

# Review : Prosthodontic Management of Acquired Palatal Defects

Dr. Deepika Sharma<sup>1</sup>, Dr. Narendra Kumar<sup>2</sup>, Dr. Nandini Singhal<sup>3</sup>, Dr. Kirti Dahiya<sup>4</sup>.

PG Student<sup>1</sup>, Professor & Head<sup>2</sup>, Reader<sup>3</sup>, Senior Lecturer<sup>4</sup>, Department of Prosthodontics & Crown & Bridge, Institute of Dental Studies & Technologies, Modinagar

## Abstract

The acquired palatal defects are created by surgical treatment of benign or malignant neoplasms and by trauma. These defects cause functional disability and psychological trauma to the patient. This article discusses briefly the historical perspective, etiology of defects, classification of defects, role of prosthodontist in management and types of prosthesis used in management of acquired palatal defects. These prosthesis facilitates speech and deglutition by replacing those tissues lost due to the disease process which result in reduce nasal regurgitation and hyper nasal speech, improve articulation, deglutition, and mastication.

**How to cite this Article:** Sharma D, Kumar N, Singhal N, Dahiya K. Review : Prosthodontic Management of Acquired Palatal Defects. HTAJOC.2018;11(2):47-48

## Introduction

The acquired palatal defects are caused by the resection of neoplasms of the palate and paranasal sinuses. The extent of the resection is dependent on the size, location, and potential behavior of the tumor<sup>1</sup>. Annually 300,000 patients worldwide are diagnosed with cancer in oral cavity. It has been estimated that among all intraoral defects caused due to cancer, 15 percent defects are palatal defects.<sup>2</sup> The Acquired palatal defect may have serious consequences as far as the relationship between form and functions like inability to chew, swallow, disorders in phonation, fluid and food leakage into the nasal cavity and psychological problems are concerned.<sup>3</sup> Rehabilitation of such patients is quiet challenging and requires multidisciplinary team form comprehensive care and optimal post treatment functional outcomes. The role of a maxillofacial prosthodontist normally is to provide appliances and devices to restore esthetics and function to the patient. The prosthesis for hard palatal defects are constructed in three phases in order to fulfil different objectives in each phase, these are surgical obturator, interim obturator and definitive obturator. The prosthesis for soft palatal defects are pharyngeal obturator, meatus obturator and palatal lift.<sup>5</sup>

## Historical Perspective

Prosthodontic management of palatal defects has been employed for many years. Ambrose Pare was the first to use artificial means to close a palatal defect as early as the 1500s. The early obturators were used to close congenital rather than acquired defects.<sup>6</sup> Claude Martin described the use of a surgical obturator prosthesis in 1875. Fry described the use of impressions before surgery in 1927, and Steadman described the use of an acrylic resin prostheses lined with gutta-percha to hold a skin graft within a maxillectomy defect (1956). Beder (1968) reported a palatal lift prosthesis with a generic velar lamina made of acrylic. The prosthesis, the palatal elevator button consisted of a maxillary denture base and a velar lamina comprised of a wire connector and a button. Mazaheri and Mazaheri (1976) wrote an important paper on prosthodontic aspects of palatal elevation and palatopharyngeal stimulation. They described the palatal lift prosthesis and the combination bulb lift-prosthesis used for velopharyngeal incompetency and velopharyngeal insufficiency.<sup>8</sup>

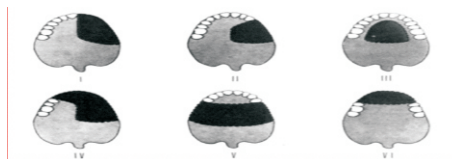
## Etiology of Acquired Palatal Defects

Acquired defects of the hard and soft palate mainly caused due to surgery or trauma. The defect appears in the form of a small opening resulting in communication from the oral cavity into the maxillary sinus, or it may include portion of the hard and soft palate, alveolar ridge

and the floor of the nasal cavity (Chalian 1971). The other causes of acquired palatal defects are Surgery during the resection of tumours, treatment of oral cancers and malignant tumour reoccurrence, Pathological entities (noma, syphilitic gumma, leprosy or leishmaniasis), iatrogenic (after dental extraction, minor or major oral surgical procedures, osteotomies, orthognathic surgeries or trauma from the suction cup used to retain upper dentures), or failure in cleft palate repair after irradiation or removal of tumors and cysts of the palate or antrum, traumatic injuries including extensive fractures, gun shot injury and accidents.<sup>7</sup>

## Classification of Partially Edentulous Dental Arches with Maxillectomy Defects (Aramany (1978))<sup>10</sup>

Defects of the partially edentulous patients have been categorized into 6 groups by Aramany (1978) based on the relationship of the defect area to the remaining abutment teeth.



