

Rehabilitation Of An Acquired Palatal Defect With A Closed Hollow Bulb Cast Partial Obturator Prosthesis: A Clinical Case Report

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ABSTRACT

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A maxillofacial patient's quality of life is distorted and social integration becomes difficult. An obturator is a maxillofacial prosthesis used to close a congenital or acquired tissue defect, primarily of the hard palate and/or contiguous alveolar/soft-tissue structures. Subsequently, it restores the esthetics, speech, and function. The size and location of these defects influence the degree of impairment and difficulty in prosthetic rehabilitation. Lack of support, retention, and stability of the prosthesis are some of the common problems in maxillectomy patients. Retention of partial denture prosthesis in rehabilitation of maxillectomy patient has been an enigma for prosthodontist. However, a well-planned prosthesis fabricated in accordance to the designing principles, reinforced by knowledge and skill of the prosthodontist would result in prosthesis with improved retention and stability.

Although patients with palatal defects can be rehabilitated by a surgical or a combination of surgery and prosthesis, the prosthetic rehabilitation was the chosen treatment in the rehabilitation described herein as it facilitated patients' follow-up and involved relatively low costs, achieving immediate aesthetic and functional improvement. This clinical report describes rehabilitation of an acquired palatal defect of a 32-year-old male patient using a single piece closed hollow bulb cast partial obturator prosthesis made with heat polymerizing acrylic resin. In this case anatomy of the defect did not contribute to the retention and stability of the prosthesis. Therefore, the hollow bulb design improves the retention of the prosthesis. Also, the cast partial framework and hollowing allows fabrication of light weight prosthesis. It describes several steps of fabrication of an obturator.

INTRODUCTION

The palatal defect may be congenital or acquired. The acquired defects may be due to disease, trauma, pathological changes, radiation burns or due to surgical resection of tumors. These defects in the form of clefts, naso-palatal communication or opening into the antrum may vary from small opening to large defect that involve any portion of the hard & soft palate, the alveolar ridges & the nasal floor.¹

Post-surgical maxillary defects result in difficulty in speech, impaired masticatory function & nasal regurgitation.^{2,3,4} The primary goal of rehabilitating these defects include separation of oral & nasal cavities to allow adequate mastication, deglutination, articulation & the soft tissue support to restore acceptable esthetic to improve the quality of life of these individuals.⁵ There are many methods for rehabilitate these defects, one of them is obturator prosthesis.

An obturator is an artificial substitute replacing surgical or congenital defective area.⁶ Successful obturation depends on the volume of the defect and the positioning of the remaining hard and soft tissues to be used to retain, stabilize and support the prosthesis.⁷ When the retention and stability of the prosthesis is compromised various obturator designs have been reported in the literature.⁸⁻¹² The hollow bulb obturator design is an aid to improve the retention and the resonance of voice as it is light in weight. In the present case, Aramany class I palatal defect¹³ was treated with a closed hollow bulb cast partial obturator prosthesis to improve the retention and stability of the prosthesis thus preserving health of remaining tissues.

CASE REPORT

A 32 years old male patient reported to the department of Prosthodontics VSPM Dental College and Research Centre, Nagpur with a chief complaint of ill-fitting maxillary prosthesis and difficulty in mastication and speech since last few months.



Patient on presentation



Maxillary Arch with the defect

His medical history revealed that he had met with an accident 2 years back, resulting in a deformity of right side of face with a defect in maxillary posterior region and loss of teeth & wearing a definitive obturator prosthesis that is ill fitting & was retained with clasps.

Intra-oral examination showed (Aramany, 1978) Class-I defect on the right maxilla that measured 2*2 cms. An intact mandibular dentition. The maxillary arch presented with a few remaining teeth that were 17 18 22 23 24 25 27 28. The defect had an oro-nasal fistula in the posterior region of the hard palate. The teeth were evaluated clinically and radiographically for periodontal condition and they were found satisfactory. A root piece was seen with 21, a root canal treated tooth with a crown on 31 and a silver amalgam filling with 48.

