

Prosthetic Rehabilitation of Maxillectomy Patient with Hollow Flange Telescopic Denture: A Case Report

Anirbit Ray^{1*} Purnendu Bhusan² Anjana Raut³ Sadananda Hota⁴ Arun Kharavela Mohanty⁵

¹Post Graduate Student, Department of Prosthodontics, Kalinga Institute of Dental Sciences, Bhubaneswar, Odisha, India.

²Senior Lecturer, Department of Prosthodontics, Kalinga Institute of Dental Sciences, Bhubaneswar, Odisha, India.

³Reader, Department of Prosthodontics, Kalinga Institute of Dental Sciences, Bhubaneswar, Odisha, India.

⁴Reader, Department of Prosthodontics, Kalinga Institute of Dental Sciences, Bhubaneswar, Odisha, India.

⁵Senior Lecturer, Department of Prosthodontics, Kalinga Institute of Dental Sciences, Bhubaneswar, Odisha, India.

ABSTRACT

Background: Prosthodontic rehabilitation of acquired defects of the maxilla is a challenge in terms of reestablishing oronasal separation. 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. 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 subtotal hemi maxillectomy is presented in whom telescopic copings were incorporated into the cast hollow flange obturator to enhance the retention and stability of the prosthesis. With telescopic dentures, the insertion and removal is much easier for the patient. The aesthetic enhancement and functional rigidity provided by telescopic retainers are favourable features to many challenging clinical situations. Telescopic denture has the benefit of secure attachment and increased bearer confidence.

Keywords: Hollow flange, Telescopic denture, Telescopic retainer, DMLS.

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 esthetics¹.

Rehabilitation is important, as such functional impairments have a detrimental effect on quality of life and self-esteem². 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 surgeons³. 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 tissues⁴. 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. The retention of partial denture prosthesis in rehabilitation of maxillectomy patient has been an enigma for prosthodontists and

Received: Jan. 11, 2018; Accepted: Feb. 26, 2018

*Correspondence Dr. Anirbit Ray.

Department of Prosthodontics, Kalinga Institute of Dental Sciences, Bhubaneswar, Odisha, India.

Email: anirbitray25@gmail.com

patients. The partially edentulous maxillofacial patient, in whom there is extensive loss of bone, undergone extensive surgery for tumour, in such a gross jaw defect, a partial denture would be unmanageable, but a prosthesis stabilized by the remaining teeth would be functionally adequate. Telescopic crowns were introduced in the 20th century. Telescopic refers to the use of a primary full coverage casting luted to the prepared tooth with a secondary casting, which is part of denture framework and is connected by means of interfacial surface tension over the primary casting⁵. Telescopic crowns have proven more effective than other direct retainers. Their degree of retention can be planned to suit different situations by modifying the design⁶. Telescopic crowns are used to retain partial dentures. They provide the best possible force distribution to the abutment teeth and can improve patients oral health-related quality of life^{7,8}. The weight of the maxillary prosthesis often caused the prosthesis to act as a cantilever⁹. The development of hollow flange or hollow bulb obturator prosthesis to overcome this problem. In the present case, a Aramany¹⁰ class IV maxillectomy defect was treated with a hollow flange complex partial denture incorporating telescopic crowns to improve the retention and stability of the prosthesis.

CASE REPORT

A 63 year old female was referred to the Department of Prosthodontics, Kalinga institute of Dental sciences, Bhubaneswar, for prosthetic rehabilitation. Her primary concerns were poor facial appearance, restricted mouth opening and inability to chew food. Past medical history revealed that, she underwent maxillectomy as a treatment plan for fungal osteomyelitis of the left side of maxilla. On extra-oral examination, the patient had a collapsed midface and an inappropriate facial contour [Fig. 1 & Fig. 2 (A),(B)] with restricted mouth opening.

Intraoral examination revealed an existing surgical defect with adequate healing and the presence of a few remaining natural teeth in maxillary arch (Fig. 3). Natural dentition were present in the mandibular arch. The teeth present in maxillary arch were 16, 17 and both were severely attrited. 16 was supraerupted and cervically abraded. A very

small or micro-maxilla with bilaterally vestibular defect was present. The mandibular anteriors had generalized attrition. Maxillary and mandibular irreversible hydrocolloid [Zelgan Plus, Dentsply] impressions were made after blocking undercuts with petrolatum laden gauze. The impressions were poured with Type III dental stone. A custom made tray were prepared on the upper arch diagnostic model. The diagnostic models were mounted on a mean value articulator. A diagnostic surveying of the models was done and a complete radiographic survey was carried out. Considering her functional and esthetic requirements, a telescopic denture for maxillary arch was planned for the patient. Maxillary right first and second molar were used as telescopic retainers. Root canal treatments were performed on maxillary right first molar. Tooth preparation was done by preparing a shoulder finish line with a taper of approximately 6 degrees (Fig.4).

