

CASE REPORT

An Innovative two stage impression procedure for fabrication of obturator in maxillectomy patient - a technical report

Kasim Mohammed K^a, Hemamalini Balaji^b

ABSTRACT

Maxillofacial defects caused as a result of surgical resection are usually complex with varied extent of the defect ranging from small to large and narrow to wide. This often leads to debilitation effects on the overall well-being of the patient due to compromised mastication, aesthetics and speech. Hence the rehabilitation of such defects is often challenging using a prosthesis. A proper impression, recording the accurate extensions of the defect can improve retention of the obturator prosthesis by using favourable undercuts along with providing support to the lip and nasal contours thus enhances aesthetics. Reproduction of the defect to its full extent in a single step impression is difficult without distorting tissue or displacing impression material. This is even more challenging in patients with radiotherapy induced microstomia. Hence an innovative two stage impression procedure was described here in the article that enables complete recording of the defect and the subsequent construction of an interim or a definitive prosthesis.

Keywords: Impression technique; Maxillectomy; Maxillofacial prosthesis; Obturator.

How to cite this article: Kasim Mohammed K, Hemamalini Balaji. An Innovative two stage impression procedure for fabrication of obturator in maxillectomy patient - a technical report. *J Clin Prosth Impl* 2022;4(2):40-43. <https://doi.org/10.55995/j-cpi.2022009>

INTRODUCTION

Malignant tumours of the upper gum and hard palate account for 1-5% of malignant neoplasms of the oral cavity; two thirds of the lesions which involve these areas are squamous cell carcinomas.¹ In India, 90 - 95% of the oral cancers is squamous cell carcinoma.¹ The international agency for research on cancer has predicted that India's incidence of cancer will increase from 1 million in 2012 to more than 1.7 million in 2035. Incidence of OSCC is 21.5% in mandible and 15.9% in maxilla as palatal carcinoma.³ These malignant lesions are treated by surgical resection followed by radiotherapy or chemotherapy. The most frequent treatment modality for patients diagnosed with a maxillary malignancy is surgical removal of the tumour. This very often leaves an oro-nasal and/or oro-antral defect, resulting in severe functional problems concerning mastication, deglutition, and speech. While maxillectomy defect in the posterior region leads to loss of masticatory and speech function, defect in the anterior region causes loss of nasal contour and eventually facial disfigurement which can be debilitating especially in younger individuals. Therefore, an appropriate substitute for the tissue lost is inevitably necessary to restore function, aesthetics and regain quality of life (QoL).^{2,4} Maxillofacial defects are usually complex, involving skin, bone, muscle, cartilage, and multiple layers of

mucosa, so reconstruction of such defects is often challenging. A multidisciplinary approach is needed to rehabilitate such patients.

A proper impression, recording the accurate extensions of the defect can improve retention of the obturator prosthesis by using favourable undercuts along with providing support to the lip and nasal contours thus enhances aesthetics. Maxillary resections leads to a tight, fibrous, horizontal scar band formation at the mucosa/skin graft junction.⁵ Above this region, the lining of the maxillary cavity may form a lateral-vertical shelf which is important for retention and stability of the prosthesis. Reproduction of the defect to its full extent in a single step impression is difficult without distorting tissue or displacing impression material.⁶ This is even more challenging in patients with radiotherapy induced microstomia. Hence an innovative two stage impression procedure was described here in the article that provides access for direct manipulation in the lateral and vertical maxillary cavity enabling complete recording of the defect and the subsequent construction of an interim or a definitive prosthesis.

CASE DESCRIPTION

A 38 year old male patient, underwent anterior segmental maxillectomy 3 years ago, following which he was given a obturator. developed an

^a Professor and Head, Department of Prosthodontics and crown and Bridge, Sri Ramachandra Faculty of dental Sciences, SRIHER, Chennai, India.

