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Case Report

A simplified technique for fabrication of obturator using light curing wax pattern: A case report

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ABSTRACT

Background: Surgical excision of the maxilla results in communication between the oral cavity, nasal cavity and maxillary sinus. Rehabilitation of such defects involves fabrication of obturator prosthesis by the maxillofacial prosthodontist. Various techniques and materials have been used in the past for rehabilitation of such defects.

Aim: To Fabricate a Obturator Prosthesis using Light Cure Wax Pattern.

Case Description: A 65-year-old man reported with the chief complaint of inability to chew food due to an ill-fitting prosthesis. His history revealed that patient had undergone maxillectomy of left side due to Carcinoma maxilla 03 years back, followed by the fabrication of a definitive obturator prosthesis. Intraoral examination revealed a well healed Aramany's Class II post maxillectomy defect on the left side measuring 5 cm X 3.5 cm anteroposteriorly and mediolaterally, with everted margins and irregular borders. This clinical report describes rehabilitation of maxillectomy defect with definitive obturator prosthesis. A light cure wax pattern was used (LiWa®; Willmann & Pein GmbH) for the fabrication of metal framework.

Conclusion: Fabrication of a cast metal framework involves a complex laboratory procedure to achieve the clinical success of the prosthesis. LiWa light curing waxes can be successfully used as an alternative to the conventional wax pattern for the fabrication of cast partial dentures framework for definitive obturators.

Clinical Significance: The light cure wax pattern helped in reducing the number of laboratory steps and allowed wax pattern trial in the patient's mouth, saving precious time and ensuring a precise fit of the prosthesis.

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1. Introduction

Loss of orofacial structure leads to changes in the normal appearance of the face, which alters the function and has psychological impact on the individual.¹ The maxilla is one of the largest bones of the facial skeleton, which forms the roof of the oral cavity and floor of the nasal cavity and the maxillary sinus. Any defect in the maxilla leads to

the communication between these three cavities and forms a confluent chamber.² These defects can be congenital or acquired. The acquired defects are created by surgical removal of the maxilla, due to trauma or tumors in the region. Such defects can be managed by surgical closure by reconstructive surgeons, but large defects are usually managed by fabrication of obturator prosthesis.

The types and designs of the obturator prosthesis used to rehabilitate maxillectomy defects have been clearly laid out by various authors in the past.³⁻⁵ The definitive obturator

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is fabricated 3-4 months post surgery, following surgical or interim prosthetic phase. Definitive obturator consists of a cast partial metal framework supporting the acrylic portion of the prosthesis. Fabrication of cast partial denture framework involves fabrication of refractory cast, wax up on refractory cast, investing and casting.⁶ These multiple steps involved in fabrication of metal framework are technique sensitive, time consuming and have cost bearing. Many attempts have been made to minimize the incorporation of errors with modification of materials and methods used for the same. One such approach toward minimizing the casting errors is the use of prefabricated light polymerizing wax pattern in place of a conventional wax pattern for the fabrication of the cast partial denture framework.⁷

This article presents a novel approach for the fabrication of a cast partial denture framework using light polymerizing wax pattern for the rehabilitation of a maxillectomy defect.

2. Case Report

A 65-year-old man reported to the Department of Dental Surgery with the chief complaint of inability to chew food due to an ill-fitting prosthesis. His history revealed that patient had undergone maxillectomy of left side due to Carcinoma maxilla 03 years back. Patient was a known case of hypertension and was on regular medication for the same. Past dental history revealed uneventful extractions under local anaesthesia and fabrication of a definitive obturator prosthesis 03 years ago.

An extraoral clinical examination revealed gross facial asymmetry with flattening of the left zygomatic buttress area. Intraoral examination revealed a well healed Aramany's Class II post maxillectomy defect on the left side measuring 5 cm X 3.5 cm anteroposteriorly and mediolaterally, with everted margins and irregular borders (Figure 1). The non resected portion of the maxillary arch was partially edentulous and a full complement of teeth was present in mandibular arch. Patient had been using definitive prosthesis for the past 03 years which had become ill-fitting over a period of time.

The treatment plan included rehabilitation of maxillectomy defect with hollow bulb definitive obturator using LiWa light polymerizing resin pattern for the fabrication of metal framework of the cast partial denture.