**Class I:** The resection in this group is performed along the midline of the maxilla, with the teeth maintained on one side of the arch. This is the most frequent occurring defect and most patients falls into this category (FIG I).

**Class II:** The defect in this group is unilateral, retaining the anterior teeth on the contra lateral side. This type of surgical resection is favoured more rather than the classical maxillectomy. The central incisors and sometimes all the teeth anterior to canine or premolar are saved (FIG, II).

**Class III:** The palatal defect occurs in the central portion of the hard palate and may involve part of soft palate. The surgery does not involve and remaining teeth (FIG III).

**Class IV:** The defect crosses the midline and involves both sides of maxilla (FIG IV).

**Class V:** The surgical defect in this situation is bilateral and lies posterior to the remaining abutment teeth (FIG V).

**Class VI:** It is rare to have an acquired maxillary defect anterior to the remaining abutment teeth. This occurs mostly in trauma or congenital defects rather than as a planned surgical intervention (FIG VI).

## Role of Prosthodontist in Management of Acquired Palatal Defects

The prosthodontist must be highly alert towards the medical health of the patient and be familiar with the various hospital protocols. He is best qualified to provide prosthetic support to the surgeon by preparing facial mouldages and

surgical stents to aid postoperative recovery. Communication with the surgeon as far as extent of disease, precise surgical technique, anticipated postoperative defects and healing time could help to plan the treatment.<sup>11</sup> Recommendations can be made for the preservation of tissues or to improve the existing anatomical structures to improve the retention, stability and support for the prosthesis (Zlotolow, 2001).

Similarly, interaction with the radiation oncologist can render opinion regarding oral and dental condition, and recommended extraction of teeth, maintenance of teeth post radiation since the radiation might modify the care of teeth and mouth.<sup>12</sup> Co-ordination with speech pathologist to gain knowledge about mechanics and physiology of speech can help to design the prosthesis, which can fulfill the requirements of resonance, phonation and articulation (Chalian et al.1972).<sup>13</sup> The primary objectives of the maxillofacial-prosthodontist in the management of acquired palatal defects are to restore the functions of mastication, deglutition, and speech and to achieve normal oro-facial appearance.

## Prosthodontic Management of Acquired Hard and Soft Palate Defects

The prostheses needed to repair the defect is termed as obturator. An obturator (Latin: obturare, to stop up) is a disc or plate, natural or artificial, which closes an opening or defect of the maxilla as a result of a cleft palate or partial or total removal of the maxilla for a tumour mass (Chalian et al., 1971). It is defined as a maxillofacial prosthesis used to close a congenital or acquired tissue opening, primarily, of the hard palate and/or contiguous alveolar/soft tissue structures (GPT 8).<sup>14</sup>

### Indications for the Use of an Obturator:

1. It act as a framework over which tissues may be shaped by the surgeon.
2. It used as a temporary prosthesis during the period of surgical correction.
3. It is used to restore a patient's cosmetic appearance rapidly for social contacts.
4. When surgical primary closure is contra-indicated.
5. When the patient's age contraindicates surgery.
6. When the size and extent of the deformity contraindicates surgery.<sup>1</sup>
7. When the local avascular condition of the tissues contraindicates surgery.
8. When the patient is susceptible to recurrence of the original lesion which produced the deformity (Nidiffer & Shipmon, 1957).

### The Obturator Fulfils Many Functions:

1. It may be used to keep the wound or defective area clean, and may enhance the

healing of traumatic or post-surgical defects.

2. It may help to reshape and reconstruct the palatal contour and/or soft palate.
3. It improves speech or, in some instances makes speech possible in the important area of esthetics, the obturator can be used to correct lip and cheek contour.<sup>15</sup>
4. It can benefit the morale of patients with palatal defects. When deglutition and mastication are impaired, it can be used to improve function.
5. It reduces the flow of exudates into the mouth.
6. The obturator may be used as a stent to hold dressings or packs post-surgically in maxillary resections. It reduces the possibility of post-operative haemorrhage, and maintains pressure either directly or indirectly on split-thickness skin grafts, thus causing close adaptation of the graft to the wound which prevents the formation of a haematoma and ultimate failure of the graft (Lang & Bruce, 1967; Chalian et al., 1971).

