



Immediate Oral Rehabilitation Using a Surgical Obturator with Buccal Extension After Partial Maxillectomy: A Case Report and Literature Review

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Case Report

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ABSTRACT

Maxillary defects resulting from surgical treatment of tumors, congenital malformations, and traumas might interrupt patients' speech, mastication, swallowing function, and physical appearance. The surgical obturator serves to restore the continuity of the palate as an immediate prosthesis after surgery. It provides an anatomically accurate, clean scaffold for surgical dressing while supporting and keeping the facial flap pressure. We report a case of temporary immediate oral rehabilitation after partial maxillectomy. A 39-year-old woman presented with a benign right maxillary tumor. Postoperatively, a surgical obturator with the addition of a buccal extension was placed. Buccal extension is a high buccal flange that supports the facial flap and, consequently, maintains the facial esthetics. This modified obturator also serves as a scaffold for surgical dressing and temporary defect closure between the nasal and oral cavities. We also outline a brief literature review of oral rehabilitation using a surgical obturator after maxillectomy. In the present case, follow-up evaluation showed that the obturator supported the upper lip, lifted the nasal lobe of the affected area, and provided a more symmetrical facial feature. Oral function improvements, such as swallowing, speech, and better facial profile, were also observed.

Key words: Partial maxillectomy, maxillary defect, surgical obturator.

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Introduction

The maxilla determines the shape of a person's face, particularly in the midfacial region. It plays a vital role in maintaining the airways and speech, chewing, swallowing, and esthetic functions.¹ Cavity opening between the antrum and the nasopharynx is the most common defect in the maxilla, causing difficulties in swallowing and speech and an unesthetic appearance.^{2,3} Maxillary defects can result from the surgical treatment of oral neoplasms, congenital disabilities, or high-impact injury.^{3,4}

The intraoral structures involved in maxillary defects may include the maxillary sinus cavity, palatal bone, and alveolar bone.³ The missing parts of the soft and hard palates alter the function because the structure is insufficient for the remaining tissues. A side effect of surgical resection of the maxilla or maxillectomy is anatomical changes because of secondary healing, tissue contractures, the underlying bone structure, and tissue edema. Rehabilitation after removal of the hard or soft palate includes a prosthesis to help the patient in deglutition and speech.² The prosthesis fabricated to repair the defect is known as a maxillary obturator.⁵

An obturator is made from natural or artificial materials, disc- or plate-shaped, and placed into the

maxillary defect after partial or total maxillectomy.^{4,5} The surgical obturator is a direct prosthesis rehabilitation tool for maxillary deformities placed during the surgical procedure. Surgical obturators serve to retain the surgical pack, reduce the risk of contamination of surgical wounds from the intraoral area, and enable speech and swallowing in the early postoperative period.⁶ Using prosthetic rehabilitation is affected by the location and size of the maxillary defect of the patient.⁷ Prosthetic rehabilitation after total and partial maxillectomy is aimed at creating an obturator that can separate the oral and nasal cavities and improve masticatory, speech, swallowing, and esthetic functions.^{3,4} The surgical obturator supports soft tissues and reduces scar contracture and damage, thereby postoperatively improving patient satisfaction.⁸

The surgical obturator varies widely in design and can be made from toothless acrylic resin prostheses, retention components using wire clasps, and acrylic resin prostheses to restore the dental arch and shape of the palate.^{8,9} Many techniques have been described for manufacturing immediate surgical obturators. These techniques have advantages and limitations, such as

multiple processing steps during fabrication.¹⁰ Here, we report a case in which a surgical obturator with buccal extension was used. Buccal extension is a high buccal flange that supports the facial flap and, consequently, maintains facial esthetics.

Case Report

A 39-year-old woman presented with a benign right maxillary tumor (Figure 1), referred from the General Surgery Department for immediate surgical obturator application. Radical maxillectomy was performed under general anesthesia in an operating room. Medical history of the patient revealed upper right cheekbone mass, since 7 years ago, that grew in the last 5 years, no history of medical compromise. Extraoral and intraoral examinations showed painless cystic mass in right maxilla, across the midline of palate. Particular attention was paid to the teeth with carious lesions, requirement of endodontic treatment, or mobility. Tooth surfaces were scaled to remove calculi and improve the patient's oral hygiene. The immediate surgical obturator design with buccal extension supported the facial flap and, consequently, maintained facial esthetics.