After informed consent, maxillary and mandibular diagnostic impressions were made using irreversible hydrocolloid impression material (Algin-Gum; Prime Dental) and a diagnostic cast was fabricated in Type III dental stone (Kalstone; Kalabhai). Diagnostic mounting was done using interocclusal records in maximum intercuspation. Surveying was done and design for the cast partial metal framework was planned. Guide planes and already prepared rest seats were refined.⁸ Primary Impression was made using irreversible hydrocolloid impression material and primary cast was fabricated. Re-

surveying of the primary cast was done. Undercuts in the defective area of the primary cast were blocked using wax (Block-out wax; BEGO) and a custom tray with its extension in the defective area was fabricated using auto polymerizing acrylic resin (Rapid Repair; Dentsply). A chlorhexidine gauze dressing tied with a silk suture was placed in the defect to prevent the ingress of impression material into the undercuts and nasal airway. The definitive impression was made in two stages with the recording of the defective area with tissue relining material (Soft Liner; GC Corporation) and dentate area with regular body elastomeric impression material (Coltene; Affinis) (Figure 2). After retrieving the secondary cast, resurveying was done by transferring tripod marks. Relief was given for the resin retention at the edentulous area on the master cast.

Here after a different sequence of steps was followed. According to the planned design, the preformed light curing wax pattern for various components such as pre-formed major connector, minor connector, occlusal rest, and direct retainer available in the LiWa pattern kit were directly assembled on the master cast in the dental laboratory (Figure 3). The pattern was adapted on the master cast as per manufacturer's instructions and was cured in a specialized light polymerizing chamber supplied as a part of the kit (Figure 4). The completion of cycle was indicated by hardening of the wax pattern. The polymerized wax pattern was carefully retrieved from the cast, and try-in was done to evaluate the intraoral fit (Figure 5). This technique, avoided the need for fabrication of the refractory cast unlike conventional technique.

The sprue former was attached to the wax pattern at the distal end. The wax pattern was finished and strengthened using LiWa finish varnish (Finish Varnish; Willmann & Pein GmbH). The wax pattern along with the attached sprue was removed from the master cast using a blunt instrument. Standardized protocol was followed for burnout, investment and casting procedure, similar to that of a fixed dental prosthesis framework rather than cast partial denture framework. Metal try-in of the framework fabricated using LiWa light cure wax pattern was found to be satisfactory (Figure 6). The finishing procedure for the framework was minimal and the time required for intraoral adjustment of the framework was minimal. Moreover, patient was highly satisfied with the fit of the framework. The hollow bulb definitive obturator was fabricated following the conventional steps. Acrylization was done using heat polymerized acrylic resin (Heat Cure, Dental Products of India), and the lost salt technique was followed to fabricate hollow bulb portion of the prosthesis. The prosthesis was checked for its fit intraorally and delivered to the patient (Figure 7). Post insertion instructions were given. Patient was recalled after 24 hours for follow up and further often every 03 months. During follow up recall visits minimal adjustments were done and there after patient was

comfortable with the prosthesis in mastication, swallowing, speech and esthetics.

