

# Gaining Retention, Support and Stability of a Maxillary Obturator

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## ABSTRACT

Construction of a maxillectomy obturator for any surgical defect requires optimum retention, stability and obturation of defect. In the following case a closed hollow bulb obturator was constructed while utilizing surveying and neutral zone impression technique. After insertion, soft liner was applied to record functional impression of the surgical defect. The obturator was resurfaced with heat cure acrylic to improve the outcome. Patient was able to masticate adequately and speak comprehensively. Patient's resonance, speech, retention and stability were markedly improved. Follow-up was done weekly in first month, fortnightly for the next 2 months then after every 3 months. In succeeding years it will be once every year.

**Key words:** *Hollow bulb obturator. Maxillectomy. Impression techniques. Mastication. Speech.*

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## INTRODUCTION

Prosthetic outcome for any obturator can be affected by the volume and location of postsurgical bony anatomy, availability of abutment teeth, size of the defect, quality of mucosa, history of therapeutic radiation therapy, patient's experience with previous dental prostheses, and neuromuscular control of the patient.<sup>1</sup> Patient's acceptance of the traumatic loss, change in appearance and altered quality of life may also impact the outcome of obturator prosthesis. Obturation of oral cavity and improvement in quality of life are the prime objectives of a maxillary obturator. To gain optimum retention, stability, support and aesthetics, few maneuvers have been recommended.<sup>2</sup>

Means of retention for surgical obturator are suture retention, bone screw retention, spring retained surgical obturator,<sup>3</sup> and circumzygomatic wiring for edentulous patients. For partially dentate patients, in addition to the above mentioned methods inter-dental wiring or suturing can also be attempted. Surgical obturators are modified with liners and tissue conditioners during interim phase.

For definitive obturators, undercuts present in the defected area can serve as a mean of retention. If undercuts are blocked out completely, the obturator will have loss of retention, loss of stability, loss of border seal, and the presence of a space in which debris may collect. Weight of an obturator may be kept as minimum as possible to counter act the dislodging pull of gravity.<sup>4</sup> Use of wrought wire or cast clasps, indirect retainers

(clasps or labial flanges), making a bulb without a top, making a two part surgical obturator or use of a sectional obturator with magnets can also aid in retention.<sup>5-7</sup> Osteointegrated implants may act as a preferable source of retention provided adequate quality and quantity of bone is available.

Rests and vertical guide planes may help in providing support to obturator prosthesis in partially dentate individuals.<sup>4</sup> Maximum extension onto the residual palate, alveolar processes and contact of obturator with pterygoid plate, temporal bone, nasal septum, vomer, floor of the orbit, or any other osseous structure within the defect may prove helpful for prosthesis support. Incorporation of adequate support and retention may fulfill the needs of stability in obturator.

Following case report signifies various methods employed at different stages of obturator fabrication to improve the prosthesis outcome.

## CASE REPORT

A 52 years old diabetic male patient presented to Prosthodontics Department of CMH Lahore Medical College, Lahore, for the replacement of his missing maxillary dentition and palate. The patient had a surgery of bilateral inferior maxillectomy in another public sector hospital for chronic necrotic osteomyelitis of maxilla and palate. His right upper first molar and right maxillary tuberosity was intact. Patient came to the department 3 months after the surgery. He was on anti-coagulants and vasodilators due to severe left ventricular dysfunction. Previously, patient had one surgical and one interim obturator made. He was not able to utilize either of them. Old obturators could not be seated onto the residual palate. So they could not be utilized to make primary impressions.

Clinical examination revealed that the patient's inferior and anterior portion of the right maxilla and the whole of

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the left maxilla were resected. The residual ridge for right second and third molars was high well rounded. Right upper first molar was intact with no mobility and mild gingival recession. Soft palate was intact. No restriction was found in the range of movement of the soft palate. There was open communication with left maxillary sinus. There was no skin graft on the lateral walls of the defect. Mild to moderate lateral undercuts and a reasonable amount of tissue flexibility of the lateral walls of the defect was noted. The inferior third of the nasal septum was also removed. Clinical findings were confirmed on radiological examination (Figure 1).



**Figure 1:** Post-operative panoramic view showing the extension of defect with resected left maxilla and right premaxilla.

Retention, stability, support and complete obturation during function were the difficult targets to be achieved. The mechanical advantage for stability was low because of presence of unilateral molar. Mandibular arch showed generalized calculus deposits and moderate periodontitis. Both right and left first mandibular molars were missing.

His pre-operative records and impressions were not available. Preliminary general dental care was provided to the patient. A prosthodontist made upper and lower primary impressions without anaesthesia. Heavy body putty material and metal stock tray were used for maxilla and irreversible hydrocolloid was used for mandible. Maxillary model was then surveyed.

At 0° tilt, the depth of undercuts was marked in the defected area and outlined in vertical plane as a blue line. The undercuts were blocked out horizontally (Figure 2). The depths of anterior and lateral undercuts were kept to 0.5-1 mm for adequate retention and stability against opposing forces. All posterior and posterolateral undercuts were completely blocked to allow comfortable seating of obturator. The model was resurveyed after blocking out of undercuts, for confirmation of the survey line.

