A Cast Partial Obturator with Hollow Occlusal Shim and Semi-Precision Attachment

Abstract
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 present clinical report aimed for the prosthetic rehabilitation of a maxillectomy defect by the incorporation of a semi-precision attachment as PRECI-SAGIX – male part of 2.2 mm on fixed partial denture (#22 and #23 teeth) and matrix – plastic female part of size 2.2 mm and height 4.2 mm of yellow on cast partial in polymer base. It aids in the retention of a hollow lightweight obturator. The technique also described the method to make a bulbless obturator with a hollow self-cured acrylic resin occlusal shim. A patient is quite satisfied with bulb less, lightweight cast partial and hollow shalatal obturator.

Keywords: Hollow occlusal rim (shim), palatal obturator, semi-precision attachment (Sagix and matrix)

Introduction
The patient’s acceptance often collapses return to normal state once the patient suffered from acquired defects such as carcinomas and they also suffer from psychological, surgical as well as functional trauma.[1] Surgical reconstruction of maxillectomy defects is not always possible because of the general health of the patient.[2] The primary goal of a prosthetic obturator is closure of maxillectomy defect and separation of oral cavity from sinonasal cavities.[3] According to GPT 9-2017, obturator has been defined as prosthetic rehabilitation of a dentulous maxillectomy patient with utilization of the remaining palate, the defect, remaining dentition and soft tissues to maximize retention, stability, and support. In the cases of large defects, the weight of the obturator is a major concern, 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, and 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 hypernasal speech, improve articulation, deglutition, and mastication; an obturator prosthesis is classified as surgical, interim, or definitive and reflects the intervention 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.[4]

A hollow obturator is the treatment of choice in such cases. Adequate retention of the obturator is also a critical factor for its function. Obturators are frequently associated with problems that result from lack of retention and stability. This leads to traumatic occlusion and failure to maintain an acceptable oronasal or oroantral seal. For a successful restoration, the patient must feel that they can socialize without impediment. They must have acceptable speech, dental appearance, and satisfactory oral function.[5] Precision attachments have been used in maxillofacial prosthetics for quite some time now.[6] The current clinical report describes the cast partial obturator (without bulb) and incorporation of a semi-precision attachment along with a part of a hollow rim (acrylic shim) to aid in retention.

Materials and Methods
A 24-year-old male patient was referred for the restoration of the palatal defect. The

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patient had undergone maxillectomy for cemento-ossifying fibroma involving the right side of the maxilla. Extraoral examination revealed gross facial asymmetry with collapsed midfacial region on the right side of the face [Figure 1]. Intraoral examination revealed the defect extended from the buccal mucosa into the midpalatine region, medially and anteriorly from the left central incisor region to the posterior extent of the hard palate [Figure 2]. The defect was classified as Aramany’s class IV defect with a curved arch form.6 Due to the scar formation after surgery, the sulcus on the affected side was obliterated with increased inter-ridge distance which would further compromise the retention, function, and prognosis of the prosthesis. It required that the planned prosthesis be lightweight with adequate retention so that the patient could overcome difficulty in speech, deglutition, and respiration.

A thorough medical and dental history was taken and the patient counseled to reduce his emotional anxiety. Maxillary and mandibular diagnostic impressions were made with irreversible hydrocolloid (Algitek DPI, Wallace Street, Mumbai) using stock trays and diagnostic casts of Type III dental stone (Kalabai Mumbai) were retrieved [Figure 3].

A heavy prosthesis usually affects the function of the prosthesis, and since the buccal sulcus on the affected side was obliterated, it was planned to fabricate a hollow occlusal shim obturator with extracoronal semi-precision attachments without the bulb (Preci-Sagi × 2.2 castable male par and female standard size ø 2.2: height: 4.1 mm-ø 4.2 mm yellow color, Ceka/Preciline, Waregem, Belgium) to enhance the retention of the obturator prosthesis.

The complete oral prophylaxis and the surveying of upper diagnostic cast were performed. After it, the left lateral incisor and canine were prepared and an impression was recorded with elastomeric impression material (Virtual, Ivoclar Vivadent AG/Liechtenstein, Germany) and the temporization of reduced teeth was done. While fabricating the wax pattern, both the copings were splinted and a castable semi-precision attachment incorporated into the wax pattern with the help of a surveyor. Casting was done and after metal try-in in the patient’s mouth, ceramic was fired, and the splinted crowns were cemented with GC-Type 1 [Figure 4].

