CASE REPORT

Comparison of obturator prosthesis fabricated using different techniques and its effect on the management of a hemipalatomaxillectomy patient

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SUMMARY

Odontogenic tumours involving the maxilla or mandible are usually treated with surgical resection. To prevent recurrence, extensive surgical intervention might be carried out leaving the patient with anatomical defects. However, rehabilitation of such patients with an obturator can improve function, facial form and social acceptance. In this case, we have evaluated the different designs and techniques of fabrication of an obturator prosthesis used for the rehabilitation of a hemipalatomaxillectomy patient. A 40-year-old man presented with a loose fitting obturator prosthesis. He had undergone hemipalatomaxillectomy for the treatment of an ameloblastoma 2 years earlier and had been using an obturator prosthesis since then. Hollow-bulb obturator prostheses were fabricated using two different methods, the lost salt and open lid techniques. The obturator prosthesis fabricated with the lost salt technique weighed less than the patient's old obturator. But the obturator fabricated using the open lid technique did not only considerably reduce the weight of the prosthesis but also improved health, function, aesthetics, phonetics and quality of life in this hemipalatomaxillectomy patient.

BACKGROUND

An ameloblastoma is a most clinically significant benign epithelial odontogenic neoplasm. If treatment of an ameloblastoma is carried out conservatively it could result in recurrence and possible malignant transformation. Hence, extensive surgical resection of the lesion is the most indicated approach. However, rehabilitation of patients after surgical resection becomes arduous, because in such patients functions such as mastication and speech will have been hampered to a great extent. Aesthetics will also have been impaired due to asymmetry of the face, affecting the psychosocial behaviour of the patient.

Traditionally, prosthetic obturation has been the standard treatment modality for palatal rehabilitation as it allows for immediate closure of oroantral communication without the need for a second surgery. The obturator prosthesis is easy to fabricate and cost-effective, minimising the emotional and psychosocial stress on the patient, thereby achieving functional and aesthetic needs.

This case report describes a hemimaxillectomy patient who was rehabilitated with obturator prostheses fabricated using two different techniques to make the bulb portion hollow. The lost salt and

open lid techniques of fabrication were compared for fit, comfort, function, aesthetics and phonetics.

CASE PRESENTATION

A 40-year-old man reported to the Department of Prosthodontics for replacement of his existing obturator prosthesis as it was unstable due to a broken clasp assembly.

History: The patient had undergone hemipalatomaxillectomy of the right side 2 years earlier for the treatment of an ameloblastoma. Surgery was carried out using a multidisciplinary approach by the oral surgeon and ENT surgeon followed by the placement of an obturator.

Clinical examination

Intraoral examination revealed a large palatal defect in the right maxillary segment with oroantral communication (figure 1). Speech was altered without the obturator and considered fair with the prosthesis in place.

Teeth were present in the left quadrant on the unaffected side of the maxillary arch from central incisor to second molar and central and lateral incisors on the affected side. The remaining dentition was intact without any restoration and oral hygiene was satisfactory.

Examination of the prosthesis revealed that there was a broken clasp on the left side because of which the prosthesis was less retentive, causing food lodgement and getting dislodged itself during functional movements. The obturator prosthesis was considerably heavy as it was not hollow and it

Figure 1 Preoperative photograph of the defect.

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Figure 2 Digital panoramic tomograph showing the extent of maxillary defect.

did not even incorporate artificial dentition on the affected side, hampering mastication.

INVESTIGATIONS

Postsurgery digital panoramic tomograph showing the extent of maxillary defect (figure 2).

TREATMENT

As per design principles described by Aramany in 1978 for a maxillectomy defect, a linear design for a class-II defect was selected for this case, in which remaining palatal tissues provided the support and retention was achieved from the embrasure clasp made on the remaining intact dentition.¹ Considering factors such as retention, stability and presence of a large defect, the bulb portion of the obturator was to be kept hollow.

