CASE REPORT

Prosthetic rehabilitation of a patient with adenoid cystic carcinoma with continuous orbital-maxillary defect

Satheesh B Haralur,¹ Farhan K Shah²

¹Department of Prosthodontics, College of Dentistry, King Khalid University, Abha, Assir, Saudi Arabia

²Department of Prosthodontics, Umea University, Umea, Sweden

Correspondence to

Dr Satheesh B Haralur,
hb_satheesh@yahoo.com

SUMMARY

Extensive head and neck surgical procedures severely affect vital functions, physical appearance and lead to huge psychological trauma in the patients. Well-constructed maxillofacial prosthesis will help them lead a normal social life for the remaining precious time. This case report explains the prosthetic rehabilitation of continuous orbital-maxillary surgical defect in a patient with adenoid cystic carcinoma with restricted mouth opening. Maxillofacial prosthesis needs individual modification to a treatment plan according to the defect and existing clinical conditions. In this case, magnetically retained three-piece prosthesis was designed because of high recurrence rate of the adenoid cystic carcinoma, lack of adequate bone for implants and limited mouth opening in the patient. The prosthesis restored the phonetics, aesthetics and deglutition of the patient by re-establishing the separation of oral–nasal–orbital cavities.

BACKGROUND

Adenoid cystic carcinoma, though a rare type of malignancy, is the third most common salivary malignancy tumour.¹ The tumour has the tendency of spreading through peri-neural invasion, which makes the surgical resection more extensive and complicated.² It is also known for its high incidence of recurrence,³ and the expected survival period is reported to be longer.⁴ Surgical resection of orofacial tumour is extremely debilitating in nature because of its deep psychological impact in addition to oral disabilities. Vital functions like speaking, eating and swallowing are severely affected. Acquired surgical defect if it involves an eye; it is not only detrimental to vision but also causes a significant emotional problem.⁵ Good physical appearance has a direct bearing on the self-esteem of an individual and eventually to his social acceptance.⁶ Maxillofacial prosthetic treatment is an attempt to restore the aesthetic and functional abilities, enabling a patient to lead healthy social life.

Treatment plan is influenced by recurrence patterns and prognostic factors of carcinoma, physical health and economic condition of the patient. Extensive head and neck surgical procedures result in severe restricted mouth opening, making impression and prosthesis fabrication procedures more complicated. If clinical conditions are not favourable for osseous-integrated implants, orbital prosthesis retained with obturator through a magnet or button is advantageous.⁷

Figure 1 Patient's photo showing facial defect.

This case report describes prosthetic rehabilitation of a patient with total maxillectomy and orbital enucleation by magnetically integrated orbital–obturator prosthesis.

CASE PRESENTATION

A 40-year-old woman was referred to the Department of Prosthodontics, SDM College of Dental Science and Research Centre, Dharwad, India, for prosthetic rehabilitation of the continuous orbital-maxillary defect. The patient had undergone surgical resection of adenoid cystic carcinoma in left posterolateral portion of a hard palate before 3 months. Examination of the post-surgical defects revealed total maxillectomy along midline, involving hard palate and zygomatic arch on the left side. Tumour invasion resulted in orbital enucleation with periorbital bone resection on the affected side. The operative defect caused the direct communications of the oral, nasal and orbital cavities (figures 1 and 2). Ablative surgical

Figure 2 Intraoral view of the maxillary defect.

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procedures included the periorbital and zygomatic bones; it resulted in facial asymmetry and restricted mouth opening. Patient was partially dentate with all teeth distal to canine missing on the left side. Patient had multiple complaints ranging from difficulty in speech, mastication and regurgitation of food into nasal cavity. She showed the signs of social appearance anxiety. Various treatment options were explored in consultation with patient and her family members. Lack of adequate remaining bone on operated side, recurrence pattern of carcinoma and adverse financial condition of the patient were not favourable for implant-retained prosthesis.

After duly evaluating the factors concerning malignancy and patient, it was decided to rehabilitate the patient with magnetically retained three-segment orbital-obturator-palatal prosthesis. The selected segmental maxillofacial prosthesis was to facilitate the prosthesis fabrication, easy insertion and maintenance of the prosthesis. The patient was educated about the procedures, limitation and post-treatment follow-up of the prosthesis.