^b Postgraduate, Department of Prosthodontics and crown and Bridge, Sri Ramachandra Faculty of dental Sciences, SRIHER, Chennai, India.

unintelligible speech, unaesthetic facial profile and difficulty during oral feeding. The patient reported with complaints anaesthetic and ill-fitting obturator which compromised his aesthetic, jeopardising his psychology and confidence along with nasality of voice and nasal regurgitation of food, thus deteriorating his overall Quality of life. He was experiencing difficulty in speech and deglutition as well. Intra-oral examination revealed partially dentate maxillary arch and Aramany's Class VI defect involving anterior maxilla. His major complaint was missing maxillary teeth. After taking a thorough medical and dental history, examination and detailed discussion, patient and his attendants, were counselled regarding obturator and prepared him psychologically for rehabilitation with obturator to improve his function of mastication, speech, aesthetic and psychosocial wellbeing. To make use of antrum defect for retention an innovative two stage maxillary impression was planned.

Technique:

1. Dimensions of the defect was evaluated intraorally. The defect had a depth of approximately 4 cm in the anterior region of maxilla. In order to record the defect in full depth, an acrylic (Self Cure Acrylic Resin, DPI RR cold cure, Germany) custom made cylindrical tray was made as shown in the *Figure 1A* with two holes in the centre to ensure the locking of impression material.



Fig 1.A represents the Acrylic stent used as a medium to carry the impression material into the narrow and deep defect;

B represents the Stent being tried inside the defect to ensure passivity and correct dimensions to reach the depth of the defect;

C represents the Impression made using putty material with the help of the stent

2.The Acrylic custom made cylindrical tray was made with two vertical extensions to facilitate impression making and for reorientation in the whole arch impression.

3.The acrylic portion is tried in to the defect to check for passivity as shown in *Figure 1B*. This extension is covered with putty Addition silicone impression material (A.Silicone Zhermack, Italy) and was used to record the full depth of the defect.

4.This is then removed and excess material is trimmed off and resealed in the defect (*Figure 1C*).

This is followed by a whole arch impression with irreversible hydrocolloid impression material (Tropicalgin, Zhermack, Italy) in a perforated stock tray.



Fig 2.A represents pick up impression made using irreversible hydrocolloid impression material;

B represents reorientation of Putty impression into the two orientation slots in pickup impression;

C represents the Master cast prepared and the plaster pillar created and covered with wax;

D represents denture base made and teeth arrangements done. (Occlusion is dictated by the dentition in the opposing arch);

E represents the denture after final wax up before processing.

5.When set completely, the impression tray is removed and the acrylic portion along with the putty impression of the defect is reoriented in the alginate impression (*Figure 2A,B*)

6.Cast was poured and a hollow acrylic bulb was constructed in the defect region of the master casts, using self cure acrylic resin and wax leaving 3 - 4 mm peripheral clearance, flushing at the height of remaining palatal vault, to create hollow-bulb in the obturator. (*Figure 2C*)

7.Denture base was made using shellac and teeth setting was done as shown in *Figure 2 D*.

8.It was then invested , processed, finished and polished using conventional technique. (*Figure 3*)



Figure 3 A and B represents the extensions of the previous vs new denture fabricated by the new two stage impression procedure

9. The final prosthesis is then delivered to the patient (Figure 4 A, B) and Post operative instructions were given.



Figure 4 A and B represents the intra and extra oral images of the patient following insertion of the obturator

10. A thorough prosthesis care was explained to the patient and follow-up was planned. The patient was recalled after 24 hour and one week later and was checked for accuracy and comfort. The patient was satisfied with the prosthesis.

Post insertion results showed improvement in speech, mastication, swallowing and facial aesthetics. Due to the improved retention achieved by this two stage impression technique, it significantly reduced the nasal regurgitation and improved speech.

DISCUSSION

Surgical resection of maxillary arch results in communication between oral cavity and nasal cavity affecting speech, deglutition and facial aesthetics as well as psychology of patient.^{7,8} Rehabilitation of oral cavity and dentition defect following mid face-palatal-maxillectomy, can be achieved by grafting a vascularised free flap containing a bone segment, but many times it fail because of large size of defect. Obturator prosthesis is only option left for minor palatal defect while large maxillary palatal defects represent a challenge for functional and aesthetic rehabilitation. In 1978, Dr. Mohamed A. Aramany presented a classification system for obturator design based on the relationship of the defect to the remaining teeth.⁹ The defect in this case corresponded to the Aramany's Class VI. The defect is Bilateral, crossing the midline involving only the anterior maxilla. In dentate patient primary retention, stability and support of an obturator depends on the distribution and number of remaining teeth and engagement of soft tissue undercuts including the defect area.¹⁰ This design is similar to the design of Kennedy class 4 removable partial denture. Conventionally for the fabrication of interim and definitive obturator, a single step hydrocolloid impression technique^{7,10} is used. The disadvantages of this single step technique is that it does not record the defect in its full depth especially when there is increased superior extent of resection. The innovative two stage impression technique that we