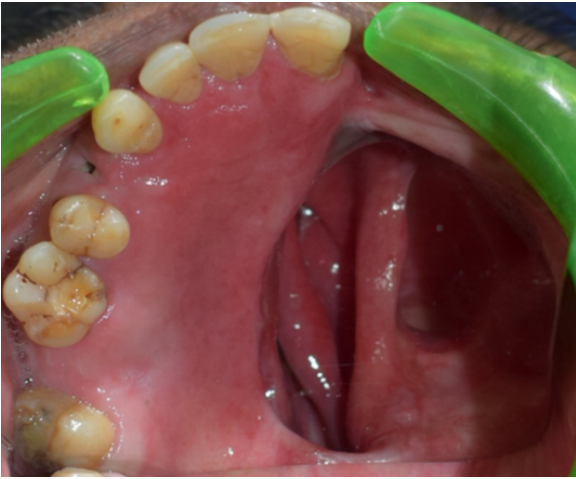


Fig. 1: Pre Op intraoral defect



Fig. 4: LiWa light curing chamber

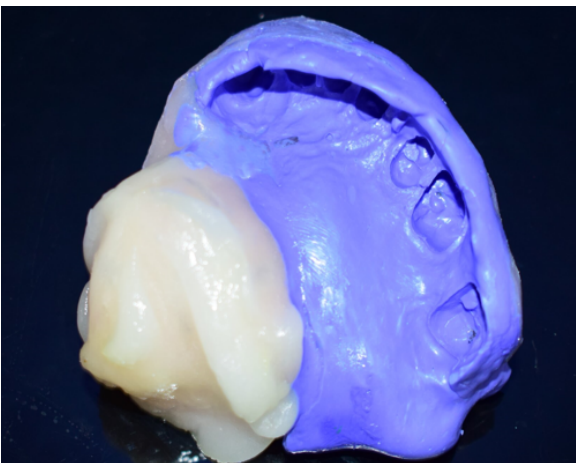


Fig. 2: Final Impression



Fig. 5: Wax pattern try in

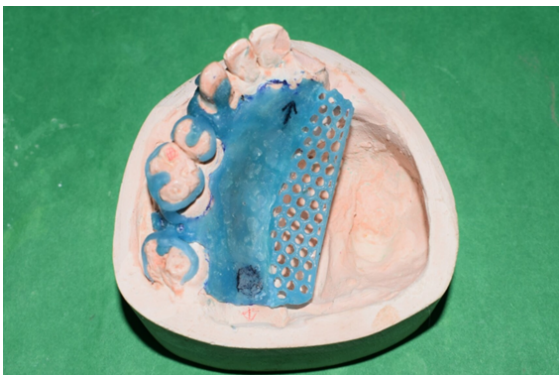


Fig. 3: LiWa wax patternon master cast



Fig. 6: Metal framework try in



Fig. 7: Prosthesis in Situ

3. Discussion

Fabrication of cast metal framework for the obturator prosthesis involves multiple steps which increase the chances of incorporation of errors in the final prosthesis. These errors can occur during blockout of the master cast, duplication of the cast, fabrication of the refractory cast, fabrication of the wax pattern, and finishing of the cast metal framework. Decreasing the number of steps involved in the procedure may reduce the chances of error and improves the fit of the prosthesis. Hence, it was decided to use LiWa pattern for fabrication of metal framework.

The use of light polymerizing waxes in this case with a large maxillectomy defect and multiple extracted teeth, eliminates the steps involved in the conventional technique of wax pattern fabrication, which is a technique sensitive procedure. These light polymerizing resins are adapted on the master cast and do not require the duplication of master cast and fabrication of the refractory cast, thus eliminating one of the major steps in the procedure.⁹ Another advantage includes that wax pattern try-in can be done to evaluate the fit in the oral cavity.¹⁰ Any distortion can be corrected at the same time and further processed for acrylization. However literature lacks comparative studies to prove that these wax patterns have better adaptation as compared to conventional technique.

Presently there are two commercially available brands of light cure resins, which include: Ti-light wax and LiWa light curing resin.¹¹ In this case, LiWa light curing resin is used which is available in different forms such as sheets, meshwork and clasps. LiWa is a light polymerized resin having mouldable consistency and can be molded with gloved hands or with an electrical wax knife. These waxes cannot be heated directly on the flame. Liwa wax pattern shows less polymerization shrinkage and reproduces accurate surface details.¹² These polymerized waxes, being

highly elastic, can be easily removed from the cast without distortion. The pattern fabricated from LiWa light curing wax is cured as per manufacturer's instructions in a light-cure chamber having particular specifications for curing.

Various authors have observed that metal framework fabricated using light cure waxes have better fit and accuracy.^{13,14} With the introduction of newer materials, a reduction in inconsistency can be expected. The use of light polymerizing resin/waxes for the fabrication of a cast metal framework in this clinical situation prove to be a successful attempt in terms of reduction in working time and laboratory steps.

4. Conclusion

The definitive obturator comprising of the metal framework has been a gold standard for the rehabilitation of maxillectomy defects. Fabrication of a cast metal framework involves a complex laboratory procedure to achieve the clinical success of the prosthesis. LiWa light curing waxes can be successfully used as an alternative to the conventional wax pattern for the fabrication of cast partial dentures framework for definitive obturators. It saves precious time, reduces cost, eliminates a few laboratory steps and provides a more precisely fitting prosthesis.

5. Conflict of Interest

The authors declare no relevant conflicts of interest.

6. Source of Funding

None.

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