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Maxillary Obturators

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ABSTRACT

This paper discusses how the congenital, developmental, acquired and surgical defects of the oral cavity and related structures can be treated in different ways. Insufficient function of various maxillofacial tissues might be because of the repercussion of treatment modalities of malignant tumour. Patients after surgical removal of tumour may have disrupted anatomy due to scarring, tissue contracture, lack of bony tissue and edema. These result into disrupted speech, dysphagia, regurgitation of food through nose. These problems may be solved by fabrication of prosthesis by adjustment to soft tissues. This prosthesis is called as ' obturator'. Obturator is the prosthesis fabricated with palatal defects in form of cleft palate, oro-enteral fistula or surgical resection after removal of pathology like tumour or cancer.

Introduction

Malignant Tumour of maxilla can be treated by different modalities including surgical treatment, radiotherapy, chemotherapy, physiotherapy and prosthetic treatment if required. Hemimaxillectomy causes problems in speech, swallowing, mastication which affect different aspects of life and may lead to functional problems due to loss of tissue. Anxiety, Emotional stress, depression & social phobia are associated complaints due to lost part of maxillofacial complex. Small palatal defects due to hemi-maxillectomy can be treated by micro vascularized flaps. Large Resection defects can be treated by obturators with dental or maxillofacial prosthesis. Remaining teeth and tissues may be gained used as support for prosthesis. Obturators have paved way for different advantages which include better facial appearance due to presence of support to facial tissues. In addition to this, since it is removable prosthesis, it gives clear vision for further detection of any other tumour. Since maxillary defect may cause nasal defect due to direct communication, obturator can prevent this. Swallowing, Mastication and speech are preserved due to obturators because it replaces soft and hard tissues.

Definitions

An obturator is a prosthesis which is fabricated for the patients with the palatal defects in the form of cleft lip and palate, oroantral fistula, or surgical resection after removable of pathology-like tumor or cancer1

- Chalian in 1971 described an obturator as a disc or plate, natural or artificial which closes an opening or defect of the maxilla as a result of cleft palate or partial or total removal of the maxilla for a tumor mass[1]
- According to Glossary of Prosthodontic Terms, obturator is a prosthesis used to close a congenital or acquired tissue opening primarily of the hard palate and/or contiguous alveolar/soft tissue structures
- Obturator is that component of a prosthesis that fits into and closes a defect within the oral cavity or other body defect.
- Obturator is 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, i.e. cancer, cleft palate, osteo-radionecrosis of the palate. It helps to restore the continuity of the hard palate and oral cavity from nasal cavity, maxillary sinus, and orbit from the oral cavity.

Ideal requirement for maxillary obturator

The maxillary obturator must be designed as to easily and swiftly place and held in position both comfortbly and securely to help the patient carry out natural functions such as phonation, deglutition ,mastication and can help maintain hygiene easily. The prosthesis should be for a durable amount of time, and must retain its polish .It should exhibit life like appearance .

There are various functions of obturator.[5]

1. To close the defect

2. For feeding purpose

3. To keep the wound or defective area clean, thus enhance the healing of traumatic or postsurgical defects

4. As a stent to hold dressings or packs post surgically

5. To reduce the possibility of postoperative hemorrhage

6. Help to reshape and reconstruct the palatal contour and/or soft palate

7. Improve speech or in some instances, makes speech possible

8. Help in reducing the flow of exudates, saliva, and fluids from the mouth into the nasopharynx

9. To improve the esthetics and correct lip and cheek contour

10. To benefit the morale of the patient with maxillary defects

11. To improve function when deglutition and mastication are impaired.

Classification of obturator

Obturator may be classified

1. According to origin of the discrepancy

a. For congenital defect

- To close the opening of hard palate, a simple base plate type of palatal plate helps to correct the swallowing, feeding, and speech
- An obturator with a tail, consisting of speech appliance or speech aid prosthesis, which restores soft and hard palate defects and a velopharyngeal extensions that correct the speech
- An overlay denture or a superimposed denture.

b. For acquired defect

- Immediate temporary obturator or surgical obturator is a base plate type of prosthesis which is constructed from the preoperative active impression cast and inserted at the time of surgery, i.e. resection of the maxilla in the operating room
- Interim obturator, temporary obturator, treatment obturator, or transitional obturator is constructed from the postsurgical master cast
- Permanent obturator or definitive obturator.