**Obturers are Constructed in Three Phases, Fulfilling Different Objectives in Each Phase. (Beumer III Et Al., 1979; Wiens, 1990)**

#### a. Surgical Obturator

It is constructed from pre operative cast after determining the approximate surgical boundaries of resection preoperatively by consulting the surgeon. At this point, it is an approximate guess relying on radiographic findings. The surgical obturator is inserted and sutured, screwed or wired at completion of resection. It separates the oral and nasal cavities, provides support for surgical packing, supporting the split thickness skin graft if used, minimizes wound contamination, enables the patient to speak and swallow immediately after surgery (Huryn, 1989).

#### b. Interim/Provisional Obturator

The surgical obturator sometimes can be modified to compensate for tissue changes or surgical defect, which is different from the pre-surgical determination to form the provisional obturator. Usually it is constructed from post surgical impression to accurately reflect the defect. It replaces the surgical obturator and is worn in the postoperative healing period. The interim prosthesis in addition to clasps for retention can have anterior teeth for esthetics and a flange for lip and cheek support, which contributes to the patient's well being and social integration. Use of molar teeth is avoided to minimize occlusal pressure on the defect. The obturator is relined periodically for better adaptation as the healing progress. Good oral hygiene is encouraged during the healing phase. (Martin, 1993)

#### c. Definitive Obturator

It is a more permanent prosthesis designed and fabricated when the surgical site is stable usually between six months to a year and local recurrence is ruled out. Precise impression of the defect is made for the fabrication of the prosthesis that allow maximum distribution of forces to all available teeth if present, remaining hard palate, lateral walls of the defect and remaining alveolus. In addition, occlusal relationship must be obtained to make the prosthesis cosmetic as well as functional. Obturator bulbs for large defects can be made hollow to reduce the weight on the surgical side and improve retention of the prosthesis and comfort of the patient.<sup>17,18</sup>

### Prosthodontic Management of Acquired Soft Palate Defects

Velopharyngeal dysfunction may be congenital, developmental or acquired, it affects all age groups.

**Velopharyngeal Insufficiency-** Any problem of this valve either due to lack of tissue . vp insufficiency is distinguished by speech . vp insufficiency is distinguished by speech and nasal resonance abnormalities related to defects of the soft palate, which may be congenital as in cleft lip and palate (clp) or acquired as in palatal tumor resection.

**Velopharyngeal Incompetence-**When there is lack of proper movement of tissue will result in velopharyngeal dysfunction. VP incompetence describes dysfunction of an anatomically intact VP mechanism as in patients with neuromuscular disorders.<sup>19,20,21</sup>

#### Types of Soft Palate Defects

Velopharyngeal Insufficiency	Velopharyngeal Incompetence
a. Pharyngeal obturators	c. Palatal lift prosthesis
b. Meatus obturators	d. Speech bulb obturator

**Pharyngeal obturator-** It is a prosthesis which has a posterior extension to separate oropharynx and nasopharynx. This obturator prosthesis restores the defects of the palate and allows adequate closure of palatopharyngeal sphincter. When a pharyngeal obturator is placed, the patient can exhibit adequate separation between the oral and nasal cavities during production of plosives consonants or while blowing with variable intensity.<sup>22</sup>

**Meatus obturator-**It is designed to close the posterior nasal conchae through a vertical extension almost 90 upwards from the distal aspect of the maxillary prosthesis to reach the roof of the nasopharynx. They are very efficient, require no muscle trimming and results can be ascertained immediately. Since the vertical extension is closer to the palatal portion of the prosthesis, less torque is placed on the palatal portion thus decreasing the tendency to dislodge.<sup>23</sup>

**Palatal lift prosthesis -** A palatal lift can be used if the velum (down to the area of the uvula) has enough length to reach the pharyngeal wall.<sup>24</sup>

**Speech bulb prosthesis -**The lift then holds the velum up against the posterior pharyngeal wall. If the velum is too short to reach the pharyngeal wall, a speech bulb could be used. The bulb of acrylic fits behind the velum and with in the nasopharynx.<sup>25</sup>

#### Recent Trends in Palatal Prosthesis

The palatal prostheses can be made from a variety of materials such as polymethyl methacrylate or urethane-backed acrylate and medical- grade silicone. These prostheses are retained with adhesives, tissue undercuts, magnets or in some cases osseointegrated implants.<sup>26</sup> Advanced technologies like rapid prototyping and computer-aided design/ computer-aided manufacturing prosthesis in maxillofacial prosthodontics is now used successfully in order to obtain better mechanical qualities. Provision of obturators with good retention not only improve the quality of life but also enhance self esteem of the patients.<sup>27</sup>

#### Conclusion

Rehabilitation of patients with acquired palatal defects has always remained an enigma

for the prosthodontist. The unpredictable nature of the defects and the uncertainty of recurrence have made the job of the prosthodontist more challenging. The integrated efforts, sound knowledge and practical implication in rehabilitating patients with acquired palatal defects will help to bring smile and hope for patients with oral cancer now that long term survival is achievable. This article hereby makes an attempt to throw light on involved prosthesis and procedures in rehabilitating patients with acquired palatal defects.

