IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 18, Issue 12 Ser.10 (December. 2019), PP 50-54
www.iosrjournals.org

Fabrication of Cast metal Closed Hollow Bulb Obturator for Partial-maxillectomy Patient: A Case Report

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Abstract: *Maxillectomy defects can result in oroantral communication that causes difficulty in mastication, deglutition, impaired speech and facial disfigurement. The prosthodontist plays an important role in the rehabilitation of such defects with obturators. In this case report, we have fabricated definitive closed hollow bulb obturator for 54 year old male patient using thermoplastic resin sheet.This technique is simple, reduces laboratory time*
and is completely covered with heat-cured acrylic resin. Closed hollow obturator prosthesis helped in functional rehabilitation and improving quality of life of the patient

Keywords: *Cast metal Framework, Closed hollow bulb, Maxillectomy, Obturator*

Date of Submission: 11-12-2019 Date of Acceptance: 26-12-2019

I. Introduction

"It is the god given right of every human being to appear human"- Da Breao[1]. Palatal defects cause multiple problems in deglutition, mastication, speech, esthetics and maintenance of oral hygiene. Such defects need special prosthesis to establish oro-nasal seal which can be provided by obturator prosthesis[2].Obturator is defined as "a maxillofacial prosthesis used to close a congenital or acquired tissue opening, primarily of the hard palate and/or contiguous alveolar or soft tissue structures"[3]. The obturator prosthesis used to restore masticatory function, improve speech, deglutition and cosmetics for maxillary defect patients resulting from a congenital, acquired or developmental disease process such as cancer, cleft palate, and osteoradionecrosis of the palate[2]. The design of an obturator is to engage the remaining natural teeth and tissue bearing areas to optimize retention and stability. Obturators fabricated with adequate extensions are often heavy, which can counteract the increased retention and stability generated by the increased extension[4]. The obturator should be light in weight to provide favourable retention, stability, support, patient comfort and cleanliness[2,4].

A hollow maxillary obturator may reduce the weight of the prosthesis from 6.55 % up to 33.06%, depending upon the size of the maxillary defect[5]. Many methods had been employed for fabricating a hollow bulb obturator. Different materials are incorporated to fabricate hollow bulb obturator such as modelling clay[6], dental stone[7], salt[8] and putty[9]. The effect of heat during acrylization is different for different materials. This clinical report describes an innovative technique of using thermoplastic technique for fabrication of hollow bulb prosthesis. This technique is simple and less time consuming and allow the control of obturator bulb's wall thickness and weight more effectively.

II. Case Report:

A 54-year-old male presented to the Department of Prosthodontics and Crown-Bridge, BP Koirala Institute of Health Sciences for the prosthetic rehabilitation of post maxillectomy defect resulting from squamous cell carcinoma of right maxilla 10 months back. The patient complained of difficulty in mastication, nasal regurgitation of fluids and nasal tone in his voice.

Extraoral examination showed facial asymmetry with decreased fullness on right side of lower face (figure 1).Intraoral examination revealed well healed surgical defect in the maxilla involving part of hard palate, alveolar ridge, maxillary tuberosity and some part of palate creating an oro-antral communication. All teeth on the right quadrant of maxilla were missing except central incisor (Figure 2). Masticatory and phonetic functions of the patient were severely affected. The defect was classified as Aramany's Class II maxillary defect and treatment plan was made to rehabilitate the patient with closed hollow bulb obturator prosthesis using thermoplastic resin sheet.

Figure 1: Extra-oral view

Figure 2: Intra-oral defect of palate

Figure 3: Primary impression

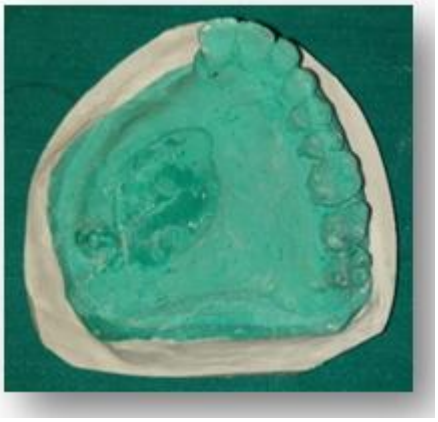

Figure 4: Primary cast

The primary impression was made using irreversible hydrocolloid(Zelgan 2002 dust-free easymixing,DENTSPLYIndia) (figure 3) and primary cast was poured with dental stone(Kalstone, Kalabhai Karson) (figure 4). The defect was blocked with gauze piece prior to impression making. The cast was then surveyed. Rest seat preparation was done on mesiocclusal surface of premolar and second molar and distoocclusal surface of first molar. Impression of mouth preparation was made with medium body elastomer(Reprosil, Dentsply) and cast was poured with type IV dental stone.(Kalstone, Kalabhai Karson).

