



Case report

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Lock and Key Obturator- Inception to Conclusion

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Abstract

Cancer of any form is delapidating for an individual. Tumours of the maxillary arch cause not only aesthetic and functional impairment but also hamper the patient's general well-being. A maxillectomy is a procedure to remove a primary tumour in the maxilla. The role of a Maxillofacial Prosthodontist is to help the patient by reconstructing and bring the patient back to his physiological state. The main aim of the treatment is by preserving what remains by stopping any communication while maintaining the integrity of the tissues and to replace what is missing in the most favourable way possible. Two-piece prosthesis are favourable due to their ease in insertion for the patient. The following case report shows a direct communication caused by surgical resection due to squamous cell carcinoma and the sequelae of the prosthesis given for the patient, from the surgical to the definitive obturator.

Keywords: Maxillary Prosthesis; Obturator Prosthesis; Lock-and-Key Mechanism; Silicone Cap

Introduction

Maxillectomy is a procedure to remove a primary tumour in the maxilla. The procedure involves surgical removal of some of the bone, part of roof of mouth and possibly some of the teeth [1]. Currently available maxillary reconstruction techniques include placement of a prosthetic obturator, local and regional flaps and micro vascular free flaps [2]. Obturator prosthesis is most frequently the choice of treatment because of the complexity of maxillary surgical reconstructions and the uncertainty of the functional outcome [3,4].

Case Report

A 35-year-old male reported to the Department of Prosthodontics and Implantology with Oral Squamous cell Carcinoma affecting the maxillary anterior region (Figure 1a,1b) a primary impression of the tumour was made in an irreversible hydrocolloid material (tropicalgin, zhermack) (Figure 2), and casts were poured. Excision of the premaxilla was planned from distal of the second premolar on the right side to distal of the first premolar on the left. Based on this plan, the tumour areas were trimmed down on the cast (Figure 3) and a surgical stent was fabricated in heat

cure clear acrylic. After removal of the tumour mass, the surgical stent was adapted in the mouth and tightened with wires (Figure 4). This helped in holding the medicament close to the surgical site. A week after surgery, the communication was evaluated and a fresh impression was made (Figure 5). It was an Armany's Class VI defect. With minimum extensions into the defect, a hollow interim obturator was made and relined intra-orally (Figure 6) and the aesthetics were evaluated (Figure 7). After relining, the patient found it difficult to wear due to the bulk of the obturator.



Figure 1a: Facial Extent of Carcinoma.



Figure 1b: Palatal Extent of Carcinoma.



Figure 4: Surgical Obturator in place.

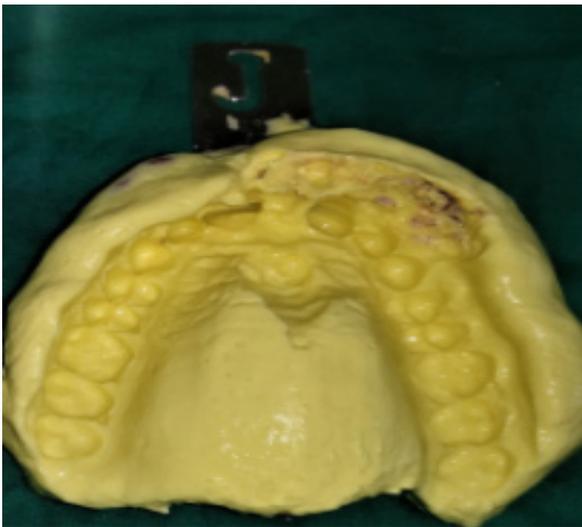


Figure 2: Impression of Carcinoma.



Figure 5: Impression of Defect.



Figure 3: Mock Surgery on Cast for extent of Surgical Obturator.



Figure 6: Relined Interim Obturator.



Figure 7: Aesthetics of Interim Obturator.