2. According to location of the defect

a. Lateral or buccal obturator: Closes a defect on the labial or buccal ridge areas

b. Alveolar obturator: Closes opening on the alveolar ridge, either on the anterior or the posterior side of the upper jaw

c. Hard palate obturator: Closes opening continued within the anatomical limits of the hard palate whereas soft palate obturator closes the opening on the soft palate

d. Soft palate obturator: Closes the opening on the soft palate

e. Palatal lift prosthesis or obturator: Used to raise the soft palate to the level of the hard palate. When palatopharyngeal incompetence is encountered, rehabilitative efforts are designed to elevate the soft palate. This elevation places the junction of the middle and posterior third of the soft palate in close proximity to the posterior to the pharyngeal wall creating a muscular seal that prevents nasal regurgitation of fluid and food during deglutition. The prosthesis also prevents the escape of air into the nose when speaking[6],[7]

f. Pharyngeal obturator or speech aid prosthesis: It is used in palatopharyngeal insufficiency. This type of prosthesis extends beyond the residual soft palate to create separation between the oropharynx and nasopharynx. Obturator is designed to close the opening between the residual hard and/or soft palate and the pharynx insufficiency. It provides a fixed structure against which the pharyngeal muscles can function to affect palatopharyngeal closure. They establish contact with the musculature comprising the lateral and posterior pharyngeal walls and the soft palate and involve the most difficult functional requirements.[8]

3. According to the type of obturator attachment to the basic maxillary prosthesis

a. Fixed: Fixed type is stationary and directed toward the Passavant's pad. It depends on the forward movement of the pharynx to effect closure. This obturator is generally preferred to hinge and meatus

type as it is relatively efficient. Fixed type will not impede the residual function and also will not compromise the integrity of resting tissues

b. Hinged: Hinged type is connected to the main maxillary prosthesis by means of a hinge. Its bulk is located along the cleft edges and supposedly serves an anatomic purpose, in that, it moves up and back, supported by the soft palate edges, as does the normal soft palate to affect velopharyngeal closure

c. Meatus: Meatus type of obturator prosthesis extends obliquely upward from the hard soft palate junction to occlude against the turbinate and superior aspect of nasal cavity up to the nasal meatus. It separates the oral and the nasal cavities. It is a speech aid prosthesis designed to close the posterior nasal conches through a vertical extension from the distal aspect of the maxillary prosthesis. This is indicated when entire soft palate has been lost. It is most applicable to the fully edentulous patient who has undergone a total soft palate resection[9],[10]

d. Detachable obturator: The detachable type of obturator is one, in which the maxillary prosthesis and obturator parts are held together by some attachment. The patient can detach the parts for the purpose of insertion and removal, cleaning, and can unite them in the mouth. It is used in patients with restricted opening

e. Magnetically retained obturator: Two portions are connected to each other with the magnets. Magnets are placed as laterally and posteriorly as possible to provide maximum amount of leverage in the denture and retention that is available

f. Implant retained obturator: Implant is more commonly used in the anterior maxillary segment as the bone loss in the anterior segment is approximately threefold more than the posterior segment placement of implant at the time of surgery due to the high rate of recurrence rate and morbidity.[11]

4. According to the physiologic movement of oral, nasal, and pharyngeal tissues adjacent to or functioning against the obturator

a. Static obturator: This obturator covers defects in the area from the lips to the junction of the hard and the soft palates and are essentially covering prostheses

b. Functional obturator: This obturator provides closure in the soft palate and pharyngeal areas and provides surfaces against which movable tissue function. A functional obturator is more difficult to construct since it must maintain contact during muscular activity and should not interfere with it.

5. Depending on the material used

a. Metal obturator

b. Resin obturator

c. Silicon obturator.