TREATMENT

The prosthetic treatment objectives were to address the aesthetic and functional disability concerns of the patient. Prosthesis consisted of palatal, obturator and orbital segments; they were fabricated in three separate stages.

Impression and working cast preparation

Oral prophylaxis and evaluation of remaining teeth for carious lesion was carried out.

Impression of a maxillary defect was made in irreversible hydrocolloid (Zelgan, Dentsply India Ltd) over a modified stainless stock tray. Impression was accomplished in two stages to record all parts of the defect (figure 3). The impression was boxed and poured in type-III dental stone (Kala Stone, Kala Bhai Pvt Ltd, Mumbai, India). The resulted cast was duplicated in silicone material (Wirosil Bego Dental, Bremen Germany); working cast for the defect area was prepared by pouring silicone mould in type-IV dental stone (KAL Rock, Kalabai, Mumbai, India).

Fabrication of obturator and palatal portion

Hollow silicone obturator was selected because of its multiple advantages like reduced weight, enhanced retention by engaging defect undercuts and patient comfort in handling the prosthesis.

Working cast was indexed with gypsum plaster base and sectioned into two halves in the centre of the defect (figure 4). Heat-cured silicone hollow bulb (Molloplast B, Buffalo Dental Manufacturing Co., Inc, Syosset New York, USA) was fabricated by a routine method. Retentive rim was included in the

Figure 4 Sectioned working cast with plaster base indexing.

obturator floor to mechanically engage palatal portion of the prosthesis. Obturator was tried in the patient mouth for retention, stability and comfort. Silicone hollow obturator was returned to master cast and palatal portion of the obturator was waxed up. Arbitrary palatal contour wax up and occlusal rim was prepared with base plate wax, and wrought wires are incorporated to enhance the retention of an obturator by engaging the remaining teeth. Finalised palatal wax up was fabricated in heat polymerised acrylic resin taking extreme care to engage the retentive rim prepared in the hollow silicone bulb (figure 5).

Both segments of the obturator were inserted in the patient mouth, retention and stability of an obturator during function was evaluated. Palate contour was refined with pressure indicating paste according to the tongue contact, speech and deglutition. Try in stage was also utilised to mark most postero-superior portion of obturator bulb to incorporate neodymium-iron-boron (I Power Solutions, Chennai, India). Magnets were incorporated to the obturator bulb with the help of self-cure acrylic resin in the predetermined area (figure 6).

Fabrication of orbital prosthesis

Facial moulage was prepared with irreversible hydrocolloid after reinforcing it with gauze pieces and type II gypsum. Impression was poured in type III gypsum stone; working cast of the orbital defective area was obtained by duplicating the mater cast from silicone material.

Customised ocular prosthesis was fabricated in standard method taking care to replicate pupil-iris size, colour and sclera

Figure 3 Irreversible hydrocolloid impression of the maxillary defect.

Figure 5 Obturator and palate portions with mechanical retentive feature.

Figure 6 Obturator with magnet for orientation of orbital magnet.

shape of the contralateral eye (figure 7). Patient was asked to sit upright, look straight at the object 3 ft away and distance between the centre of pupil-facial midline and inner canthus of an eye to the nasal bridge were recorded. Ocular prosthesis orientation was refined on the working cast with the help of recorded facial measurement. Missing anatomical structures like eye lids and adjoining skin area was sculpted in the wax. Neodymium-iron-boron magnet was incorporated in the most postero-inferior part of an orbital defect in correspondence with magnet on an obturator. Completed wax pattern was tried on the patient face for final evaluation of ocular orientation gaze, eyelid aperture, prosthesis margin fit and magnet position (figure 8).

Patient opinion on the aesthetic acceptability of the orbital prosthesis was taken. Sprue was attached to the iris region to maintain the ocular orientation in the prosthesis before flasking the wax pattern. The finalised wax pattern was flased, and the mould was prepared in a conventional method. A-330-G Platinum Primer was used to enhance bonding between ocular and orbital portion of a prosthesis. Silicone (A-2009 Platinum Silicone Elastomer, Factor II, Lakeside, Arizona, USA) was packed and polymerised as per the manufacturer's instruction. The residual flush after polymerisation was trimmed by a scalpel and finished with an abrasive stone (figure 9).

