

A Hollow Silicone Finger Prosthesis with Modified Metal-Mesh Conformer

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Abstract Loss of an organ such as a finger not only imposes a functional impairment, but also leads to unaesthetic appearance and a deep psychological stigma to the patient. Hence replacement of such missing finger with the help of an artificial finger prosthesis has been very successful. The success of the prosthesis depends on the precision in meticulous planning and designing of prosthesis, technique of fabrication and the materials used. This article describes fabrication of a finger prosthesis by a modified technique, by making a metal conformer with a wire mesh. This design offers maximum retention and excellent aesthetics, thereby imparting a lifelike appearance to the hand with missing finger.

Keywords Amputation · Prosthesis · Hollow metal conformer · RTV

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Introduction

Loss of a missing organ has been a major form of physical impairment for an individual. The manifestations of such a physical loss leave a psychological trauma to the patient. Finger and partial finger amputations are some of the most frequently encountered forms of partial hand loss. The commonest causes of these amputations may be trauma/accident, congenital absence or malformations [1, 2]. All such situations pose a varying degree of difficulty in management. Prosthetic rehabilitation of such defects poses a challenge to maxillofacial prosthodontist.

Success of the prosthesis depends on the precision in meticulous planning and designing of prosthesis, technique and materials used [3]. Hence, accurate impression technique, carving of wax patterns that would provide desired esthetics, retention and stability is of paramount importance. Most of the conventional custom finger prosthesis made up of autopolymerizing resin or polyvinyl chloride have not been able to provide the desired results due to poor esthetics, lack of flexibility and the tendency to stain. The prosthetic rehabilitation should be as barely discernible as possible with an attempt to create the prosthesis life like and natural. Fabrication of such prostheses with realistic skin surface and seamless visual integration with surrounding tissues requires high degree of clinical skill and laboratory expertise.

Case Report

A 55 year old man reported with a chief complaint of unaesthetic look due to amputated little finger of left hand (Fig. 1). History revealed that the reason for loss was traumatic accident 6 years back. On examination a solitary



Fig. 1 Amputated little finger of left hand

healed wound/scar on the base of amputated little finger, with approximately 3 mm stump of tissue left behind.

Patient was not satisfied with the previous prosthesis made out of autopolymerizing resin. Hence reconstruction of lost finger with the help of silicone elastomers was considered [4].

Procedure of Fabrication

Reconstruction of lost finger was planned meticulously in following manner.

In order to make the prosthesis light weight and retentive, a specially designed hollow metal conformer using patient's ring, with altered method of mechanical interlocking for elastomeric material, using wire mesh was fabricated and used. The procedure was systematically undertaken into following steps:

Impression Making

Both of the hands were lubricated using petroleum jelly and rested on a flat surface. Using modeling wax (DPI ltd), the hands were boxed. Irreversible hydrocolloid impression



Fig. 2 Irreversible hydrocolloid impression of the hand

material (Jelgan, Dentsply ltd) was manipulated as per manufacturer's instructions and was placed first over the palmar aspect then over the dorsal aspect. Patient was instructed to leave his hand in normal resting position and not to stretch (Fig. 2).

Preparation of Model

Impressions of both hands were poured in dental stone & positive replica thus obtained was observed critically for anatomy.

Fabrication of Hollow Metal Conformer with Altered Design

Two brass rings were fabricated for ring and little fingers respectively. These were joined with a brass connector. A long brass rod of 5 mm thickness was molded into conical shape projecting from the little finger ring. The open ends of this brass cone were welded to the ring on little finger and the apex extending till the last phalangeal joint, to form a hollow conformer. A wire mesh for interlocking of silicone was welded on top of the cone (Fig. 3).

Trial of Metal Conformer on Patient's Hand

Proper fit of both the rings were checked and also the digital movement was evaluated.

Fabrication of Wax Pattern

Using modeling wax, the lost part of finger was sculpted accurately with reference to the contralateral hand. The pattern was made hollow with heated wax spatula and attached to the metal conformer (Fig. 4).



Fig. 3 Two brass rings joined with a brass connector within a wire mesh for interlocking of silicone was welded on top of the cone



Fig. 4 A carved hollow wax pattern was made with heated wax spatula and attached to the metal conformer

The carved pattern was tried on patient's hand and evaluated for esthetics, retention and stability. Necessary modifications were carried out.

Laboratory Steps

1. Wax pattern was invested and flasked, undercuts and areas to be made hollow were blocked with putty elastomeric material and dewaxing was performed.
2. Packing of wax pattern was the most crucial step.
3. A procedural step by step shade matching was conducted for characterization of dorsal and palmer surfaces of finger (Fig. 5). Separate matching of shade was done for nail. Shade matching should be performed at the time of packing to ensure optimal esthetics.
4. Room temperature vulcanizing silicone (703 RTV, Fuzhou Huayu Sealing Material Co.) was packed in incremental layers first on the dorsal surface followed by the rest of the space. It then was cured for 24 h.
5. Retrieval of prosthesis was carried out and excess was trimmed. Excessive polishing should be avoided to ensure matt finish which is more natural and life like.



Fig. 5 Shade matching was conducted for characterization of dorsal and palmer surfaces of finger



Fig. 6 Prosthesis was placed on the patient's finger, fit and appearance were evaluated both on dorsal and palmer aspects



Fig. 7 Prosthesis was placed on the patient's finger, fit and appearance were evaluated both on dorsal and palmer aspects

6. Nail was fabricated using autopolymerizing resin with intrinsic coloration and was attached using adhesive.
7. Prosthesis was placed on the patient's finger, fit and appearance were evaluated both on dorsal and palmer aspects (Figs. 6, 7).

Discussion

The specially designed metal mesh hollow conformer for retention of finger prosthesis has proved its superiority in terms of ensuring proper intimate fit and reduced weight of the prosthesis and offering remarkable resistance to corrosion. The metal wire mesh ensures mechanical interlocking of silicone.

Silicone finger restorations have proven their efficacy in terms of flexibility, excellent colour matching, ease of fabrication and more lifelike appearance [5].

Factor II brand medical grade silicone was employed for fabrication of the prosthesis. It has high tear strength, good

electrical and thermal stability, easy to pour and possesses remarkable color stability. It cures at room temperature and does not require any special equipment for processing. It maintains its dimensional stability after curing.

The prosthesis thus fabricated merged seamlessly with the adjacent tissues providing desired esthetics and psychological boost to the patient.

Conclusion

Fabrication of finger prosthesis has not been a means of physical fulfilment but also it has imparted a deep sense of psychological upliftment for this patient who was otherwise undergoing a social stigma causing embarrassment and lack of social acceptance.

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