The study protocol was approved by the ethics committee of the Rumah Sakit Universitas Airlangga, Surabaya, Indonesia (no. UA-02-22119). The first step was to examine the oral lesion carefully before surgery and discuss the treatment plan with the oncology surgeon regarding the proposed incision line and extent of resection. A presurgical impression of the maxillary arch was taken with irreversible hydrocolloid and poured with gypsum material type II to obtain a working cast. The resection line was made on the maxillary working cast (Figure 2). The oncology surgeon reviewed the design to verify the extent of resection.

The cast of the lesion area was modified to acquire normal anatomical contours by comparing the patient's three-dimensional mouth model. It was intended for adaptation to the buccal extension design. Subsequently, a hard, round stainless-steel orthodontic wire was used to fabricate the C-clasp and Adam's clasp to form retentive areas of the remaining healthy teeth on the unresected side. The palatal plate was incorporated into the clasps with heat-polymerizing acrylic resin and finished and polished with stone polish.

The plate obturator was reinserted on the maxillary working cast to evaluate all surfaces of the defect side and retention on the unresected side. Finally, a surgical obturator with buccal extension was fabricated for the patient (Figure 3).

On the day of the operation, after the resection (Figure 4A), the palatal plate served as a temporary surgical obturator (Figure 4B). Plate reduction was applied during the operation for defect adaptation. The Adam's clasp and C-clasp were inserted into the teeth to increase retention. The surgical pack was placed inside the defect to fill the surgical void for surgical dressing. Subsequently, the

surgical obturator was fixed with #2.0 circular silk sutures between the remaining palatal or peri-palatal soft tissues.

In postoperative care, the patient was placed on a liquid diet for 3 days. The surgical dressing was removed on postoperative day 3. After discharge from the hospital, the patient was routinely monitored at the polyclinic. Follow-up evaluation included oral functions, such as swallowing and speech, and the facial profile (Figure 5). When the wound tissue had healed well, the patient was sent to a prosthodontist 1 month postoperatively to receive a temporary obturator.

Discussion

We searched the PubMed database for articles published in the last 10 years using the following keyword: "Surgical obturator for maxillectomy." We obtained 121 articles, including case reports, case series, clinical trials, and reviews, both narrative and systematic. We retrieved articles of clinical studies comparing flap reconstruction and surgical obturators for oral rehabilitation. A total of 143 (53%) patients underwent oral rehabilitation with flap reconstruction, including 59 (41%) men and 84 (59%) women, with a diagnosis of benign tumor in 25 (17%) patients and malignant tumor in 118 (83%) patients. A total of 126 (47%) patients underwent oral rehabilitation with a surgical obturator, including 63 (50%) men and 63 (69%) women, with a diagnosis of benign tumor in 12 (9%) patients and malignant tumor in 114 (91%) patients.

Oral rehabilitation of maxillary defects after maxillectomy can be carried out by using a material prosthesis or with surgical flap reconstruction. Rehabilitation using a prosthesis obturator is frequently performed by practitioners because it can reduce the risk of donor morbidity. The disadvantage of using an obturator is the gradual use process that is expensive and requires patient compliance to maintain the cleanliness of the obturator.¹¹

Oral rehabilitation using a prosthesis obturator is divided into three stages: immediate, temporary, and definitive.^{2,5,12} The immediate surgical obturator is the first temporary prosthesis rehabilitation to restore the palate and alveolar bone continuity after maxillectomy.^{2,7} In the present patient, this obturator was inserted at the time of surgery in the operating room.⁴ The primary function of the immediate surgical obturator was to separate the oral and nasal cavities and support the surgical dressing.^{10,13} It reduced the risk of infection from bacterial contamination from the oral cavity.⁴ The immediate surgical obturator is composed of an acrylic denture base without artificial teeth. It is usually used for a short duration, i.e., 7–14 days, up to 1 month.¹⁴ A transient/temporary obturator replaces the immediate surgical obturator and usually adds artificial teeth.² The temporary obturator is the second prosthesis used until healing is complete and meets the overall functional and esthetic needs. The last stage is using a definitive obturator after the tumor treatment and healing process

have been completed. The definitive obturator is usually used 6–12 months postoperatively.¹⁴

