CASE REPORT

Prosthetic Rehabilitation of Maxillectomy Defect with Cast Metal Framework and an Acrylic Hollow Bulb - A Case Report

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ABSTRACT: The goal of a successful Prosthodontist should be aimed in delivering a smile to the patient be it dentulous or edentulous or partially edentulous state. This article discusses a case report of a patient who underwent hemimaxillectomy and had her smile restored back after definitive hollow bulb obturator prosthesis. It is a light weight one and was processed using a novel technique in which a cast partial framework was fabricated with an acrylic hollow bulb using double cure technique to render it weightless and more retentive.

Keywords: Rehabilitation, Maxillary Prosthesis, Palatal Obturators, Casting

Man's necessity to overcome difficulties associated with missing body parts or defects paved way to its artificial replacement which dates back as far as humanity itself. [1, 2] Oral and Maxillofacial defects may be due to congenital malformations, traumatic injuries, infection or tumors. [2,3] Major surgeries of head and neck tumors, malignancies as well as benign pathology [4] often results in severe mutilation well beyond the scope of surgical reconstruction. Disfigurement of face due to the loss of tissue may mean loss of status in society. This loss may manifest in the form of stress, depression, loss of appetite and irritability which leads to severe psychological impairment in these patients [5] and also presents impediment in speech, mastication and swallowing. This scenario is very common in prosthetic rehabilitation of maxillary defects wherein a Prosthodontist restores functions of mastication, deglutition and speech in addition to achieving normal orofacial appearance and functional occlusion, thereby fulfilling the objectives of any prosthesis. [4]

Surgical procedures involving closure of small oroantral and oronasal defects can be managed surgically, but major defects are rehabilitated by the Prosthodontist. [4] The Prosthodontist as a member of the team,

works in co -ordination with several other interdisciplinary specialties which includes speech therapy, psychology, psychiatry, physical therapy plans the design of the obturator, [6] which functionally restores the lost function and improves the aesthetics. Such a prosthesis eliminates the disease as well as improves the quality of life and more social activity, that greatly influences the psychological condition of patient. [7]

An obturator is a maxillofacial prosthesis used to close a congenital or acquired tissue opening, primarily of hard palate and/or contiguous alveolar or soft tissue structures. [8] Lost anatomic barrier between the oral and nasal cavity is best restored by a maxillary obturator to restore functions such as speech, food intake, and deglutition. [9, 10] The aims of such prosthesis as suggested by Aramany and Drane are oronasal separation, retention and stabilization of the prosthesis and speech rehabilitation. [9]

In case of large defects that lack palatal support, the prosthesis is extended vertically to engage the surgical defect as well as horizontally to the lateral aspect of the orbital floor, at the cost of its size and weight. Hence the underlying structures are subjected to continuous stresses which compromise the health of the tissues, function and comfort. [10]

The bulb portion of the obturator is made hollow after processing into acrylic resin as weight reduction is very vital since the prosthesis is suspended without bony or posterior tooth support on the defect side. Based on the size of the maxillary defect the weight of the prosthesis may reduce up to 33%, if a hollow maxillary obturator is planned. [10]

Case report

A 60 year old female patient reported to the Department of Oral and Maxillofacial Prosthodontics, with a chief complaint of inability to eat and swallow, aspiration of food into nasal cavity, hyper nasal speech and cosmetic reasons [Fig-1]. Her medical history revealed that she underwent right hemimaxillectomy, one and half years back

Fig– 1: Preoperative

Fig– 2: Pre operative intraoral view

for the management of squamous cell carcinoma of right maxilla. Extra oral clinical examination revealed flattening of right middle third of the face with prominent naso labial fold and right upper lip showed evidence of scarring. Intra oral clinical examination revealed right maxillectomy defect of dimension 52 mm antero-posteriorly and 24 mm bucco-lingually with missing 11, 12, 13, 14, 15, 16, 17, 18,21, 22 ,34, 37, 38 and 48 along with an oro-antral fistula [Fig-2] . Mouth opening was limited to 14 mm. Health of the remaining teeth and the oral hygiene status was satisfactory.

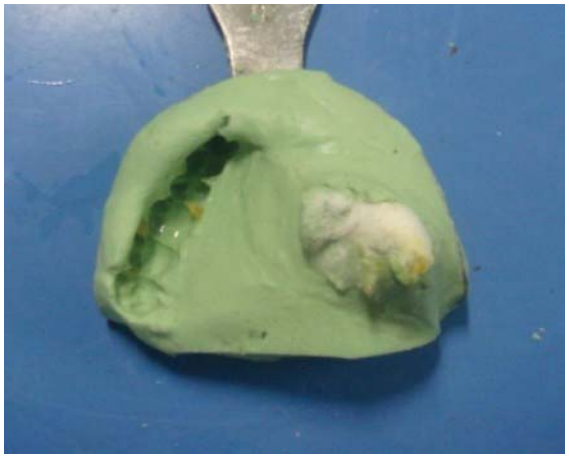
She gave a positive medical history of Non-Insulin dependent Diabetes Mellitus and Hypertension since ten years and which was under control by the medication.