6. Mohamed Aramany in 1978 classified obturators for maxillectomy patients who are partially edentulous into seven groups. It takes into consideration only the hard palate defects [Figure 1].[12]

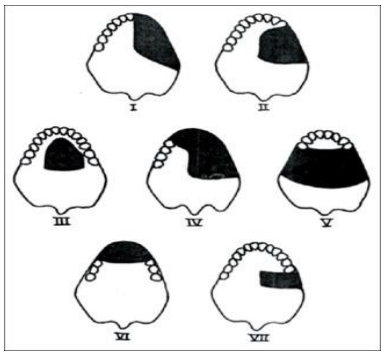

Figure 1: Mohamed Aramany classification

a. Class I: Resection or defect is performed along the midline of the maxilla; teeth are maintained on one side of the arch. It is the most frequent maxillary defect

b. Class II: Defect is unilateral, retaining the anterior teeth on the contralateral side

c. Class III: Palatal defect occurs in the central portion of the hard palate and may involve part of the soft palate. The surgery does not involve the remaining teeth

d. Class IV: Defect crosses the midline and involves both sides of the maxilla. There are few teeth remaining which lie in a straight line. This may create a unique design problem similar to the unilateral design of conventional removable partial dentures

e. Class V: Surgical defect is bilateral and lies posterior to the remaining abutment teeth

f. Class VI: Defect occurs mostly in trauma and the defect lies anterior to the bilaterally standing abutments. Surgical intervention of anterior midpalatal pathology can cause such type of defects

g. Class VII: This situation is similar to Kennedy Class II, but the defect is small unilaterally posterior to the standing abutments. This situation usually arises as a result of minor surgery for removal of pathology or can occur as squeal of multiple extractions in the posterior regions.

Depending on the phase of treatment or prosthetic rehabilitation of acquired hard palate defects

Patients who undergoes maxillary resection are rehabilitated in three phases by an obturator prosthesis that supports the patients through various stages of healing. These three phases are immediate temporary surgical obturator, interim obturator, and definitive obturator.

It involves three phases of treatment

a. Immediate surgical obturator

b. Transitional obturator

c. Definitive obturator

1. Immediate surgical obturator or maxillary surgical prosthesis or immediate temporary obturator: Surgical obturator is defined as a temporary prosthesis used to restore the continuity of the hard palate immediately after surgery or traumatic loss of a portion or all of the hard palate and/or contiguous alveolar structure - GPT

- This is a base plate type of prosthesis which is constructed without a definite extension into the defect
- It is fabricated on casts obtained from the preoperative active impression and is inserted at the time of surgery, i.e., resection of the maxilla in the operating room
- It is used primarily in conjunction with a surgical procedure to resect the maxillae and adjacent structures totally or in parts
- After initial healing and removal of the pack after 7–10 days, the immediate obturator is usually discarded and replaced by a transitional or temporary prosthesis having a definite bulbous extension and occasionally anterior artificial teeth
- Objective of the obturators is to restore and maintain oral functions at reasonable levels during the postoperative period until healing is substantially completed
- Historically, there has been some disagreement as to the value of the surgical obturator. Lang and Bruce (1967) and Zarb (1967) have advocated the use of immediate surgical obturator in most patients.

- The obturator should terminate short of skin graft-mucosal junction
- Prosthesis should be simple, lightweight, and inexpensive

- Normal palatal and alveolar contours should be reproduced to facilitate postoperative speech and deglutition
- Posterior occlusion should not be established on the defect side until the surgical wound is well organized
- The obturator for dentate patients should be perforated at interproximal extensions to allow for it to be wired with the remaining teeth
- In some patients, existing complete denture or removable partial denture may be adapted for use as a surgical obturator. Procedure of fabrication of surgical obturator in edentulous patients is as follows.[14]
- An alginate impression of the maxilla is made, and cast is obtained
- If any tumor bulk is present on the alveolus or hard palate, that area of the cast is reduced to normal contour
- Ensure that the prosthesis will not be overextended at the peripheries of the surgical defect, and prosthesis should have border extensions identical to a complete denture
- Avoid estimating the extent of the surgical peripheries, especially in the soft palate and pterygoid area
- Surgical packing will close any discrepancies in the surgical defect margin and the prosthesis margin
- Prosthesis can be fabricated with heat-cure resin or autopolymerizing resin. A heat cure base plate is not necessary as the prosthesis will be used for <10 days. It is most commonly fabricated in clear resin to facilitate visualization of the underlying tissues at the time of placement and during the initial healing period
- Use of an immediate surgical obturator is less common for the edentulous patient than the dentate patient because of the seemingly invasive method of securing the prosthesis.