The patient underwent radiation therapy during which he was instructed not to wear the obturator since it would interfere with the tissue contracture. 10 days after radiation therapy, the patient reported to the department. The site was smaller when compared to immediately post the resection (Figure 8). A fresh impression was made and cast was obtained. A wax pattern was prepared such that a keyhole was incorporated into the obturator, for the “lock” to allow for the fit of the removable prosthesis, which acted as the “key” (Figure 9). The completed waxwork was then flaked before finally processing with a medical-grade silicone (Reviver, Medicept). The patient was recalled for a try-in of the resilient obturator intraorally, to ensure that it was able to fit and engage the soft-tissue undercuts without traumatizing the tissues (Figure 10). Once the comfort and fit were assessed, the obturator lock mechanism was picked up in a final impression in addition silicon (Aquasil, Dentsply) (Figure 11).

During the wax-up, a self-cure acrylic baseplate with an extension of the wax was incorporated into the keyhole simulating the lock-and-key mechanism (Figure12).



Figure 9: Wax to form Key- Way.



Figure 10: Wax Checked intra orally.



Figure 8: Post Radiation- Reduced size of Defect.



Figure 11: Pick Up Impression of Key way.



Figure 12: Wax rim with Key portion in wax.

The next clinical step was to record the jaw relationship of the patient. It was then followed with a wax try-in to evaluate the aesthetics and phonetics of the patient (Figure 13). Once the patient was completely satisfied with the appearance and could comfortably articulate, we proceeded with the final processing. Clasps were casted on the existing teeth and the final removable partial denture was designed to be an acrylic denture with maximum extension of the baseplate for additional retention, resistance, and stability (Figure 14a,14b). The denture was delivered to the patient (Figure 15a,15b). During the final fit, the denture was polished and instructions were given to the patient on how to insert and remove the prostheses. The aesthetics and speech were evaluated and the patient was recalled after 1 week for a follow up. The patient was also advised on how to maintain and clean the prostheses so that it can remain well fitted, functional, and aesthetically pleasing.



Figure 14a: Wax Pattern of Final Prosthesis after block out of key-way.



Figure 14b: Final Prosthesis.



Figure 13: Try in of Denture.



Figure 15a: Intra oral View of Prosthesis.



Figure 15b: Smile with Prosthesis.

Discussion

Maxillary and midface defects result in major functional and aesthetic abnormalities. Prosthetic rehabilitation has long been advocated for the rehabilitation of defects of the soft and hard tissues of the palate. This includes maxillary obturators for defects of the hard palate, pharyngeal obturators for defects of the soft palate, and maxillopharyngeal obturators for defects that include both structures [5]. However, several disadvantages to a prosthetic approach exist, including [1] the discomfort of wearing a prosthesis [2], the inconvenience of removing and cleaning the prosthesis [3], the inability to successfully retain a prosthesis when the defect is large or when dentition is lacking, and [4] the frequent need for readjustments by a prosthodontist [6]. The patient was given a surgical obturator immediately after surgery and an interim obturator after the primary healing. The definitive obturator has a lock-and-key mechanism which was first described by Emil Fischer in 1894 [7]. The concept was applied in a clinical case report by P. Sukumaran and M. R. Fenlon [8] where the obturator acts as the lock and the removable partial denture as the key.

The acrylic denture is a rigid structure, the combination of a removable, silicone cap anchors the obturator in the smallest defect undercuts [9], such as the maxillary sinus openings, drastically improving the retention of the obturator. This provides a cushioning effect, comfort, and an impenetrable seal of the communication, inevitably increasing patient satisfaction, function, and an enhanced quality of life. It must be further emphasized that the resected area progressively undergoes dimensional variations due to cicatrices, fibrotic changes, and tissue contracture. This necessitates the fabrication of a new acrylic obturator at every phase. However, with the current design, the removable, flexible cap is the only component which needs to be replaced to compensate for the defect alteration. Furthermore, the silicone cap can be disinfected regularly by immersing the cap in water at a rolling boil for 10 min [10].

Conclusion

Maxillofacial prosthetics is one of the fast-changing branches of Prosthodontics, with advent of newer techniques and materials, the treatment modalities for the cases are abundant. Two-piece prosthesis are favourable to maintain the patient comfort and longevity of the prosthesis. Satisfactory functional and esthetic results can be achieved in patients restored with a two-piece obturator denture using the “lock-and-key” mechanism, hence restoring the patient to his normal physiological position.

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