Post dam area was carved for added retention. A c-shaped wrought wire clasp was designed on the only intact tooth. Maximum extension onto the foundation area was planned to reduce the force per unit area. Heat cure acrylic resin was utilized to make the base plate for

hollow obturator. After curing, patient's comfort and plate extension were evaluated with fit checker. Border molding was performed to improve retention. Resonance was evaluated through pronunciation of /b/ and /p/ sounds. As the obturator was hollow so patient had difficulty in production of linguopalatal consonants, /r/ and /j/(yh). The obturator was closed with a heat cure lid. Patient was asked to sip and swallow water to assess effective obturation of nasal and oral cavities.

Patient was advised to use the obturator for 14 days. He could speak comprehensively and was able to swallow liquid and semi-solid diet without nasal regurgitation. Obturator did not dislodge at rest and during function.

After 2 weeks, vertical jaw relation was recorded using wax occlusion rims. As the defect involved middle and superior third of maxillary bone, so the middle third of the face contracted. There was a risk of dislodgement of obturator through contraction of fibrotic facial tissues. A compromise was made between the support of facial tissues and the stability of obturator. To ensure stability, retention and facial support, neutral zone was recorded with impression putty. Swallowing and phonetic neutral zone record techniques were utilized.<sup>8</sup> Plaster matrices were made on articulator. Tooth arrangement in maxillary arch was done according to neutral zone concept. Occlusion was adjusted according to mandibular teeth. Class I relation was achieved in the anterior segment. Posteriorly cross bite was given on to the affected side. Shallow cusped teeth were utilized to allow freedom of movement.

At trial, all maxillo-mandibular relation records were verified. Palatal wax up was carefully done and verified at trial visit. It was made bilaterally symmetrical to allow smooth delivery of linguoalveolar and linguopalatal sounds. Polished surfaces impressions were recorded to enhance denture stability. After processing, remount was done for occlusal adjustments.

At insertion over extensions were checked on cameo surface and peripheral borders (Figures 3 and 4). Pressure areas were evaluated using pressure indicating paste. Bulb portion was checked by using tissue conditioning material. Patient was advised about oral hygiene maintenance. To avoid tissue edema the obturator was to be worn at night too. Follow-up visits were advised fortnightly.

At second follow-up visit patient complained of occasional looseness of obturator during mastication. To gain maximum support, the obturator was then relined with a soft liner. Liner remained on the obturator for one week to record functional impression, during patient's daily routine. The functional impression showed relatively greater undercut engagement. There



**Figure 2:** Occlusal view of maxillary model in hard plaster. After surveying, undesirable undercuts are blocked out.



**Figure 3:** Hollow bulb obturator.



**Figure 4:** Obturator insertion.

was improved retention and support of the prosthesis. The obturator was re-surfaced with acrylic. To reduce the weight, lid was opened. The bulb was ground from interior. Lid was closed again. Patient's outcome for resonance, speech, retention and stability were markedly improved.

Follow-up was done weekly in first month, fortnightly in next 2 months then after every 3 months. In succeeding years it will be once every year.

### DISCUSSION

A maxillary obturator was fabricated for a patient undergone bilateral inferior maxillectomy because of chronic necrotic osteomyelitis of left maxilla. Diabetic patients need special care for appropriate control of sugar level. Mid-day impression may help in a better outcome of the prosthesis. Meticulous oral hygiene maintenance was mandatory for such patient to prevent any infection. To meet the objectives of an obturator various measures were employed.

Single step impression technique was utilized. The elastic material helped in recording the maximum depth and lateral undercuts of the defected area. Irreversible hydrocolloid and tissue conditioners can also be employed depending upon case selection and operator's preference.<sup>1</sup>

Survey of the defect aided in precise utilization of undercuts. Blockage of posterior and posterolateral undercuts allowed anterior path of insertion. Minimum utilization of lateral undercuts prevented tissue trauma of fragile nasal mucosa. It can also combat opposing dislodging forces.<sup>1</sup>

The general principles of denture construction may not be ignored for a maxillofacial prosthesis. Maximum extension of denture base utilized adhesive and cohesive means of retention. As the posterior portion of hard palate and entire soft palate were intact so post dam carving prevented the ingress of air. After the relining procedure, the bulb portion came in maximum

contact with the remaining osseous structures. This ensured improved prosthesis support. In the context of obturator prosthesis design, if the principles of support and retention are fulfilled, the need for stability will automatically be satisfied.<sup>5</sup>

Neutral zone concept implies improved denture stability. Utilization of neutral zone for a maxillofacial patient allows tooth set up in conformity to the new acquired muscle positions. Recording neutral zone with both techniques may accommodate maximum oral functions.<sup>8</sup> Loss of facial support results in palatal positioning of maxillary teeth. Negative horizontal overlap may be provided to house the drooping maxillary facial curtain.<sup>2</sup> In the present case, a class I relation anteriorly and posterior cross bite were provided to accommodate the compromised buccal tissues.

To reduce the weight of the resurfaced obturator, bulb was ground interiorly. Classic technique for hollowing an obturator is to grind out the interior of the bulb after processing was utilized.<sup>9</sup> Lid was then reapplied using auto polymerizing acrylic. The closed hollow obturator prosthesis can prevent fluid and food collection, reduce air space, and allow for maximum extension.<sup>4</sup>

It may be concluded that obturator prosthesis fulfilling all primary objectives of prosthodontics, may serve optimally for maxillectomy patients.

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