After preliminary investigations, treatment plan was charted out. The prosthetic design plan was to correct Aramany's classification of class–IV maxillary defect. Since the existing natural teeth follow a linear configuration, cross tooth stabilization was planned with buccal retention in premolar and palatal retention in molars.

Thereby a definitive obturator with Cast Metal framework and Acrylic Hollow bulb was planned using double cure technique.

Technique for fabrication of Obturator

Primary impression was made with irreversible hydrocolloid [Zhermack, ItalyDM40] with metal stock trays (Jabbar & co). [Fig-3] After blocking the tissue undercuts with wet gauze, accurate primary casts with usable tissue undercuts were obtained. Diagnostic cast was surveyed to determine the path of insertion. Rest seat preparation done in 23 & 24 and 26 & 27 for embrasure clasps. After relieving the residual palatal structures, a custom tray was fabricated using auto polymerizing resin. Border molding was done using low fusing compound (DPI Pinnacle tracing sticks, Mumbai, India,10132), initially on the



Fig– 3: Primary impression

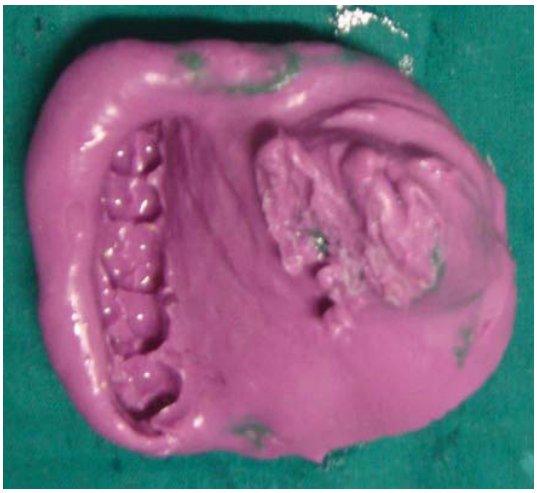
Fig– 4: Border moulding of unresected site

unresected side followed by palatal defect. [Fig-4] Secondary impression was made using monophase. [Aquasil, Dentsply,Germany,1005001219] [Fig-5]. Beading and boxing done and master cast was poured with die stone. [Ultrarock, Kalabhai,] [Fig-6]. Master cast was surveyed after obtaining a favorable tilt. [Fig-7]. Blocking out of the undercuts was carried out in master cast [Fig-8]. Master cast was then duplicated using reversible hydrocolloid [Repligel, Bego, Germany] [Fig-9] and refractory cast was obtained. Wax pattern was fabricated using pre-fabricated wax pattern (Bego-Germany) and sprue was attached [Fig-10]. Refractory cast was invested with wax pattern. Burnout procedure carried out in muffle furnace [Zhermack, Italy,DM40] [Fig-11] and casting was done with Cobalt-Chromium alloy [Wironit, Bego, Germany] in an induction casting machine.[Fornax, Bego, Germany] Trimming and polishing of the framework completed after divesting. Framework was then tried in patient's mouth.

A uniform layer of base plate wax [Cavex, Switzerland,120519] of thickness 1.5 mm, adapted onto the walls of the surgical defect in the duplicated cast and extended till the finish line of the metal framework and acrylization of the same was carried out [Fig-12].

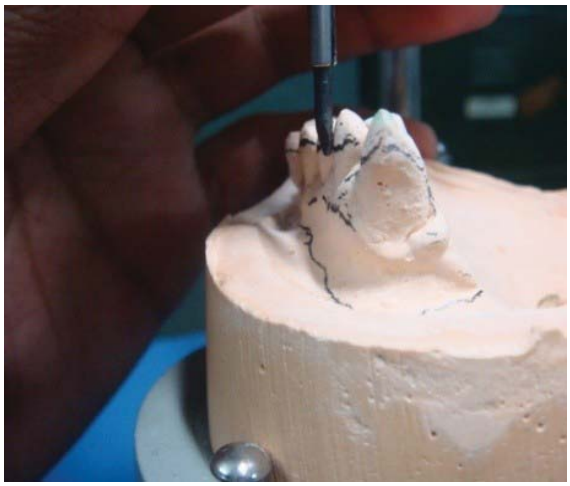
After deflasking and finishing, obturator with metal frame was tried in patient's mouth. Lid over the Obturator was temporarily made with auto polymerizing resin, over which occlusal rim was constructed. Jaw relations recorded and master casts were articulated. Teeth setting (Cosmo HXL) followed by festooning and carving was done. Occlusal corrections and verification of buccal corridor checked in trial denture [Fig-13]. Flasking and dewaxing done and the temporary lid over the defect area removed. Hollow bulb of the obturator was filled with salt and mould area packed with heat cure resin, and curing completed using long curing cycle.

