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ORIGINAL ARTICLE

Rehabilitation of a Maxillectomy Case with Telescopic Crowns: A Case Report

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Abstract Prosthodontic rehabilitation of acquired defects of the maxilla is a challenge in terms of reestablishing oronasal separation. Most of the times these goals are met by means of obturator prosthesis. Preservation of the remaining hard and soft tissues in such patients is very much essential in order to have a good retention, stability and support for the prosthesis. It is very much imperative to fabricate a prosthesis to provide proper function to the patient. Various techniques have been developed to enhance the retention and stability of the prosthesis, some of them being extension of the obturator bulb into the undercuts within the defect, use of magnets, implants etc. Telescopic crowns have been an adjunctive utility to prosthetic dentistry since a very long time. The biomechanics of telescopic crowns aid in providing a good retention and stability to the prosthesis. In the following clinical report a patient with a status of Subtotal Hemi Maxillectomy is presented in whom telescopic copings were incorporated into the cast hollow bulb obturator to enhance the retention and stability of the prosthesis.

Keywords Maxillectomy · Telescopic copings · Hollow bulb obturator · Surveying · Milling

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Introduction

Defects of the maxilla may result from trauma, disease, pathological changes, or follow surgical resection of oral neoplasm. Maxillectomy defects result in the formation of an opening between the oral cavity and the antrum and or the nasopharynx. This results in problems with speech, mastication, swallowing and impaired facial esthetics [1]. Rehabilitation is important, as such functional impairments have a detrimental effect on quality of life and self-esteem [2]. Although there have been advances in plastic surgery, surgical reconstruction of Maxillectomy defects continues to be challenging, unpredictable and not always possible either due to local or systemic reasons. Rehabilitation of the Maxillectomy defect has been well defined by prosthodontists and surgeons [3]. The primary goal of prosthetic obturation is closure of the Maxillectomy defect and separation of the oral cavity from the sino-nasal cavities. Patients may prefer to avoid secondary morbidity from reconstructive procedures. In such patients obturator prosthesis can reestablish the separation of the oral cavity from the sino-nasal cavities, restoring speech and swallowing function. In dentate patients support, stability and retention of such an obturating removable prosthesis relies on the remaining hard and soft tissues [4]. The larger the surgical resection, the greater the loss of mucogingival support, which in turn results in increased unfavorable forces acting on the remaining abutment teeth. The limited amount of

remaining maxillary bone following Maxillectomy is a major cause for the preservation of the remaining hard and soft tissues so as to improve the stability and retention of the prosthesis. It has been a challenge to the prosthodontists in rehabilitation of Maxillectomy patients. The design of the prosthesis for better function should be the primary goal because the main problem encountered is the stability, retention and support of the prosthesis which can be enhanced by proper design of the prosthesis. Accurate impression of the defect site, utilization of the undercuts, use of magnets, telescopic crowns, osseointegrated implants has been utilized to overcome the problems. This clinical report demonstrates the use of telescopic crowns incorporated into the obturator to improve the retention and stability of the prosthesis [5].

Case Report

A 55 year old man reported to the Department of Prosthodontics, Army Dental Centre (R&R), Delhi Cantt with difficulty in chewing, nasal leakage of fluids and improper speech. His medical history revealed that the patient had been operated for "Squamous cell carcinoma" of left maxilla 1 year back and rehabilitated with a surgical obturator and 2 weeks after the operation he was rehabilitated with an interim obturator. The patient was subjected to radiotherapy and chemotherapy. After a span of 6 months the patient revisited the dental centre seeking definitive rehabilitation. Intra oral examination revealed an existing surgical defect with adequate healing and the presence of a few remaining natural teeth (Fig. 1). There were no natural teeth remaining in the mandibular arch. Treatment plan was formulated for obturator prosthesis for the maxillary arch and mandibular complete denture.

Treatment plan: Obturator prosthesis for the maxillary arch and mandibular complete denture was planned.