Surgical obturator in dentulous patients

1. Basic approaches that can be considered in designing a surgical obturator for the dentate patient.

a. One can fabricate the obturator according to the most conservative line of resection, which will still allow the obturator to be used for larger resections with the understanding that surgical dressing may be needed to fill the space between the obturator and the final line of resection. This method allows the surgeon to utilize the obturator regardless of the size of the defect and does not require the surgeon (or the prosthodontist) to perform intraoperative adjustments to the obturator

b. Other option is to design and fabricate the surgical obturator for the most extreme surgical resection, thereby making it fit best in the worst case situation. With this approach, the surgeon must be willing and able to modify the obturator to accommodate the teeth that are not resected but have been removed

from the cast during obturator fabrication. The prosthodontist can guide at the time of surgery to perform the modifications

c. It is the surgeon's preference that dictates the design and placement of the lines of resection on the cast, type of retentive mechanism built into the surgical obturator, and where the holes need to be placed in the obturator

d. Prosthodontic rehabilitation of the dentate patient is a lengthy and involved process. However, if attention is paid to the proper sequencing and details of treatment, it can be one of the most satisfying procedures.[16]

2. Temporary or transitional or postsurgical or interim Obturator

a. It is defined as a prosthesis that is made several weeks or months following the surgical resection of a portion of one or both maxillae. It is frequently included replacement of teeth in the defect area. This prosthesis when used replaces the surgical obturator that is placed immediately following the resection and may be subsequently replaced with a definitive obturator - GPT

b. This obturator is constructed from the postsurgical master cast

c. Interim obturator is placed when the surgical dressing that was supported by the surgical obturator is removed from the superior recesses of the maxillectomy defect

d. This obturator has a false palate, false ridge, teeth, and a closed bulb which is mostly hollow

e. The interim obturator serves the patient for 4–6 months till the maxillary defect heals and matures. Teeth are frequently added to the prosthesis at this juncture to improve function and enhance cosmetics

f. Natural teeth selected for abutment are clasped with stainless steel or wrought metal wire retainers to enhance retention and stability

g. Patient should be seen routinely and must be taught about home care procedures for the regular cleaning of the residual defect, remaining teeth, and the prosthesis

h. When sutures and surgical pack are removed, the prosthodontist should be present in the operating room to begin or to continue fabrication of the temporary obturator[17]

3. Definitive obturator: It is defined as a prosthesis that artificially replaces part or all of the maxilla and the associated teeth lost due to surgery or trauma - GPT

ADVANTAGES AND DISADVANTAGES

- Weight of the obturator is reduced, making it more comfortable and efficient
- Light weight improves one of the fundamental problems of retention and increases physiological function so that teeth and supporting tissues are not stressed unnecessarily
- Decrease in pressure on the surrounding tissues, aids in deglutition and encourages the regeneration of tissue
- Light weight reduces the self-consciousness of wearing a denture
- Light weight does not cause excessive atrophy and physiological changes in muscle balance.

Trouble shooting of obturator

Patients wearing obturators over a period of time complain of nasal reflux and hyper-nasal speech caused by escape of air. This is mainly due to continued fibrosis of the tissues bordering the prosthesis.

Leakage into the nose

The prosthesis should be disclosed with a tissue-conditioning material, and the patient should perform functional movements. If swallowing and speech improve, the disclosing material should be evaluated for the area where the tissue conditioner is thickest. The speech can be tested by evaluating the “m” and “b” sounds and the word beat. The thickness of the material can be checked with an explorer.

Most areas will be very thin, while other areas will be 2–3 mm or thicker. These thicker areas should be targeted for the reline procedure. This reline can be accomplished chair side with an auto-polymerizing or composite acrylic resin (Triad). This procedure satisfies the patient's chief complaint and requires minimal time.