The surgical obturator design has been developed with various modifications, including a hollow obturator, U-loop modification, buccal flange, and labial flange. These modifications were made to improve the retention of the surgical obturator. Buccal flange modification serves to restore orofacial contours more normally and indirect retention to reduce the movement of the surgical obturator.¹⁵

Oral *et al.* (1979) used a surgical obturator with a different design for ten participants. Some participants used a surgical obturator with a buccal flange, while others used a hollow-bulb obturator. In live speech evaluation results, both groups showed good sound production, but the buccal flange obturator showed a better retention rate than the surgical hollow-bulb obturator.¹⁶

The maxilla is a facial structure with support and esthetic functions together with the orbital bones, nasal bone, zygomaticomaxillary complex, and stomatognathic bones. It is responsible for projecting the nose, cheeks, and upper lip.¹⁴ Maxillectomy creates a maxillary defect that causes a connection between the oral and nasal cavities. The maxillary defect causes the patient to be unable to speak or swallow and affects the physical appearance.¹² Maxillary defects require comprehensive treatment and complex processes to restore missing skeletal and soft tissues and reconstruct the dental arch.¹⁴

Maxillary defects can be rehabilitated using a device prosthesis and surgical flap reconstruction.^{5,11} The advantages of using the surgical obturator are shortening the operation time and no requirement of additional surgery.^{11,12} The immediate surgical obturator was fabricated preoperatively and adjusted to the defects at the time of surgery.¹² The general principles of denture construction may be addressed for maxillofacial prostheses, including the surgical obturator. Obturators should be qualified for retention and stability requirement of the prosthesis.¹⁷

Retention of the surgical obturator is influenced by the remaining bone, teeth and soft tissues, and defect size.¹⁷ The surgical obturator design with the maximum extension of the denture base and utilization of the Adam's clasp and C-clasp provides increased retention of the surgical obturator.⁹ Retention can be improved by suturing the remaining soft tissue.¹⁷ The degree of surgical obturator movement is influenced by the size of the defect, residual height of the alveolar bone, contour of the remaining bone and soft tissue, and presence of undercuts.^{9,17} The surgical obturator with a large maxillary defect involving the palatal defect requires a design mostly extended vertically and horizontally to improve retention and stability.¹² The periodontal status of the abutment teeth for the Adam's clasp and C-clasp should be in good condition because it affects the absorption of functional forces and retention and stability of the surgical obturator.⁹ When the surgical obturator shows adequate retention, it is stable as well.¹⁷

In the present case, the surgical obturator did not include artificial teeth. The difference in this case design was that the surgical obturator used a high buccal extension to support the facial flap and support the projections of the nose, cheeks, and upper lip.¹⁸ A modification of buccal flange extension was used to restore speech and improve the orofacial contour of the patient.¹⁵ Construction of the obturator without teeth minimized the weight of the obturator by reducing the amount of compound used to restore the facial contours.¹⁸

The surgical obturator with buccal flange extension provided direct retention of the obturator prosthesis. Rotation and movement of the surgical obturator could be minimized by these modifications.¹⁵ The modification also provided cross-arch stability of the jaw wherein the extension acrylic of the buccal flange prevented rotation of the prosthesis. Additional retention with buccal flange extension did not increase the difficulty of fitting the prosthesis and was more comfortable for the patient.¹⁹

The first aim of using the immediate surgical obturator was to sustain the surgical dressing placed over the defect and close the open link between the oral and nasal cavities, which helped the patient with speech and swallowing after partial maxillectomy.¹² The surgical obturator restores loss of the maxillofacial contour, oral structures, and esthetics. It improves the psychosocial status of the patient. Patients with immediate surgical obturators have advantages of speech, convenience, and comfort in social interactions because the design with buccal extension can improve the facial profile, unlike patients who do not use obturators during the healing process.^{12,20} The present patient's condition was evaluated with a questionnaire regarding the quality of life using the surgical obturator adapted from Ali *et al.*'s study (2018).²¹ The patient showed improved speech and mastication. The patient also felt that her face was more symmetrical when using the surgical obturator.

Conclusions

The surgical obturator is the main treatment option for patients after maxillectomy because it is more effective and carries minimal risks. An immediate surgical obturator is required for mastication and swallowing functions, speech and swallowing corrections, and esthetic improvement after maxillectomy. The modified buccal flange extension provides direct retention and improves the orofacial contour of the patient with easy placement of the surgical obturator prosthesis. The main purpose of therapy in the patient is to eradicate the disease and provide a near-normal life postoperatively.

