading a layer of medical grade silicon (Xylene) was used.

On the day of delivery, magnets (MPMS, Factor II Inc., AZ, USA) were directly attached to the acrylic base of the nasal prosthesis and also the vertical process of the maxillary obturator. Water-based adhesive (Daro Adhesive Extra Strength; Factor II Inc., AZ, USA) was used for edge retention. Light-weighted eyeglasses which had been carefully chosen to cover the margins of the nasal prosthesis were applied over the previously formed nasal depressions. An artificial mustache, designed and dyed according to the patient's preference, was also attached to the upper lip of the patient in order to compensate for the reduced upper lip support and to camouflage the surgical scars (Figure 3).

The retention offered by the magnets, adhesive and the eyeglasses was sufficient in retaining prosthesis; therefore no additional retention method was used. Three months after prosthesis delivery, the patient reported improved mastication, speech, and deglutition and he was satisfied with the overall appearance (Figure 4).

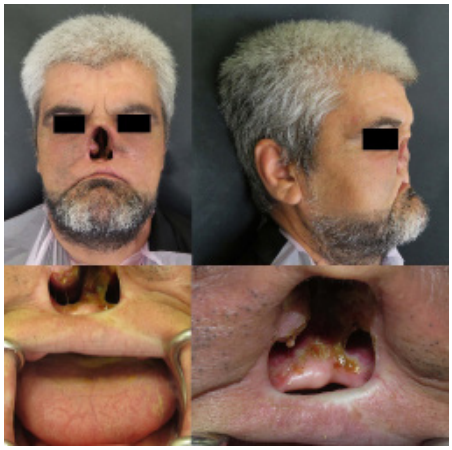

Figure 1. Patient's Facial Appearance and Surgical Defects.

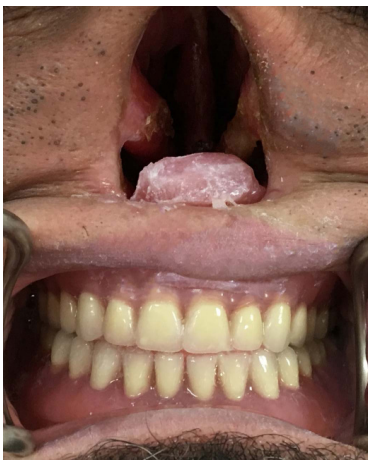

Figure 2. Definitive Obturator Prosthesis.

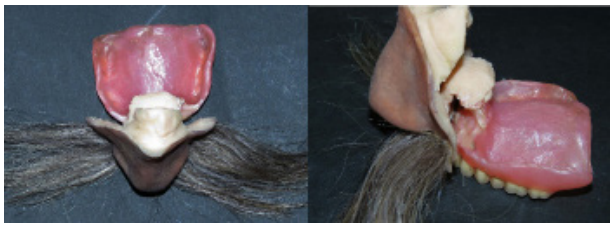

Figure 3. Intraoral Obturator and Nasal Prostheses Attached By Magnets.

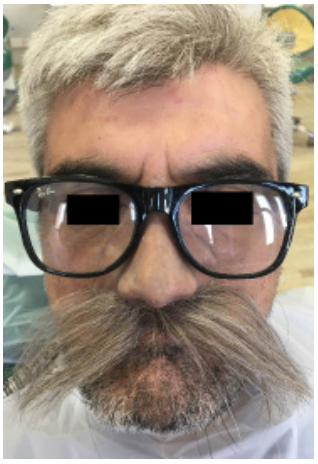

Figure 4. Delivery of the Intraoral Definitive Obturator and Magnet-retained Nasal Prostheses.

Discussion

Deciding whether to choose prosthetic rehabilitation or surgical techniques are what patients are faced with during their treatment. The probability for a more satisfactory surgical nose reconstruction is imminent, with the initiation of micro-vascular surgical techniques. Nonetheless, the difficulty of its anatomical configuration as well as the obvious position of the nose renders surgical reconstruction extremely difficult. Although, a prosthesis has its own problems, such as risk of infection of the implants [3], the necessity of permanent maintenance, as well as the perception of the synthetic body part by the patient [12]. When the defects are of a great size, the prosthetic alternative for nasal deficiencies is more practical, in maxillofacial rehabilitation. In addition, when financial aspects are considered, it becomes an ideal option. For the rehabilitation of midfacial defects, Nadeau described an intraoral-extraoral combination prosthesis with magnets [13]. However, it needs to be stated that adhesive retained prostheses aren't the ideal option for rehabilitation. There is always a concern about moving prosthesis while oral functioning in these types of prostheses [5,13]. This clinical report describes how these challenges were addressed in the fabrication of a magnet retained oral-nasal prosthesis for a patient with midline midfacial and anterior maxillary defects. In the patient described, maxillary endosseous dental implants with good anterior-posterior spread would have been ideal for support and retention, however the overall patients acceptance was good and patient was totally satisfied with function and esthetic. Because of the magnetic attachment, patient could easily orient the prosthesis and with a minimum use of medical adhesives,hygiene, ease of care and extended life of prosthesis was achieved.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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