Figure 5: wax –pattern design

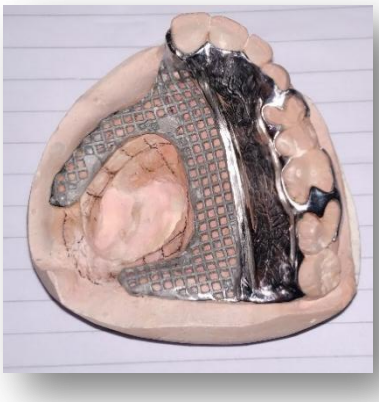

figure 6: Cast metal framework

Cast partial framework was designed and fabricated (figure 5, figure 6). It was then tried in the patient's mouth for fit. Border molding was done to record the soft tissues surrounding the defect using green stick impression compound (DPI pinnacle tracing sticks). Final impression of defect was made with medium body elastomer (Reprosil, Dentsply) and over it, pick –up impression was made with alginate (figure 7) and

master cast was poured.Jaw relation was recorded and transferred to a semiadjustable articulator (Hanau Wide Vue Articulator) (figure 8)for teeth arrangement. The wax try-in was carried out to check occlusion, phonation and esthetics (figure 9).

Figure 7: pick –up impression

Figure 8: Articulation

Figure 9: Try-in of teeth arrangement

After try-in, baseplate wax was adapted in the defect with stoppers for relief (figure 10). Thermoplastic resin sheet 1.5 mm thick (Erkodent) was used to fabricate the bulb part of the obturator in a thermoforming unit (Erkopress 300Tp). Lid part of the obturator (hollow bulb) was then fabricated. The bulb and lid portions were bonded with autopolymerising resin to obtain a single hollow body (Figure 11). The denture was flasked and dewaxed in the usual manner. The defect area was loaded with heat-polymerising resin and preformed hollow body was sandwiched between packed acrylic resin.Finishing and polishing of the prosthesis were done (figure 12, 13&14). The obturator prosthesis was then inserted in the patient mouth (figure 15&16). Patient was happy and satisfied with his improved function, speech and esthetics.

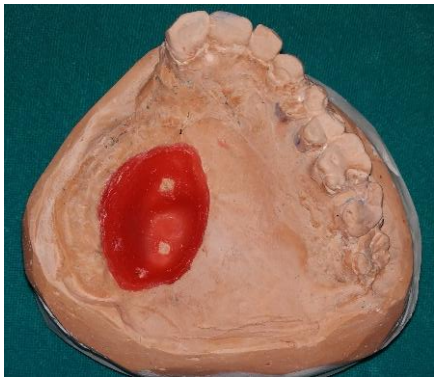

Figure 10 : Base plate wax adapted with stoppers **Figure 11: Single Hollow Body**



Figure 12, 13&14: lateral, tissue surface and occlusal surface view of prosthesis.

Figure 15: Prosthesis in-situ

Figure 16: Extra-oral view after prosthesis insertion

III. Discussion

Obturator prosthesis play a crucial role in the recovery of oral function in postsurgical maxillectomy patients. Lack of support, retention, and stability are common prosthodontic

treatment problems for them. A hollow bulb prosthesis is a better choice, as it is lighter in weight and is more hygienic[10].

Several techniques and materials have been described previously to fabricate a hollow obturator. Mc Andrew et al described the technique of fabricating the prosthesis in two halves and sealing them using autopolymerising resin.This sealed area is a potential site for leakage and discoloration[11]. Fattore et al. used variation of the double- flasktechnique for obturator fabrication.However, this technique requires extra laboratory steps, two denture flasks and is time consuming[12].

Habiband Driscoll described a simple method by grinding out unwanted part directly after packing. However, it is hard to control the adequate thickness of the obturator and also time consuming[13].Other materials such as modelling clay, dental stone, salt, sugar and silicone rubber have been used for fabrication of hollow bulb obturator. Modeling clay, dental stone and silicone rubber are difficult to remove because of their hardness and inability to dissolve in water[6-9]. Operator cannot give or maintain a definite form and position of hollow bulb with sugar and salt during packing and curing.

The method described in this report solves these problems and has several advantages. The variety in thickness of commercially available thermoplastic resinsheets makes it possible to control the thickness and weightof the hollow bulb being fabricated with this technique. The separate lid fabrication and subsequent luting of the lid to the prosthesis is not required in this technique. So, chance of water leakage, food accumulation, and bacterial overgrowth can be prevented since bulb template is completely covered by heat cureacrylic resin. The prosthesis is fabricated with one-time processingtherefore reducing laboratory time. However,theremight be an impact on the strength of the prosthesis duringbench curing process and also on the stability to temperatureduring acrylization. The published literatures regarding thedisadvantages of the thermoplastic resin over conventionaldenture base resins are limited and require further researchfor clarification[10].

IV. Conclusion

Definitive prosthodontic treatment is one of the final therapies which is instituted and it attempts to alleviate any anatomical and functional deficiencies. The prosthodontist plays a significant role in functional

rehabilitation of the patient by providing better masticatory efficiency, improved phonetics, esthetics and contributed to psychological well-being of the patient.

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Dr. Mira Singh. "Fabrication of Cast metal Closed Hollow Bulb Obturator for Partial-maxillectomy Patient: A Case Report." IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), vol. 18, no. 12, 2019, pp 50-54.