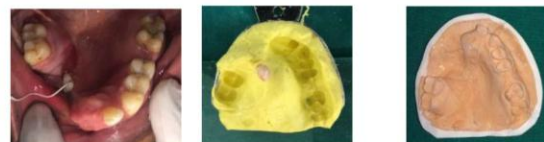


Frontal View

Right lateral View

Left lateral View

After thorough oral prophylaxis, all undesirable undercuts were blocked using a piece of moist gauze to prevent intrusion of the material into the nasal cavity and an irreversible hydrocolloid impression was made. Diagnostic cast was poured in type III stone. Wax spacer of 3 mm thickness was adapted on the cast and a custom tray was fabricated using autopolymerising resin 24 hours before the procedure.



Wax Spacer Adapted

Primary Impression

Diagnostic Cast



Blocked undercuts with a gauze

Custom tray fabricated

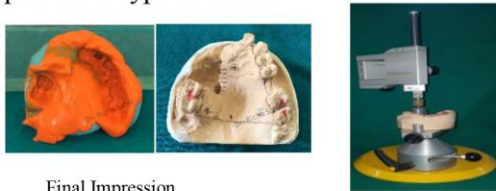
On another maxillary cast with the defect, surveying was done and a cast partial framework was planned with the following components: Embrasure clasps with 17 18 & 27 28, tooth colored I bar clasp with 22. Cingulum rest were given on 22 23, complete palatal type of major connector where extension to the palatal surface

will act as a guiding plane and provide indirect retention. The distal surface of 22 was also prepared as a guiding plane. Also, a tooth preparation for bridge with 25 26 27 was done and porcelain fused to metal prosthesis was cemented prior to the mouth preparation for the partial denture.



Designing on Diagnostic cast Mouth Preparation for the bridge with 25 27 and final cementation in occlusion

The mouth was prepared; border moulding was done using low fusing compound to record the functional limit of surrounding soft tissue as well as the extension into the defect. Final wash impression was made with putty and light body impression material using a double step double mix impression technique of the dentulous and defect area. The impression was then boxed and poured in type III stone.



Final Impression Master cast and Surveying

The master cast was blocked and duplicated as a refractory cast on which a wax pattern was adapted. Spruing was done and the casting of the metal framework was carried out. Trial of the finished and polished framework and the needed adjustments were done.



Wax Pattern and Spruing on the refractory cast

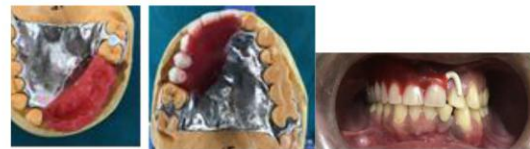


Casted Framework

Wax occlusal rim was made on the framework and the jaw relation was recorded. Desired teeth

arrangement was done. Trial of this waxed up prosthesis was done in the patient to check for

Occlusion, esthetics and phonetics and the prosthesis was processed.

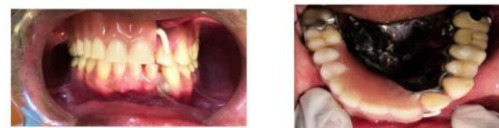


Jaw Relation Teeth Arrangement Try-in in patient

In order to make a lightweight prosthesis, hollowing was done. After dewaxing, heat cure acrylic resin was packed in the counter flask in the ridge area, and the resin was scooped out from the center of the defect and ridge area from the counter flask and filled with salt to hollow it out and the heat cure acrylic was then packed once again in the remaining portion of the flask. The lid was closed and curing was done, followed by finishing and polishing. The salt was removed from the cured denture by injecting hot water through a small hole made in the prosthesis which was then closed with self-cure acrylic resin. The prosthesis was characterized to match the color of the soft tissue of the contra lateral side using external staining method. The prosthesis was finished and polished and the insertion was done.



Salt filled for hollowing the bulb and flange Fabricated obturator Removal of salt after acrylisation



Fabricated obturator Removal of salt after acrylisation



Obturator Insertion

DISCUSSION

According to GPT-9-obturator is defined as a maxillofacial prosthesis used to close, cover, or maintain the integrity of the oral and nasal compartments resulting from a congenital, acquired, or developmental disease process, such as cancer, cleft palate, osteoradionecrosis of the palate; the prosthesis facilitates speech and deglutition by replacing those tissues lost because of the disease process and can, as a result, reduce nasal regurgitation and hyper nasal speech, improve articulation, deglutition, and mastication.⁶

Obturator prosthesis is classified as surgical, interim or definitive and reflects the intervention time period used in the maxillofacial rehabilitation of the patient; Prosthodontic restoration of a defect often includes use of a surgical obturator, interim obturator, and definitive obturator.¹⁴ Prosthodontic rehabilitation of maxillary acquired defects could be classified into three stages of treatment.¹⁵