After cementation of crowns, a second diagnostic impression is recorded by stock metal tray from irreversible
hydrocolloid (Algitex DPI, Wallace Street, Mumbai) and cast of Type III dental stone was poured. Maxillary defect was filled with the modeling wax on the stone cast. A customized acrylic tray with spacer and shortened margin at defect side is made. For the cast partial mouth preparations, over teeth no. #24, #25, #26, and #27, saucer-shaped occlusal rest seats prepared. Approximate border molding over defective side was done with green stick compound. A definitive complete mouth maxillary impression was made with elastomeric impression material, using single mix technique [Figure 5] after reducing the recorded 1.00 mm green stick border and final cast procured. The cast was again surveyed and the framework designed in accordance with Kennedy class I removable partial denture design principles [Figure 6]. The casted framework was tried in the patient’s mouth and adjusted for proper fit. Acrylic denture base was made on the framework and jaw records were taken and transferred to a semi-adjustable articulator. Teeth were arranged. Wax up dentures were tried and checked for retention, stability, support, phonetics, and esthetics in the patient’s mouth. Adjustments were made accordingly. The trial dentures were further waxed carved and finished [Figure 7].

**Fabrication of hollow occlusal rim (shim)**
- After flasking, the trial cast partial denture with teeth for acrylization in flask base with dental plaster, a customized wax bead (Preparation wax, red color, 0.5 mm Bego, Germany), was adapted on the dental stone cast in flask which was 2 mm short of the cervical level of teeth of effected side over palatal and buccal side.
- This bead serves as a guideline for the height of the shim wax block. A putty index (elastomeric impression material) is made below the bead wax [Figure 8].
- After counter flasking, the dewaxing was done. The putty index is replaced on the base flask and molten wax (Modelling wax, Samit® Jhandewalan, Delhi) is filled into the index till the level of bead [Figure 9]. The wax is allowed to cool down.
- About 1–2 mm of wax is scraped from the walls of the block wax to make space for the acrylic shim. Autopolymerizing resin is mixed, and once in dough stage, a uniformly thick layer (1–2 mm) is applied to the wax to make a shim. Once cured, two holes are made in the shim and the flush of hot water is done forcefully.
through one hole to eliminate the wax through the other hole. Now, attached hollow shim is ready for obturator

• The obturator is processed with heat-cured resin in a conventional manner [Figure 10]. The final prosthesis is tried and adjusted in the patient’s mouth and finished and polished in a conventional manner.

The female part of the semi-precision attachment was attached intraorally and fixed to the prosthesis with the help of self-cured resin [Figures 11 and 12]. The attachment improved the retention of the prosthesis, distinctly.

Discussion

Palatal obturators were used for prosthodontic rehabilitation of surgical or acquired palatal defects. The common problems associated with cast partial obturators are loss of retention in due course of time because of the plastic deformation caused by cycles of insertion/removal which causes food lodgment and discomfort to the patient when the prosthesis is in function. An attachment was indicated over the terminal abutment adjacent to a large palatal defect. Precision or semi-precision attachments may prove very useful in such cases. If the defect is large and some or all of the remaining teeth are weak, extracoronal retainers should be used. Precision attachments are often expensive as compared to the semi-precision attachments. In the present case report, extracoronal semi-precision attachments were used over the adjacent abutment #22, i.e., lateral incisor teeth were periodontally sound. Moreover, these attachments are fairly economical and the retentive female component is easily replaced.

Due to the extension of the prosthesis into the defect, the weight of the obturator invariably increases which further compromises the retention of the prosthesis. The weight of the obturator is a major concern for the prosthodontist.

Several methods have been described to overcome the difficulty with fabrication of hollow bulb obturators. Separate flasking of the two halves and joining them with autopolymerizing acrylic resin has been done by some authors, but this technique was time consuming and there are chances of leakage at the interface of the two halves. Previous authors had used sugar and ice to make the bulb hollow by eliminating these materials later. These

![Figure 9: Putty index with wax occlusal rim](image1)

![Figure 10: Hollow occlusal autopolymerizing resin shim](image2)

![Figure 11: Patient recalled and cast partial prosthesis (obturator)](image3)

![Figure 12: Final prosthesis (intraorally)](image4)
techniques also seemed cumbersome. Another technique using a light-polymerized resin record base was tried which was less time consuming.\[18\] Advocated technique used the bead wax and putty index for the height of hollow shim.

The current advocated technique is a variation of the past used technique while authors used wax and acrylic resin hollow shim which has been seemed a predictable technique because of the uniform thickness of the shim achieved as well as the ability to achieve a single-piece prosthesis which is always superior to a two-piece obturator.\[19\] The use of a beading wax and putty index improved the accuracy of the technique.

Conclusion

The fabrication of an obturator prosthesis in cases of oral sinonasal 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 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. The current report concludes that the patient with semi-precision attachment and cast partial denture, without bulb and a part of hollow occlusal rim, is very much comfortable, and it is also free from sensation and weight of the obturator bulb. Over a period of 6 months of follow-up, the patient is very much satisfied with the lightweight obturator.

Declaration of patient consent

The authors certify that they 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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