have described here has the advantage of recording the depth of the defect which aids in utilizing the usable or favourable undercuts in the defect. This in-turn improves the overall retention of the prosthesis.

The obturator offers several advantages including prevention of nasal regurgitation, immediate restoration of dentition and oral structure.^{11,12} The retention and stability of obturator in this case report was improved by finger like acrylic extension engaging the favourable undercut. Utilizing the favourable undercuts of the defects improve the prognosis of the obturator prosthesis. Hence impression making plays a vital role in the success of the prosthesis.

CONCLUSION

Oral defects caused by congenital and acquired defects especially in the anterior region tend to affect the aesthetics, function and speech thus deteriorating the overall quality of life of the patients. The prosthodontist and maxillofacial prosthodontist plays an important role in the satisfactory rehabilitation of the palatal defect. Successful recording of defects is vital for long term success of the prosthesis. A simplified approach for two stage impression of defect area for better retention and stability of the obturator is described for fabrication of successful prosthesis utilising the defect undercuts.

CONFLICT OF INTEREST

There is no conflict of interest

REFERENCES

1. Oh W, Roumanas E. Optimization of maxillary obturator thickness using a double-processing technique. *Journal of prosthodontics* 2008; 17: 60–63.
2. Ahmed B, Hussain M, Butt A M, Yazdanie N. Maxillofacial rehabilitation of a large cleft palate using fixed-removable prosthesis. *Journal of the college of physicians and surgeons pakistan* 2011; vol. 21 (1): 52-54
3. Bhasin A, Singh V, and Mantri S. rehabilitation of patient with acquired maxillary defect, using a closed hollow bulb obturator. *Indian J Palliat Care* 2011 Jan-Apr; 17(1): 70–73.
4. Rilo B et al. A hollow-bulb interim obturator for maxillary resection. A case report. *Journal of Oral Rehabilitation* 2005; 32: 234–236.
5. Dable R. A hollow bulb obturator for maxillary resection in a completely edentulous patient. *Journal of clinical and diagnostic research*. 2011 Feb; Vol-5(1):157-162.

6. Tirelli G et al. Obturator prostheses following palatal resection: clinical cases. ACTA otorhinolaryngologica italica 2010; 30:33-39.
7. Aramany M. Basic principles of obturator design for partially edentulous patients. Part I: Classification. The journal of prosthetic dentistry nov 1978; 40 (5): 554-557.
8. Brown K, Commander. Clinical considerations improving obturator treatment. J Pros. Dent October 1970; 24(4): 461-466.
9. Blair FM, Hunter NR. The hollow box maxillary obturator. Br Dent J 1998;184:484-7.
10. Wei F-C, Celick N, Chen H-C, et al. Combined anterolateral thigh flap and vascularized fibula osteoseptocutaneous flap in reconstruction of extensive composite mandibular defects. Plast Reconstr Surg 2002;109:45-52.
11. Jones NF, Taub PJ. Sequential second free bone flap for reconstruction of metachronous mandibular defects. Plast Reconstr Surg 2005;116:939-45.
12. Wei F-C, Celick N, Yang W-g, et al. Complication after reconstruction by plate and soft-tissue free flap in composite mandibular defects and secondary salvage reconstruction with osteocutaneous flap. Plast Reconstr Surg 2003;112:37-42.

Corresponding Author: Dr. Hemamalini Balaji, MDS, Department of Prosthodontics and Crown & Bridge, Sri Ramachandra Faculty of dental Sciences, SRIHER, Chennai.
E-mail: b.hemamalini27@gmail.com , Ph.No.: +91 9884627795

Copyright by the Editorial board for The Journal of Clinical Prosthodontics and Implantology