Conflict of Interest

None



Figure 1. Photographs on the first visit. (A) Anterior view. (B) Bottom view.



Figure 2. Maxillary working cast with a line of resection marked. (A) Anterior view. (B) Lateral view. (C) Occlusal view.

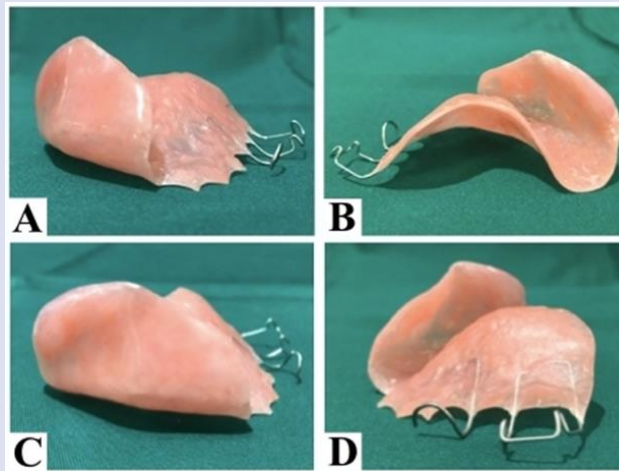


Figure 3. Surgical obturator with buccal extension. (A) Anterior view. (B) Posterior view. (C) Right-side view. (D) Left-side view.

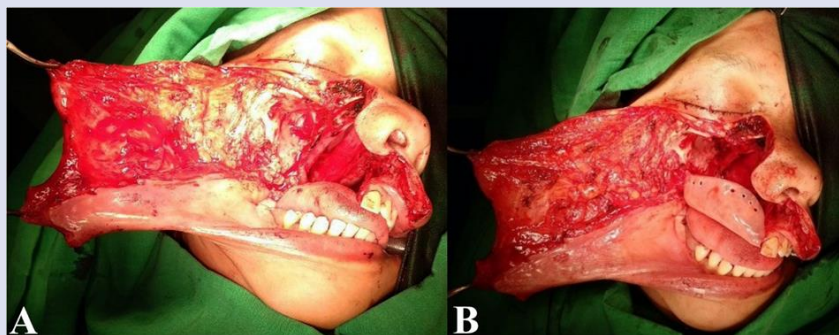


Figure 4. (A) Defect after resection. (B) Insertion of the temporary surgical obturator.

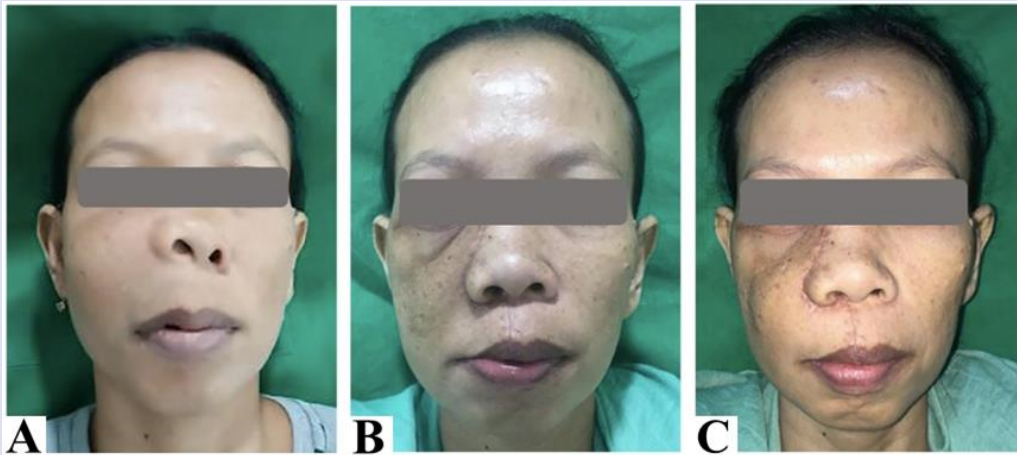


Figure 5. Facial profile. (A) Before surgery; (B) One-month postoperatively without a surgical obturator. (C) One-month postoperatively with a surgical obturator.

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