After the tooth preparation in the maxillary arch, gingival retraction was done and a final impression was made with addition silicone using the putty wash technique. The first master model was prepared from the impression for fabrication of the primary copings. The wax patterns were prepared for the primary copings on maxillary right permanent first molar and second molar. The primary copings were milled on a surveyor to attain parallelism between two copings.

The primary copings were evaluated for fit and the copings were luted with glass ionomer cement (Fig. 5). Border moulding was done using green stick compound over custom made tray. Definitive impression (Fig.6) was made using the medium viscosity addition silicone impression material. The second master model (Fig.7) was made and it was used for the fabrication of cast partial framework. Scanning of second master model was done and framework design has been developed with the help of CAD software. Metal framework fabrication was done with DMLS (Direct metal laser sintering) System [Fig.8(A),(B)]. Framework trial was done for fit in the oral cavity. After that occlusal rim was prepared on the framework and vertical dimension was established. Horizontal jaw relation was recorded and transferred to the articulator for the arrangement of artificial teeth. The trial denture was checked intraorally (Fig.9).



Fig 1: Pre-operative extraoral frontal view.



Fig 2(A,B): Pre-operative extraoral lateral view.



Fig 3: Pre-operative intraoral view.



Fig 4: Tooth preparation done for primary coping.

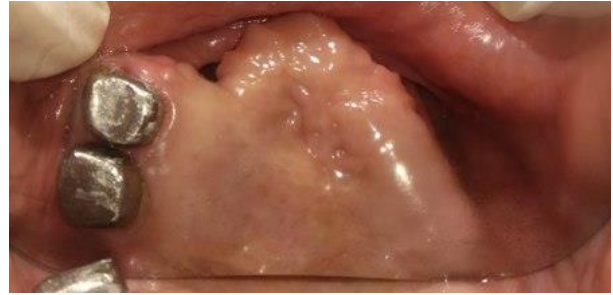


Fig 5: Cementation of primary copings.



Fig 6: Medium viscosity addition silicone impression was made for fabrication of metal framework.



Fig 7: Master model.



Fig 8(A): Metal framework with secondary coping

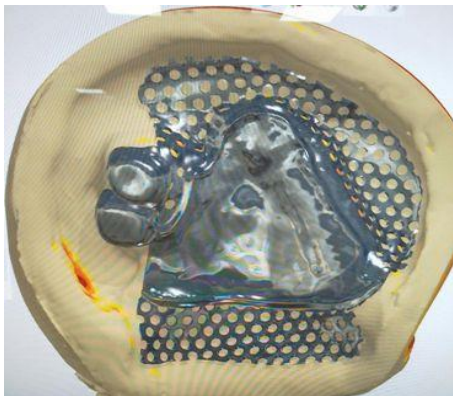


Fig 8: (B) DMLS CAD design with model cast.



Fig 9: Trial denture checked intraorally.



Fig 10: Two elevations of small acrylic resin were placed on the bulky portion of the prosthesis.



Fig 11: Hollow portion of the flange and acrylic lid.



Fig 12: Hollow flange telescopic denture.

Patients esthetics, function were verified followed by the processing of maxillary denture. After processing, two small elevations of acrylic were placed anteriorly on the heavy and bulky labial flange portion of the prosthesis for identifying the border area of heavy and bulky flange (Fig.10). A putty index of the external part of the bulky surface was made. A thin lid of autopolymerizing resin was made using that putty index.

After that, the bulky portion of the flange was marked using a marker and reduced excess acrylic with the help of acrylic trimming bur to made this portion hollow and decreased the total weight of

prosthesis (Fig.11). Then the acrylic lid was attached on to the hollow portion of the flange of the prosthesis as a roof. Then the two small elevations of acrylic were eliminated and polished the surface properly (Fig.12). Final prosthesis was inserted. On delivery, the prosthesis presented satisfactory occlusion, good retention and stability. The patient reported a feeling of comfort and satisfaction of her demands [Fig.13(A),(B),(C)]



(A)



(B)



(C)

Fig 13(A,B,C) : Post-operative extraoral [frontal(A) & lateral(B,C)] view after insertion of final prosthesis

DISCUSSION

Oral restoration based on a combination of telescopic dentures with hollow flange procedure represents one of highest levels of functional and esthetic therapy¹¹. Telescopic partial denture was chosen for the maxillary arch, because of its good retentive and stabilizing properties. The telescopic denture are mainly utilized for transmitting occlusal forces from artificial teeth to abutment teeth, devoid of applying deadly forces on the alveolar ridge. Furthermore, the added quality with telescopic RPD is proprioception because of periodontal fibers of over retained teeth which allow patients a sense of discernment to various senses similar to pressure, which is not

acknowledged by edentulous patients using dentures^{12,13}.