Fabrication of the obturator

A primary impression was made in a stock tray with alginate irreversible hydrocolloid impression material. After obtaining the primary cast, a special tray was made with self-cure acrylic resin. Then, with modelling compound, the extent of the defect was recorded so that soft tissue undercut was recorded to maximise the retention and obtain a proper peripheral seal; this was followed by a secondary impression using light body impression material (AFFINIS Coltene Whaledent Pvt Ltd) and a final dual impression was made so that the tissue-bearing areas as well as existing dentition were recorded (figure 3). The master cast was made of diestone (GYPROC India, Rajkot) and then duplicated in order to fabricate the obturator prosthesis employing two different techniques.

In the first technique, a temporary denture base was fabricated over the master cast and an occlusal wax rim prepared.

Figure 3 Final impression of the maxillary arch.

Figure 4 Obturator with lost salt technique.

Jaw relations were recorded. An attempt was made to compensate for the loss of facial support on the defect side by moulding the wax on the labial aspect of the wax rim and carrying out functional movements. With the help of bite registration records, maxillary and mandibular casts were mounted on the semiadjustable articulator (Hanau wide view series, Whip mix, Fort Collins, USA, Lot no. 008014).

Teeth selection and arrangement were performed. At trial insertion occlusion, aesthetics and phonetics were evaluated and found to be acceptable to the patient.

An Adams clasp on left quadrant first molar and a ball-ended clasp on left quadrant canine were placed. Although aesthetically compromising, a C-clasp was also placed on lateral incisor of the affected right side for better retention.

A waxed up obturator was fabricated by flasking, dewaxing and packing using heat cure acrylic resin. Incorporation of table salt in between the shim and newly packed acrylic made the bulb portion of the obturator hollow. After processing, salt removal was facilitated by creation of two holes on the polished surface, one for injecting water into and the other for removing the dissolved salt from. After removing the salt the holes were plugged with self-cure acrylic resin (figure 4). The obturator was finished and polished. The obturator fabricated by the described technique was not as light weight as expected, though when compared it was lighter than the patient's original obturator.

In the alternative technique the bulb portion of the obturator was kept open up to the end with the open lid technique to reduce the weight (figure 5). Once the fabrication was done it was polished and finished and inserted in the patient's mouth to check adaptability (figure 6). Necessary changes were made. These changes were easy to carry out because of the open bulb portion of the obturator; also, the weight of the obturator could be considerably reduced by trimming it from inside. Once all the corrections were carried out the separately fabricated heat

Figure 5 Obturator with open lid technique.

Figure 6 Obturator with open lid inserted intraorally.

cure acrylic lid was employed to close the open bulb portion using self-cure acrylic resin at its periphery (figure 7).

Considerable changes in weight of the prosthesis were observed in the aforementioned techniques. The patient's previous obturator prosthesis weighed about 35 g without artificial teeth, whereas the single stage obturator prosthesis fabricated by incorporating salt weighed 30 g with the artificial teeth. But the greatest reduction in weight was observed in the obturator fabricated by the open lid technique; it weighed only 27 g in spite of addition of artificial teeth from canine to second molar (figures 8 and 9).

OUTCOME AND FOLLOW-UP

The newly fabricated open lid technique prosthesis was not only functionally and aesthetically more acceptable due to addition of teeth, but in spite of addition of missing teeth, it weighed less than the original obturator. Patient examination was performed after specific time intervals. The patient reported satisfactory aesthetics and improved functioning of the prosthesis without any discomfort (figure 10).

DISCUSSION

Maxillectomy results in sudden change in the physiological process creating oronasal and oroantral communication. An

Figure 7 Final obturator after lid closure.

