

A Hollow Bulb Obturator For Maxillary Resection In A Completely Edentulous Patient

Rajani Dable

ABSTRACT

Palatal defect of any extent causes multiple problems in speech, mastication and esthetics. Palatal obturator is the only substitute which covers the defect and contributes to normal speech production. It eliminates hypernasality and improves the communication. An obturator prosthesis for an edentulous patient becomes more critical in terms of its movements as there is no mechanical retention available. Denture is supported only by the underlying residual ridge

and the defect. In the present case, surgical removal of part of the palate made the labial and buccal mucosa more stretched and fibrous, thus limited the potential to use features which otherwise help in retention and stability of denture such as the depth of sulci, muscle function or neuromuscular control. Hollow bulb obturator was the treatment of choice here, which helped in reducing the extra loads on underlying tissues and remaining amount of bone.

Key words: Maxillofacial prosthesis, Hollow obturator, Palatal defect

Key Messages:

- It is easy to prepare a hollow obturator in two separate parts and join them after curing. Even though it is done in two steps and little more time consuming, it is acceptable as there are less chances of inaccuracy
- Hollow bulb prosthesis reduces the weight of prosthesis

INTRODUCTION

In case of patients with palatal insufficiency, speech and deglutition becomes arduous, thereby requiring prosthodontic rehabilitation. The prosthodontic rehabilitation of patients with acquired defects of the maxilla after surgical resection is the complete responsibility of a maxillofacial prosthodontist. He has to recreate an artificial barrier between the cavities and thus restore the functional capabilities of speech, mastication and swallowing [1-5].

Many a time, the maxillary defects involving both hard and soft palates, which extend towards or include the velopharyngeal region, affect all the functions and thus pose a challenging situation to the prosthodontist.

Maxillofacial defects result in facial disfigurement, thus leading to psychological problems. This in turn, create great difficulty in facing and accepting the social consequences. Basic prosthodontic principles are followed during the fabrication of an obturator prosthesis, while taking extreme care of the more resilient and unsupported tissues. Some principles need to be modified according to the defect, the condition and the position of the remaining structures. The defect, in conjunction with the remaining structures, must be used to provide support, retention, and stability to the prosthesis.

Acceptable prosthodontic care for a patient with acquired maxillary defect should include cautious prosthesis designing, combined with routine maintenance and ample care to provide comfort, function, aesthetics and minimal changes to the remaining compromised structures.

It is more difficult to treat the acquired palatal defects in edentulous patients, as no natural teeth are present to take support from. As per Aramony [5], the partially edentulous palatal defect patients

are classified as per Kennedy's classification and are treated successfully by taking support from the remaining natural teeth [5]. In fully edentulous patients where the support is taken only from the remaining bone, it is always mandatory to take care of what is remaining, while keeping in mind what is lost.

A simple technique of the fabrication of the two piece closed hollow bulb obturator prosthesis to rehabilitate a unilateral palatal defect, is illustrated here.

METHODS

A male patient aged 56 years, who had undergone surgery for a maxillary tumour on the right side of the maxilla, reported to the Department of Prosthodontics for the restoration of the palatal defect. The defect extended from the buccal mucosa to the midpalatine region, medially and anteriorly from the canine region to the posterior extent of the hard palate, involving some part of the soft palate.

The patient presented with an obvious and typical nasal twang and he was experiencing difficulty in speech and deglutition. Besides, the patient needed a denture to restore his lost teeth and an obturator which would overcome his defect and make things easier for him in terms of mastication and communication.

On examination, it was found that the right half of the patient's face was disfigured, thereby stretching the right labial and the nasal regions. It was clearly evident that the oral tissues, the palatal bone and the remaining residual ridge were incapable of supporting the prosthesis. Owing to such unfavourable conditions, it was necessary to plan a prosthesis that would be light and easy to wear. The weight of the prosthesis could jeopardize the health of the tissues and compromise the function of the prosthesis.

After taking a thorough medical and dental history, the patient was educated and prepared psychologically to undergo the procedure of obturator making. Soon after, a primary impression was made in irreversible hydrocolloid impression material [Table/Fig 1] and a primary cast was retrieved out of it.