Finishing and polishing carried out after deflasking. A hole is made in the Obturator bulb and saline was syringed to remove the



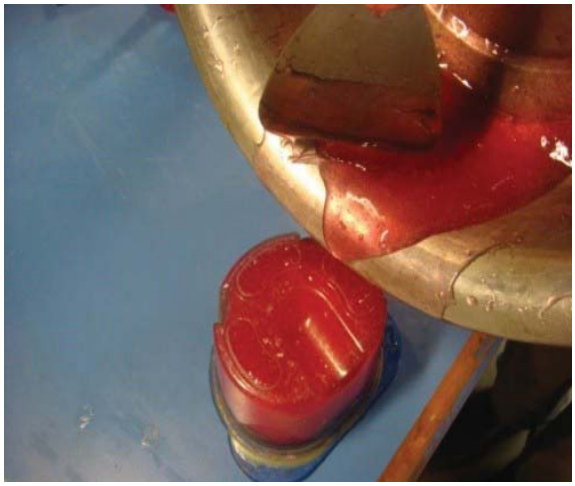
Fig– 5: Secondary impression

Fig– 6: Secondary Cast



Fig– 7: Surveying the master cast

Fig– 8: Blocked out master cast



Fig– 9: Duplicating with agar

Fig– 10: Crucible former attached with sprue

Fig– 11: Wax burn out

Fig–12: Fabricated bulb portion with metal frame

salt and the hole was blocked with auto polymerizing resin. Hollow bulb Obturator was inserted into the patient's mouth and occlusal corrections were made [Fig-14 and 15]. The prosthesis evaluated for pressure areas in residual palatal region and the bulb portion should be checked for functional pressure areas with tissue conditioning material. Review was done after twenty four hours. Two month and six month follow up showed satisfactory results.

Discussion:

In a dentulous patient retention ,support and stability of an obturator depends upon the number and distribution of existing teeth.[10] As the prosthetic design plan for this patient was to correct Aramany's class–IV maxillary defect [11] , retention is planned with a combination of palatal molar retention and buccal premolar retention [12, 13] with embrasure clasps. A well designed and fabricated direct retainer provides stability, splinting, bilateral bracing, reciprocation and retention.[14] The scar band created by skin graft- mucosal junction provided retention for the obturator bulb on the defect side.[15,16] Perpetual preservation of underlying soft

Fig– 13: Wax try in

Fig– 14: Post-operative

Fig– 15: Post operative intraoral view

tissues, light weight, ease to clean and simplicity of design and construction are considered to be vital in prosthesis to obturate the defect after maxillary resection. [17, 18] Weight of the obturator often makes the prosthesis to act as cantilever. Since the weight of the obturator is often dislocating force, it must be as light as possible [9]. As in this case, the area to be reconstructed is large enough that it was planned to provide hollow bulb, which reduces the weight as well as aids in good retention, stability, improved palatal contour and resonance.

Leaving the hollow bulb open at the top may create difficulty for the patient in its maintenance and collection of nasal secretions and accumulation of food particles causing a foul odor and also increases the weight of the prosthesis. [19] So taking into the considerations of the patient's age and the dexterity for maintenance, closed hollow bulb prosthesis was preferred.

Though acrylic resin is the material of choice its demerits such as, increase in the weight of the prosthesis and decreased thermal proprioception overweighs its merits such as biocompatibility and ease of handling. [19] Hence we intended to provide a combination of cast metal framework with acrylic denture base, which decreased the weight, increased the structural durability [10] and improved the proprioception.

Following the tumor resection in the maxilla, future reconstructive techniques will be followed by the combination of surgical and prosthetic reconstruction by use of micro vascular surgical procedures and implants which will have a paradigm shift in the treatment plan as well as in the prosthesis. [1]

Conclusion:

The restorative dentist has to be imaginative, innovative and adhere to the principles of rehabilitation while designing this prosthesis. [20]

Hence this definitive obturator prosthesis with cast metal framework and acrylic hollow bulb restored the patient complaints such as speech, mastication and swallowing thereby fulfilling the functional objectives. However esthetics was not appealing owing to uneven scarring in right upper lip, which otherwise wouldn't have compromised on the esthetics

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