Figure 8 Comparison of the extent of defect between surgical obturator, old and new obturator prostheses.

obturator provides a simple reconstructive solution for separating oronasal communication, reducing the difficulties associated with swallowing, mastication, supporting the facial soft tissues, re-establishing speech and providing immediate dental restoration, without the need for second surgery.^{2 3}

The remaining teeth and their location and number will determine the type of retainer to be used. Retainers that are properly designed help to reduce stress to the abutment tooth. Hence, while designing the clasp assembly, basic principles such as passive placement, encirclement and stabilisation should be followed.⁴ However, in cases with large palatomaxillary defects the stability and retention of the obturator could be significantly compromised because of the diminished bone support or if terminal abutment tooth is absent, for long-term clasping. There are different types of retentive aids that are used for the conventional hollow-bulb obturator prosthesis such as magnets and snap-on (friction type) attachments,⁵ acrylic buttons, retentive clips and implants.⁶ Implants reduce prosthesis movement, prevent rotation and encourage axial loading. Obturators retained using implants and cast metal framework will be of a totally different design and their weight may change accordingly. In this particular case, the patient was not willing to have further surgical procedures or to bear the additional cost involved.

Figure 9 Comparison of patient's surgical obturator, old and new obturators.

Figure 10 Final obturator inserted intraorally.

A heavy obturator prosthesis exerts continuous stress affecting the health of the tissues and resulting in discomfort.

The weight of the prosthesis should be minimised to reduce dislodging forces.⁷ The most commonly used material for fabrication of obturator prostheses is heat cure acrylic resin because of its durability and compatibility with tissues.⁷ A hollow-bulb obturator fabricated by the open lid technique is a lightweight prosthesis that not only extends effectively into the defect area but can also be easily tolerated by the patient. It is hygienic and increases speech intelligibility.^{8–10}

Learning points

- ▶ A hollow-bulb obturator fabricated with readily available material will improve health, function, aesthetics and quality of life in a hemipalatomaxillectomy patient.
- ▶ The technique in which the bulb portion of the obturator was kept open initially was more effective in reducing the weight of the prosthesis than the lost salt technique.
- ▶ The hollow-bulb obturator prosthesis is hygienic.
- ▶ It increases speech intelligibility by improving resonance of the voice due to the hollow-bulb portion.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Aramany MA. Basic principles of obturator design for partially edentulous patients. Part I: classification. *J Prosthet Dent* 2001;86:559–61.
- 2 Genden EM, Okay D, Stepp MT, *et al.* Comparison of functional and quality-of-life outcomes in patients with and without palatomaxillary reconstruction. *Arch Otolaryngol Head Neck Surg* 2003;129:775–80.
- 3 Tirelli G, Rizzo R, Biasotto M, *et al.* Obturator prostheses following palatal resection: clinical cases. *Acta Otorhinolaryngol Ital* 2010;30:33–9.
- 4 Aramany MA. Basic principles of obturator design for partially edentulous patients. Part II: design principles. *J Prosthet Dent* 2001;86:562–8.
- 5 Gunasekar C, Nasser KS, Sabarigirinathan C, *et al.* Modified snap-on attachment with 'O-ring' for two piece hollow bulb obturator. *Indian J Dent Res* 2013;24:507–10.
- 6 Gurjar R, Sunil Kumar MV, Rao H, *et al.* Retentive aids in maxillofacial prosthodontics—a review. *Int J Cont Dent* 2011;2:84–8.
- 7 Rodrigues SJ, Saldanha S. Prosthetic rehabilitation of a patient after partial maxillectomy. *Contemp Clin Dent* 2011;2:355–8.
- 8 Devlin H, Barker GR. Prosthetic rehabilitation of the edentulous patient requiring partial maxillectomy. *J Prosthet Dent* 1992;67:223–7.
- 9 Turkaslan S, Baykul T, Aydin MA, *et al.* Articulation performance of patients wearing obturators with different buccal extension design. *Eur J Dent* 2009;3:185–90.
- 10 Keyf F. Obturator prostheses for hemimaxillectomy patients. *J Oral Rehab* 2001;28:821–9.

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