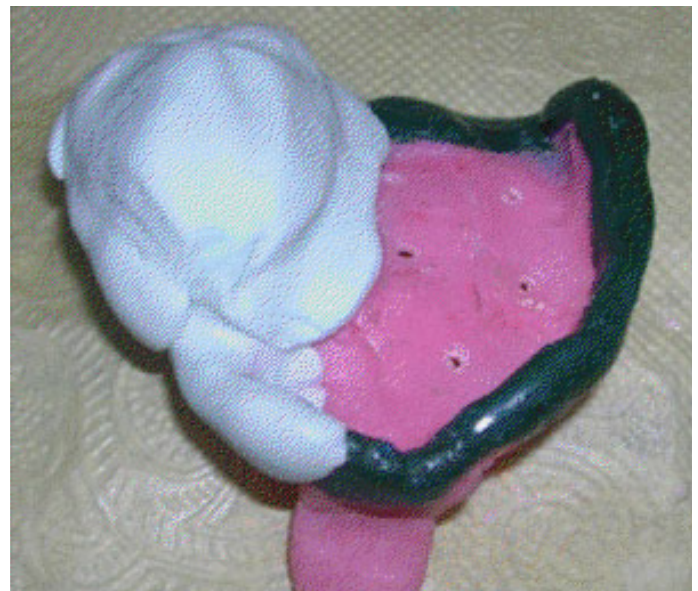
[Table/Fig: 1] Primary impression

Proper border molding was done on the non-defect side of the denture, by following the conventional methods of denture fabrication [Table/Fig 2]. A final impression of the defect area was made in putty [Table/Fig 3], while the wash impression was made in light body rubber base impression material [Table/Fig 4].



[Table/Fig: 2] Border molding of edentulous residual ridges

A master cast was procured out of it and the borders were outlined for the record bases. The undercuts on the sides of the defect were blocked with wax and also, the internal part of the cavity was painted with a thin layer of wax before making the acrylic record bases [2]. A jaw relation record was made ([Table/Fig 5] and [Table/Fig 6]) by a conventional method. The usual tracing devices were not used in this case because of the lack of a resistant base (palate). Moreover, after surgery, a patient is not expected to give a centric relation record.



[Table/Fig: 3] Impression of defect in rubber base putty material



[Table/Fig: 4] Final impression of maxillary residual ridge along with defect



[Table/Fig: 5] Master cast showing defect and residual alveolar ridge



[Table/Fig: 6] Jaw relation record



[Table/Fig: 8] Occlusal bite



[Table/Fig: 7] Waxed up dentures



[Table/Fig: 9] Scraping of posterior half of wax rim

The rules of aesthetics were borne in mind during the selection and the setting of the teeth [Table/Fig 7].

Waxed up dentures were tried and checked for retention, stability and comfort in the mouth. Phonetics was a cause of concern and so, the denture movements were re-checked during phonation, and corrections were made accordingly.

After this, an occlusal bite was made in rubber base putty material, that would be used in the later stages for the occlusal orientation. [Table/Fig 8]

Before commencing with the laboratory procedures, the posterior part of the wax rim over the defect area (with three posterior teeth set in position) was removed carefully with a sharp scalpel and was preserved till the definite prosthesis was ready ([Table/Fig 9] and [Table/Fig 10]).



[Table/Fig: 10] Denture without teeth on defect area



[Table/Fig: 11] Maxillary and mandibular dentures



[Table/Fig: 14] Wax up of defect area at palatal level to create a lid of hollow bulb



[Table/Fig: 12] Finished denture with orientation grooves



[Table/Fig: 13] Defect area of denture filled with plaster

Both the maxillary and the mandibular dentures were finished, polished and were kept aside [Table/Fig 11]. The palatal margins around the obturator opening were trimmed to be flush with the remaining hard palate.

The next step was to prepare the lid or cap for the defect area. For the fabrication of the lid, 4-5 orientation grooves /notches were scored all around the defect wall of the denture [Table/Fig 12]).