The teeth present in the maxillary arch were 11, 12, 13, 14, 15 and 16 of which 11, 12 and 16 were periodontally compromised with Grade III mobility that could not be retained and hence were extracted. 13, 14 and 15 were also periodontally compromised with Grade I to Grade II mobility. The preservation of the remaining hard and soft tissues is important for the stability and retention of the prosthesis [6] thus 13, 14 and 15 were retained. These three teeth were endodontically treated pre and post operative radiographs were taken (Fig. 2, 3). The crowns were sectioned at the level of middle 1/3rd to get a favorable crown root ratio and decrease the mobility of the teeth. The teeth were prepared with a shoulder margin (Fig. 4). A sectional impression was made using addition silicone elastomeric impression material and primary copings (casted with Wironit LA, Co–Cr alloy, Bego Co) having shoulder

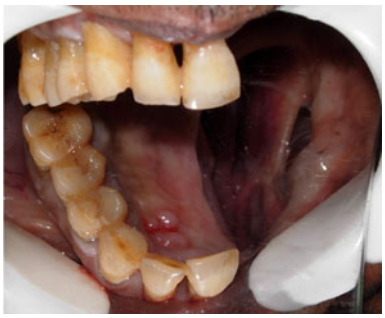

Fig. 1 Pre-operative intraoral

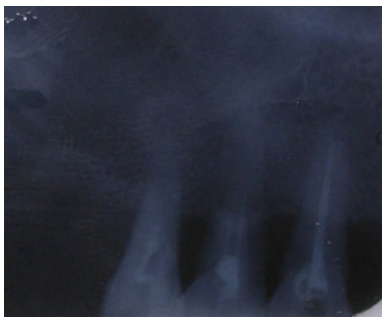

Fig. 2 Pre-op IOPA radiograph of retained teeth for telescopic copings

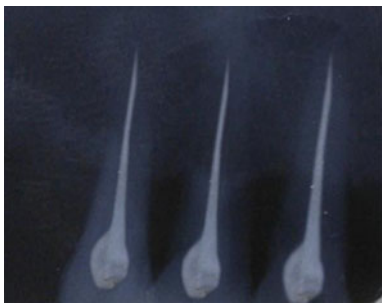

Fig. 3 Post-op IOPA radiograph of RCT treated teeth for telescopic copings

Fig. 4 Teeth prepared with shoulder margins for telescopic copings

Fig. 5 Primary copings try in

Fig. 6 Primary and secondary telescopic copings fabricated

margins were fabricated (Fig. 5). The primary copings were milled on a surveyor to attain parallelism between three copings. Secondary telescopic copings were fabricated over the milled primary copings (Fig. 6). The primary copings were luted in the patient's mouth and a secondary impression of the maxillary arch was made using addition silicone elastomeric impression material and the master cast obtained by pouring with dental stone. The maxillary cast was blocked out and duplicated using agar–agar duplicating material. A refractory cast was obtained by pouring with phosphate bonded investment material. Wax pattern was fabricated over the refractory cast. The wax pattern was invested and cast with chromium cobalt alloy to obtain a chromium–cobalt palatal plate.

The chromium cobalt plate was placed on the master cast and a two stage wax up was done (wax up of the defect site on the master cast, and wax up of the lid portion separately) for the fabrication of a closed hollow bulb obturator.

The primary copings were cemented in the patient's mouth and then the secondary copings were placed on the primary copings by means of mechanical interlock that is present because of the parallelism between primary copings. The telescopic copings were picked up into the obturator prosthesis using autopolymerizing resin so that the telescopic copings are incorporated into the obturator prosthesis (Fig. 7). Telescopic copings increases the retention and stability of the obturator prosthesis.

Fig. 7 Secondary copings picked up into the obturator using autopolymerizing resin

An initial impression followed by border molding and secondary impression using selective pressure technique was made of the edentulous mandibular ridge and a master cast of mandibular ridge obtained. An acrylic denture base was fabricated for the mandibular edentulous ridge.