Immediate surgical obturator/plate: This type of appliance is constructed from an impression obtained prior to the operation and inserted at the time of surgery. Advantages of using immediate surgical plate includes provision of a stable matrix for the surgical packing, it can form a barrier between the oral cavities and wound during the initial healing, it enables the patient to speak and swallow more effectively. The major deficits and difficulties that occur after resection may have a psychological impact on the patient that may be reduced by the presence of the surgical plate.^{15, 16}

Interim obturator: Two weeks after resection, the construction of interim obturator is advised. This type is totally acrylic incorporated with stainless steel wrought wire clasps engaging the remaining teeth for the purpose of retention. The patient should be seen every two weeks as the healing of the soft tissues in defect side exhibits more progress and lining materials can be placed.^{15, 17}

Definitive obturator: The definitive obturator should be constructed when the defect site is completely healed and is dimensionally stable. This may take from 3 to 6 months after surgery varying according to many factors e.g., prognosis of the tumor, size of the defect, healing progress and presence or absence of teeth.^{15, 18}

The rehabilitation of a maxillary defect involves a multidisciplinary approach. Designs for this type of obturators may vary based on the classification

system of the defect. In this case the patient reported after installation of definitive acrylic prosthesis that became loose. Various means of retaining the prosthesis has been reported in the literature. However, the design of the prosthesis depends on the volume of the defect, residual anatomic structures, remaining natural teeth and the economic status of the patient.

Abutments adjacent to distal extension maxillary resection sites are subjected to excessive rotational forces. Fixed splinting of some or all of the remaining teeth is indicated to provide dissipation of the stresses directed toward primary abutment teeth. Moreover, if the defect is small and the remaining teeth stable and unilaterally located, intracoronal retainers might be considered. If the defect is large and some or all of the remaining teeth are weak, extracoronal retainers should be used. Guiding planes are made to resist vertical displacement of the obturator and disengagement of the retentive clasp arms in case if the remaining teeth are not parallel with the walls of the defect.¹⁹ In the present situation, maximum distribution of support is achieved by incorporating more of the remaining teeth into the design of the framework and maximizing the use of occlusal and cingulum rests. Maximum extension onto the residual palate by using full palate major connector also increased the support for the prosthesis.

Also, in this case, defect involved the sulcus, so there was a need for making a hollow bulb obturator. Hollow bulb obturators are lighter in weight and improve the resonance of voice. Cast partial dentures are lighter in weight and do not pose problems to the health of the gingiva and supporting tissues. The basic principles of the design of removable partial dentures should be reviewed when designing the framework for an obturator. Major connectors should be rigid, occlusal rests should direct occlusal forces along the long axis of the teeth, guide planes should be designed to facilitate stability and direct retainers should provide bracing & retention, these all should be within the physiological limits of the periodontal ligament, and maximum support should be gained from the residual soft tissues.¹⁹ Changes in the tissues supporting a maxillofacial prosthesis may be more rapid than in those of conventional prosthesis. Therefore, the occlusion and base adaptation must be re-evaluated frequently and corrected by selective grinding of the occlusion or rebasing of the prosthesis.^{13, 20}

Quality of life of patients with palatal defects could obviously be improved with the provision of a properly designed obturator. The prosthetic obturator can restore mastication, swallowing, esthetic particularly the midface, resonance and speech. Patients with maxillofacial defects who undergo rehabilitation can resume their social habits in the normal way.²¹

CONCLUSION

Rehabilitation of patients with acquired maxillary defects present a challenge for the maxillofacial prosthodontist. The hollow bulb design improves the retention of the prosthesis when the clinical situation prevents adequate retention of the prosthesis. The fabrication of an obturator prosthesis in cases of oral postsurgical defect is extremely important for the recovery of mastication, speech, respiratory, and esthetic functions, affected by the loss of large amounts of orofacial structures and consequently to lead to an improvement in the quality of life of these patients. An obturator should fulfill the basic requirements of adequate retention, stability, and support and at the same time be lightweight to prevent any discomfort to the patient. Over a period of 6 months of follow-up, the patient is very much satisfied with the lightweight obturator.

DECLARATION OF PATIENT CONSENT

We certify that we have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

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