Notches of 1.5 mm depth were created to ease the re-orientation of the lid. The open defect area of the denture was filled with plaster, 2- 3 mm away from the palatal surface of the denture. A lead foil was spread over the defect as a separating medium and then the wax was shaped to level and prepare the false palate ([Table/Fig 13] and [Table/Fig 14]). The scraped part of the wax rim with the teeth affixed on it, (which was removed before processing the dentures) was replaced, positioned and adjusted again on the posterior half of the denture on the defect side. Thereafter, the rubber base occlusal bite was used for checking the orientation and the occlusion of the denture prosthesis ([Table/Fig 15] and [Table/Fig 16])

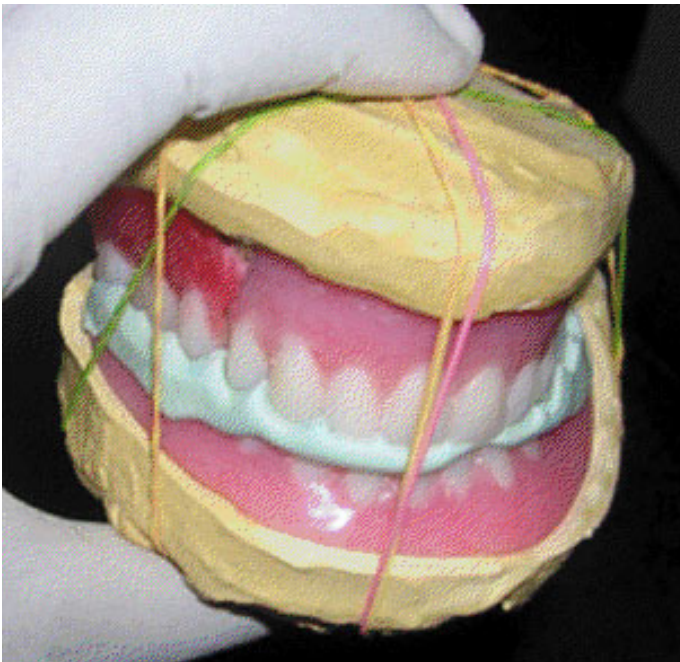
The lid with the posterior teeth was separately cured in heat cure resin, and was later finished and polished [Table/Fig 17] The next step was to close the open defect area by fixing the lid with the help of autopolymerising acrylic resin by using the pre-constructed orientation grooves [Table/Fig 18].

RESULT

A hollow bulb prosthesis was aimed at first, to provide more stability to the denture by gaining support from the defect and secondly, by reducing the weight of the prosthesis.

Limited mouth-opening restricted the patient from removing and placing the denture in the mouth with ease, but a little practice helped to solve the problem. He was also assisted by clinicians in the hospital and relatives at home in getting adapted to wear the denture-obturator. Over the days, the patient also learned to speak with a lesser twang in his voice and effortless deglutition led to a greater comfort.

A week later, the patient was recalled and was checked for accuracy.



[Table/Fig: 15] Checking of occlusion after placing waxed up posterior half on defect side



[Table/Fig: 17] Posterior half cured in heat cure acrylic resin



[Table/Fig: 18] Finished and polished denture obturator



[Table/Fig: 16] Waxed up posterior half of denture

DISCUSSION

It is a common practice to construct a palatal plate type obturator in patients with palatal defect, but the problem surfaces when the regurgitation and nasal voice does not get treated successfully. The patient may be able to chew the food on the palatal plate kind of denture-obturator, but when in function, the denture moves and the food gets trapped between the denture and the defect.

A full bulb is likely to increase the weight of the prosthesis and therefore, it cannot be used successfully.

A hollow bulb prosthesis (either one piece or two piece) is a better choice, as it is lighter in weight and is more hygienic.

Therefore, it was planned to fabricate a 'two piece hollow bulb prosthesis' for the patient. Considering the patient's physiological, physical, psychological and economical conditions, the prosthesis was constructed in accordance to his needs. As the remaining residual ridge and the almost flat palatal vault was not contributing to the retention and the stability of the denture, extreme instability and movement was expected with the prosthesis.

Although we have advanced materials to cope with the critical areas, there are some limitations in their use. The defect area/areas always need to be relieved of pressure under the prosthesis. Permanent

soft liners can be used to reduce the pressure on the defect areas, as they provide the cushioning effect between the defect margins and the prosthesis. Also, they provide flexibility to the obturator, which allows its relatively simple placement in retentive undercut regions. But, as soft liners need repetitive replacement, it is better to avoid using them for fabricating a definite maxillofacial prosthesis, thus limiting their use only till the recently created defects. [3]

Light-cured resin record bases can also be used for palatal defect cases, thus eliminating the need for heat-processed record bases, which save clinical and laboratory time while providing the patient with a lightweight prosthesis [4]. There are some articles which describe a technique that provides an easy method for the construction of an obturator prosthesis using a visible light-cured (VLC) resin. It is easier for the technicians to construct the obturator in comparatively less time; which in turn, provides the patients with light, comfortable, and tolerable prostheses [6].