Hypernasal speech

Disclosure of the bulb with a tissue conditioning material often reveals that the surface contact is adequate. In this situation, the prosthesis is adequately closed at the periphery, but the patient's soft palate and pharyngeal closure mechanism are not functional. Observation of the soft palate usually reveals that it is barely elevating on phonation and/or it is quite short in an anterior-posterior dimension. This condition is seen frequently when a portion of the soft palate was also resected due to a lesion located at the hard palate-soft palate junction. Relining of the prosthesis periphery will not alter the hypernasal speech. If there is adequate space to add a pharyngeal bulb to the posterior medial aspect of the prosthesis, this bulb can pass superior to the edge of the soft palate and extend into the larynx. In this way, the minimal functional palate is bypassed by the pharyngeal obturator. The conventional

obturator prosthesis will close the hard palate defect, and the extension will close the nasopharynx defect

Some obturator prostheses may lack sufficient extension or adaptation at the time of delivery to prevent leakage of fluids of food bolus into the defect upon swallowing. In other patients, speech may be suboptimal

References

1. Chalian VA, Drane JB, Standish SM. Maxillofacial Prosthetics. Baltimore: The Williams and Wilkins Co.; 1971.

2. Deba K, Yunus N, Tamrakar A. Oral and maxillofacial prosthetics Part I: Objectives and history. Heal Talk 2012;4:18-20.

3. Rahn AO, Boucher LJ. Maxillofacial Prosthetics: Principles and Concepts. Saunders (W.B.) Co Ltd, 1970

4. Parr GR, Tharp GE, Rahn AO. Prosthodontic principles in the framework design of maxillary obturator prostheses. J Prosthet Dent 1989;62:205-12. [PUBMED]

5. Lang BR, Bruce RA. Presurgical maxillectomy prosthesis. J Prosthet Dent 1967;17:613-9. [PUBMED]

6. Schaefer K, Taylor TD. Palatal lift prosthesis first described by Gibbons and Bloomer in 1958. Clinical application of palatal lift. Clinical Maxillofacial Prosthetics. 1st ed., Ch. 9. Chicago: Quintessence Publication Co, Inc.; 2000. p. 133.

7. Lavelle W, Hardy J. For treatment of palate-pharyngeal incompetence: Palatal lift prosthesis. J Prosthet Dent 1979;42:308.

8. Eckert S, Desjardins R, Taylor T. Clinical Management of the Soft Palate Defect. Ch. 8. Chicago: Quintessence Publication Co, Inc.; 2000. p. 125.

9. Thomas T, Ronald D. Construction of the meatus type obturator: Its advantages and disadvantages. J Prosthet Dent 1983;16:279.

10. Sharry JJ. The meatus obturator in cleft palate prosthesis. Oral Surg Oral Med Oral Pathol 1954;7:852-5. [PUBMED]

11. Gitto CA, Plata WG, Schaaf NG. Evaluation of the peri-implant epithelial tissue of percutaneous implant abutments supporting maxillofacial prostheses. Int J Oral Maxillofac Implants 1994;9:197-206. [PUBMED]

12. Aramany MA. Basic principles of obturator design for partially edentulous patients. Part I: Classification. J Prosthet Dent 1978;40:554-7. [PUBMED]

13. Beumer J, Curtis T, Marunick M. Maxillofacial Rehabilitation: Prosthodontic and Surgical Considerations. St. Louis: Ishiyaku Euro America, Inc. Publishers; 1996. p. 240-85.

14. Desjardins RP. Obturator prosthesis design for acquired maxillary defects. J Prosthet Dent 1978;39:424-35. [PUBMED]

15. Taylor TD. Clinical maxillofacial prosthetics. In: Jacob RF, editor. Clinical Management of the Edentulous Maxillectomy Patient. Ch. 6. Illinois: Quintessence Publication CO, Inc.; 2000. p. 85-102.

16. Taylor TD. Clinical maxillofacial prosthetics. In: Arcuri MR, Taylor TD. Clinical Management of the Dentate Maxillectomy Patient. Ch. 7. Illinois: Quintessence Publication CO, Inc.; 2000. p. 103-20.

17. Shaker KT. A simplified technique for construction of an interim obturator for a bilateral total maxillectomy defect. Int J Prosthodont 2000;13:166-8. [PUBMED]