Processed orbital prosthesis was cleaned and washed with mild detergent, tried on the patient for evaluation of colour, fit and aesthetic parameters. Spectacle with suitable frame size was given to the patient to hide the prosthesis margin (figure 10).

Figure 7 Flasked customised ocular prosthesis.

Figure 8 Wax orbital prosthesis try in.

Patient was educated about prosthesis insertion, removal, maintenance and tissue hygiene procedures.

OUTCOME AND FOLLOW-UP

The prosthesis was found to be retained well with an effective seal during function. The patient's speech, swallowing and masticatory efficiencies were significantly improved after prosthetic rehabilitation. Patient was trained to insert, stabilise in position and also to remove the facial and obturator prosthesis. The importance of prosthesis hygiene and removal of the prosthesis during sleep was conveyed to the patient.

Follow-up evaluation was done for once in a week for 2 months, and the patient was satisfied with the aesthetic and functional improvement from the prosthesis.

DISCUSSION

The major goal of maxillo-facial prosthesis is not just the restoration of orofacial defect, but to enable the patient to lead normal social life.⁸ Large postsurgical defect combined with loss of orbit and limited mouth opening made prosthetic rehabilitation of the patient clinically challenging procedure.

Aesthetics and retention of a prosthesis play a vital role during selection of treatment plan and design of the prosthesis. Selected design should adequately retain the prosthesis during

Figure 9 Final prosthesis with all three segments.

Figure 10 Final prosthesis on the patient's face.

functional movements, and these retentive features should not negatively affect the aesthetics. In the present case, retention and stability of the prosthesis were adversely affected because of the lack of anatomical undercuts, large prosthesis size and heavy weight. Ideally, osseous-integrated implant-retained maxillofacial prosthesis is preferred. Alternatively, anatomic undercuts, magnets, adhesives and spectacle, etc are routinely utilised for retention of extra oral prosthesis.^{9–10} Magnetically retained sectional prosthesis was selected for the patient after considering the factors like high recurrence rate of tumour, lack of adequate bone in adjacent structure and poor economic condition.^{11–13} This design in addition to its lower cost, it also provided the opportunity to carry out the follow-up surgery in case of tumour recurrence.

Regular removal of the prosthesis is critical for hygiene of the prosthesis and for the remaining tissue health. A case was considered to fabricate a three piece prosthesis separately because of restricted mouth opening and compromised neuromuscular control in the patient. This design was helpful for the execution of prosthesis fabrication procedures as well as easy prosthesis manoeuvrability by the patient.

Retention of the prosthesis is usually compromised in large midfacial defect because of increased weight of the prosthesis. In addition to its reduced weight, silicone hollow bulb was helpful in engaging available anatomical undercuts. Silicone has good biocompatibility with better marginal adaption and life-like appearance; hence, it was a material of choice for fabrication of a facial prosthesis.¹⁴

Orbital prosthesis with direct communication with oral cavity is susceptible for dislodge during mastication and sneezing. Lack of anatomical undercut in the orbital defect was overcome by integrating an orbital prosthesis to the obturator through magnets.

Palatal section of the prosthesis was devoid of heavy occlusal contact except the light contact on the second molar area. This contact provided the support for the prosthesis and reduced downward movement of the prosthesis during function.¹⁵

Normal occlusal contacts were avoided to eliminate the mobility of an orbital prosthesis during mastication and deglutition.

Learning points

- ▶ Well-made maxillofacial prosthesis efficiently restores the vital functions like mastication and phonetics in addition to aesthetic recovery.
- ▶ Postsurgical management of a patient with cancer does not end with the elimination of disease, but continues with functional, aesthetic and psychological rehabilitation.
- ▶ Prognosis factors and recurrence pattern of the carcinoma should be carefully considered during treatment plan and prosthesis design.

Competing interests None.

Patient consent Obtained.

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