With the application of visible light-cured resin material, separate segments of the obturator can be fabricated on the individual cast sections and then combined.

Some studies are carried out recently by using a 'gas injection technique' for the fabrication of the hollow bulb obturator where the prosthesis can be fabricated in one step and it does not require the resin seal [7].

As per a new technique a closed, hollow obturator can be fabricated with a nondetachable screw cap to seal the access

hole that allows cleaning of the inside of the bulb. A small screw cap can be fabricated from a cobalt-chromium alloy and screwed to the access hole prepared at the top of the hollow obturator which can be easily removed to clean the inside of the bulb. It is easier for the patient to maintain the hygiene [8,9].

In any obturator case, it is important to know that the affected palate provides limited 'tissue support' for any prosthesis which rests on it. Efforts were taken to fabricate the prosthesis by abiding the basic rules of denture preparation.

KEY MESSAGE

It is easy to prepare a hollow obturator in two separate parts and then join them after curing. This two-step procedure, though a little time consuming, is advisable, as there are less chances of inaccuracy.

CONCLUSION

Definitive prosthodontic treatment is one of the final therapies which is instituted and it attempts to alleviate any anatomical and functional deficiencies. The prosthodontist plays a significant role in the complete rehabilitation of the palatal defect. Thorough knowledge and skills, coupled with a better understanding of the needs of the patients enable the successful rehabilitation of such patients. Mostly, the maxillofacial patients come from the lower socioeconomic group, who need the best out of the lowest expenses. The maxillofacial patient is a compromised person who requires total rehabilitation, physically as well as psychologically.

ACKNOWLEDGEMENTS

The contribution and efforts of the team from the Dept. of Prosthodontics, SMBT Dental College & Hospital, is highly appreciated.

Conflict of Interest : None

Funding : Nil

REFERENCES

- [1] Varoujan A. Chalian, Joe B. Drane [and] S. Miles Standish. Maxillofacial prosthetics, Williams & Wilkins Co. Baltimore 1972 pp.133-157.
- [2] Aaron Schneider, Method of fabricating a hollow obturator. J Prosthet Dent. 1978;40:351.
- [3] Stephen M. Parel, and Henry LaFuenfe, Single visit hollow obturators for edentulous patients, J. Prosth Dent. 1978;40:426-429.
- [4] Karen S. McAndrew, DMD, MS, a Sandra Rothenberger, b and Glenn E. Minsley, DMDc. An innovative investment method for the fabrication of a closed hollow obturator prosthesis J. Prosth Dent. 1998;80:129 - 132.
- [5] Mohamed A. Aramany, Basic principles of obturator design for partially edentulous patients. J. Prosth Dent. 2001;86: 559 - 561.
- [6] Mustafa Kocacikli, Suat Yalug , Huseyin Yazicioglu , Caner Yilmaz. Fabricating a Hollow Obturator with Visible Light-Cured Resin System. J Prosthodont. 2008;17,596-598.
- [7] Iramaneerat W, Seki F, Watanabe A, Mukohyama H, Iwasaki Y, Akiyoshi K, Taniguchi H. Innovative gas injection technique for closed-hollow obturator. Int J Prosthodont. 2004;17:345-9.
- [8] Nishigawa, Goro, Maruo, Yukinori, Jin, Keiji, Oki, Kazuhiro, Minagi, Shogo. A custom-made sealing screw cap for a closed, hollow obturator. J Craniofac Surg. 2007;18:1138-41.
- [9] Benington IC. Light-cured hollow obturators. J Prosthet Dent, 62: 322-325, 1989.

AUTHOR:

1. Dr. RAJANI DABLE: Professor, SMBT Dental College and Hospital and Research Institute, Amrutnagar, Sangamner, Maharashtra, India.

CORRESPONDING AUTHOR:

Dr Rajani Dable, Professor, SMBT Dental College and hospital and research institute, Amrutnagar, Sangamner, email- rajnidable@hotmail.com

DECLARATION ON COMPETING INTERESTS: No competing Interests.

Date of Submission: **23/08/2010**
Peer Review Completion: **02/11/2010**
Date of Acceptance: **05/01/2011**
Date of Publish: **06/02/2011**