Occlusal rims were fabricated for both maxillary and mandibular denture bases and maxillo-mandibular relations were recorded and transferred to a semi adjustable articulator. Teeth arrangement was done using semi anatomic teeth and a bilateral balanced occlusion was achieved. Try in of the dentures were carried out. The dentures were acrylised using heat cure methyl methacrylate resin in a long curing cycle finished, polished and inserted (Fig. 8). Occlusion was checked and verified. Post insertion instructions were given to the patient and the patient was recalled after 1 week for follow up. The patient was comfortably consuming soft and liquid diet and there were no complaints of any nasal regurgitation, dislodgement of the prosthesis or any difficulty in speech. The obturator was adjusted to the point where the patient could produce a clear "p" and a sustained "f", "s" sound without emission of air through the nose, as well as understandable nasal consonant sounds, such as "m". The sustained pressure required for the "s" phoneme is a reliable method of

Fig. 8 Post operative extraoral after obturator insertion

evaluating the effectiveness of the obturator. Whereas greater intraoral pressure is required for stop-plosives, such as "p", the sustained pressure required for stop-plosives, such as "p", the sustained pressure required for "s" mitigates the compensatory elevation of the tongue to assist with closure. The patient proved positive to all these tests (Comparative oral and nasal air flow measurements, and oral and nasal endoscopy, will aid in assessing the perceived resonance balance. Nasal endoscopy, especially, can be very helpful, as this instrument does not interfere with speech. Larger openings can be visualized through the scope, while the bubbling of mucous may indicate smaller openings that require correction). There was no nasal regurgitation when the patient was asked to sip fluids nor any bubble formation on the posterior border of the obturator. Further recall appointments were performed at 1, 3, 6 months and 1 year following prosthesis insertion. No complications were detected and the abutment teeth supporting the telescopic copings were healthy and excellent oral hygiene was maintained by the patient.

Discussion

Rehabilitation with obturator prosthesis was the first line of treatment for this patient. Investigations have confirmed the effectiveness of obturator prostheses in terms of speech, masticatory function, swallowing and appearance [3]. There is evidence that speech can be restored to a preoperative level with maxillary obturator prosthesis [7]. Nasalance values are markedly influenced by the extent of resection and by the degree of the soft palate involvement.

According to the Aramany classification of defects the presented defect situation corresponds to a Class I (resection performed along the palatal midline) [8]. In this patient there were very few teeth present which were periodontally compromised. The teeth which had poor prognosis were extracted; the remaining teeth were retained over which telescopic copings were fabricated. The telescopic copings offer maximum stability, support. The biomechanics of telescopic crowns namely the conical taper, milling of the crowns to achieve parallelism and the clearance for rotation offered more frictional retention and greater stability for the prosthesis. The disadvantages of this type of attachment are the loss of tooth substance during preparation and possible overcontouring of the crown. Despite these disadvantages, the telescopic-crown technique is well established and has good long term performance. A study comparing clasp-retained removable partial dentures to telescopic crown retained dentures showed a higher rate of abutment tooth loss and failure for clasp retained dentures [9]. Technical problems associated with telescopic crowns are primarily related to loss of cementation of the inner crowns [10]. The traditional alternative would have been to use conventional clasps and rests to retain the obturator in place and to neutralize adverse cantilever forces. Such a design would have been more plaque retentive, thus increasing the risk of caries and further periodontal breakdown. Recent advances in the form of placement of zygomatic implants in the defect site for additional retention have been reported but no long term studies of zygomatic implants is yet available. Hence a more favorable prosthesis was planned taking the support of the remaining natural teeth with telescopic crowns.

Conclusion

The situation presented demonstrates the treatment of the patient with a maxillary defect by a closed hollow bulb obturator prosthesis retained by telescopic crowns. The telescopic system provides suitable abutments for the prosthesis even when the remaining teeth are compromised. This option provides additional support and retention to a conventional obturator and renders such a procedure beneficial to the patient.

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