The neglected fact about the successful use of telescopic denture depends upon the effective completion and maintenance of endodontic treatment of abutment teeth. While considering the tooth for abutment, proper diagnosis of abutment tooth is very crucial, present periodontal status, radiographic examination, level of remaining bone, assessment of any systemic illness of patient, oral hygiene status and prognosis, all these fact are to be considered^{14,15}. The proper diagnosis and skillful endodontic treatment impart a great degree of success to the procedure. With telescopic dentures, the insertion and removal is much easier for the patient and thus improves the prognosis of the complex partial denture. This type of telescopic retainer provides guidance, support, and protection from dislodgement and it transfers bite forces along the long axis of the abutment teeth¹⁶.

Cleanliness, simplicity of construction, and light weight are very important considerations in the construction of any intraoral prosthesis. Great weight of the maxillary obturator interferes with its retention. The larger and heavier the obturator, the greater is its tendency to become dislodged as the result of cantilever action. Being light weight is the prominent advantage of the hollow obturator. According to Nidiffer and Shipmon,¹⁷ reduction in the weight of the obturator also makes the patient less conscious of the prosthesis. In this case, the anterior portion of the maxilla was depressed due to maxillectomy. So thick and bulky labial flange of the maxillary prosthesis provide better upper lip support and esthetics which also increased the overall weight of the prosthesis. This heavy and bulky portion of the prosthesis reduced the overall retention of the prosthesis. Removal of excess acrylic from the labial flange portion of the prosthesis and placed a acrylic lid on the hollow portion of the flange , improving overall retention of the telescopic denture without disturbing the facial contour of the patient.

CONCLUSION

The restoration of function and esthetics in the patients with gross defects of the oral cavity is a valuable and often dramatic service provided by the maxillofacial prosthodontist. Success of dental

prosthesis is greatly dependent on its ability to withstand the various forces acting on it. The residual tissues of the defect area help in counteracting these displacing forces, in addition to the properly designed components of the prosthesis. Telescopic crowns reduce the destructive horizontal and rotational occlusal forces by directing them more axially and less traumatically than other retainers. Depending on the amount and nature of the residual tissues, the retention and stability achieved in prosthesis could vary from optimum to maximum. In the present case, hollow flange of the prosthesis reduce the overall weight of the prosthesis which make the prosthesis more retentive. All the above ingenious methods have been utilized to its maximum, in restoring a partial maxillectomy defect. This improved retention and stability of the prosthesis will bring the patient many years of dental comfort and pleasure.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

REFERENCES

1. Taylor TD (2000) Clinical maxillofacial prosthetics. Quintessence, Chicago, pp 103–120
2. Rogers SN, Lowe D, McNally D, Brown JS, Vaughan ED. Health related quality of life of after Maxillectomy: a comparison between prosthetic obturation and free flap. J Oral Maxillofac Surg 2003; 61:174–181
3. Minsley GE, Warren DW, Hinton V. Physiologic responses to maxillary resection and subsequent obturation. J Prosthet Dent 1987; 57:338–344
4. Devlin H, Barker GR. Prosthetic rehabilitation of the edentulous patient requiring a partial maxillectomy. J Prosthet Dent 1992; 67:223–227
5. Weaver JD. Telescopic copings in restorative dentistry. J Prosthet Dent. 1989; 61 No 4:429-33.
6. Langer A. Telescopic retainers for removable partial dentures. J Prosthet Dent. 1981;45:37-43.
7. George O Isaccson. Telescopic crown retainers for removable partial denture. J Prosthet Dent. 1969;22:436-48.
8. Wostmann B, Balkenhol M, Kothe A, Ferger P. Dental impact on daily living of telescopic crown-retained dentures. Int J Prosthodont 2008; Sep-Oct 21:419-21.
9. El-Mahdy, A. S.: Processing a hollow bulb obturator. J prosthet dent 22:682, 1969.
10. Aramany A. Basic principles of obturator design for partially edentulous patients, Part 1. Classification J Prosthet Dent. 1978; 40:554-57.
11. Schwenzer N, Weber H. Operative correction and prosthodontics care in skeletal deformities of the face. Discussion and reports of typical cases. Intl J Adult Orthognath Surg 1988;3:155-64.
12. Wenz HJ, Hertrampf K, Lehmann KM. Clinical longevity of removable partial dentures retained by telescopic crowns: Outcome of the double crown with clearance fit. Int J Prosthodont 2001;14(3):207-13.
13. Dittmann B, Rammelsberg P. Survival of abutment teeth used for telescopic abutment retainers in removable partial dentures. Int J Prosthodont 2008;21(4):319-21.
14. Stanley HR. Management of the aging patient and the aging pulp. J Calif Dent Assoc 1977;5(3):62-4.
15. Goodis HE, Curtis D. Endodontic considerations when fabricating overdentures. Gerodontology 1990;9(1):25-8.
16. Beschnidt SM, Chitmongkolsuks, Prull R. Telescopic crown retained removable partial denture: Review and case report. Compend Contin Educ Dent. 2001;22: 927-34.
17. Nidiffer. T. J. and Shipmon T. J. The hollow bulb obturator for acquired palatal openings. J Prosthet dent 7: 125, 1957.