#### References

1. The importance of form, characterization and retention in facial prosthesis. J Prosthet Dent 1966; Fonseca EP. 16: 338-43.
2. Coelho KR. The challenges of oral cancer and its burden in india. J Cancer Epidem 2012; 12:48-57.
3. Beumer et al. Rehabilitation of maxillary defects in maxillofacial rehabilitation. Quintessence Int 2011; 11: 195-12.
4. Genden EM et al. Comparison of functional and the quality of life outcomes in patients with and without palatotomy reconstruction. Arch Otolaryng Head Neck Surgery 2003; 129: 775-9.
5. Pigno MA. Conventional prosthetic rehabilitation after free flap reconstruction of a maxillectomy defect: A clinical report. J Prosthet Dent 2001; 86: 578-81.
6. Bulbulian AH. Maxillofacial prosthetics: Evolution and practical application in patient Armany MA. A history of prosthetic management of cleft palate: Pare to Suersen. JProsthet Dent 1971; 11: 45-6.
7. Grootsema WR. An overview of the maxillofacial prosthesis as a speech rehabilitation aid. J Prosthet Dent 1987; 57: 204-8.
8. Desjardins RP. Obturator prosthesis design for acquired maxillary defects. J Prosthet Dent 1978;
9. Aramany MA. Basic principles of obturator design for partially edentulous patients. Part I: Classification. J Prosthet Dent 1978; 40: 554-7.
10. Chierici G and Lawson L. Clinical speech considerations in prosthodontics: perspectives of the prosthodontist and speech pathologist. JProsthet Dent 1973; 12: 29-39.
11. Grunewald AM. The prosthodontist role in cranioplasty. JProsthet Dent 1955; 5: 235-43.
12. Rahn AO, Boucher LJ; Maxillofacial Prosthodontics: Principles and Concepts, WB Saunders 1970; 1-17, 83-112, 188-227.
13. Lemon JC, Kiat-Amnuay S, and Gettleman L. Facial prosthetic rehabilitation: preprosthetic surgical techniques and biomaterials. Curr Opin Otolaryngol Head Neck Surg. 2005; 13: 255-2.
14. Raj N, Raj V and Aeran H. Interim palatal lift prosthesis as a constituent of multidisciplinary approach in the treatment of velopharyngeal incompetence. J Adv Prosthodont 2012; 4: 243-7.
15. Omandi BL, et al. Maxillary obturator prosthesis rehabilitation following maxillectomy for ameloblastoma: case series of five patients. Int J Prosthodont 2004; 17: 464-8.
16. Keyf F. Obturator prostheses for hemimaxillectomy patients. J oral rehab 2001; 28: 821-9.
17. Okay DJ, Genden E, and Buchbinder D. Prosthodontic guidelines for surgical reconstruction of the maxilla: a classification system of defects. J Prosthet Dent 2001; 86: 352-3.
18. Taylor T. D. Clinical Maxillofacial Prosthodontics. Quintessence Int 2000; 1-15, 45-105
19. Chambers MS, Lemon JC, Martin JW. Obturation of the partial soft palate defect. J Prosthet Dent 2004; 9: 75-9.
20. Ram HK and Shah JR. A novel approach for velopharyngeal prosthetic rehabilitation. Int J Biomed Res 2013; 1(2): 70-6.
21. Tuna S, Pekkan G, Gumus HO and Aktas A. Prosthetic rehabilitation of velopharyngeal insufficiency: Pharyngeal obturator prosthesis with different retention mechanisms. Eur J Dent 2010; 4: 81-7.
22. Spratley MH, Cheney HJ and Murdoch BE. A different design of palatal lift appliance. Review and case reports. Aust Dent J 1988; 33: 491-5
23. Ueda N et al. New design of a palatal lift prosthesis combined with palatal bar. Cleft Palate J 2002; 39(1): 63-71.
24. Tapia G, Casey D, and Schaaf NG. Conversion of an interim into a definitive speech aid: a predictable approach. J Prosthet Dent 2002; 87: 106-109.
25. Mac Carthy D, Murphy N. Replacement of an obturator section of an existing two-piece implant retained edentulous obturator. J Prosthet Dent 2010; 83: 652-5.