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## CASE REPORT

### Prosthetic Rehabilitation by an Aesthetic Finger Prosthesis: A Case Report

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#### ABSTRACT:

Complete or partial fingers are the most commonly encountered forms of partial hand losses which have a negative impact on physical and psychological well being of an individual. In order to alleviate these problems, an aesthetic prosthesis should be fabricated which can offer psychological, functional and rehabilitative advantages to the patient. The success of a prosthetic restoration primarily depends on its retention. This clinical report portrays a method to fabricate silicone finger prosthesis for a patient who has a partial fingers losses caused by occupational trauma. Silicone material was used to provide function and esthetics for this patient.

**Keywords:** finger prosthesis, prosthesis retention, silicone materials, traumatic amputation

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#### INTRODUCTION

Human beings have five digits, termed phalanges, on each hand. A finger is a type of digit which is an organ of manipulation and sensation along with functions like grasping and feeling which also have an esthetic impact.<sup>1</sup> Finger and partial finger loss are some of the most frequently encountered forms of partial hand loss due to congenital abnormalities, diseases and most commonly trauma which not only produces significant esthetic but also cause functional deficiencies.<sup>2</sup> Traumatic amputation of the fingers represent a serious insult and therefore a prosthesis becomes a necessity for such patients whose surgical reconstruction is not possible for any of these reasons whether psychological, financial, functional or rehabilitative. Most common methods to replace the loss of finger are implants, silicon prosthesis, acrylic prosthesis, prosthesis using attachments and magnets.<sup>3</sup> The restoration of finger amputations depends on the amount of tissue involved, the involvement of bone, the angles and levels of amputation. A precisely fitting replica not only improve function by restoring length but also provide opposition for the remaining digits by maintaining

sensitivity through a thin lamina and also by protecting the sensitive residual finger.<sup>4</sup>

This case report presents a case of rehabilitation of finger defect with a silicone prosthesis and describes a method of retention for the same.

#### CASE REPORT

A 41 year old male patient reported to the Department of Prosthodontics, with a chief complaint of a partially missing fingers of his right hand except for the thumb. History revealed that the patient lost his fingers two years back due to occupation-related trauma. The patient had suffered a long period of psychological depression immediately after the injury and post surgery he had also observed difficulty in holding large sized objects and any work that would be related to them for example using a hammer. On physical examination, there was no pain on palpation, and the surrounding skin showed no signs of inflammation and infection (Fig-1). The patient had no history of a previous prosthesis and a written consent was signed by the patient to ensure his willingness and cooperation the treatment.

## Method of fabrication

### Impression making

A thin layer of petroleum jelly was applied to the patient's hand prior making an impression. A wide plastic container was selected according to the size of the palm and impressions of affected hand was made with irreversible hydrocolloid impression material by asking the patient to keep the hand in the normal resting position without stretching while impression making (Fig-1-4).

### Model preparation

When the material was set the impression was retrieved and was poured in stone plaster and the model was prepared.

### Wax pattern fabrication and try in

Another impression of the contralateral digit using alginate impression material was made, and modeling wax was melted and poured into the negative mold to duplicate the anatomic details of the lost finger. The wax pattern was placed over prepared finger stump and necessary modifications in thickness and anatomy were done. Surface characterization like skin folds and wrinkles were incorporated so as to reproduce exact anatomy of missing fingers. These patterns were assessed and further adjusted keeping in mind the alignment, size, shape and contours of the contralateral fingers. Wax pattern trial was done to check fit and alignment with respect to adjacent fingers (Fig-5).

### Flasking and processing of final prosthesis

After satisfactory trial, the wax patterns were then flaked using die stone into conventional denture curing flask using two pour technique. Necessary steps were taken to avoid incorporation of air bubbles. Undercuts were avoided to facilitate easy opening of the flasks and subsequent removal of the set silicone prosthesis. Dewaxing was done, and mold was obtained (Fig-6). Once satisfactory shade was obtained, packing of maxillofacial silicone material was done with respect to dorsal and ventral portions (Fig-8,9). The flask was closed under pressure and was left undisturbed for 24 h for complete polymerization (room Temperature vulcanization of maxillofacial silicone). Deflasking was done (Fig-10) and finger prosthesis was carefully retrieved from stump and excess silicone trimmed using sharp curved scissors. Burs provided by the company were used to finish the prosthesis. The fit and shade of the finger prosthesis were evaluated on the patient. The customized metal ring was used in index finger as an auxiliary aid of retention and also to mask prosthesis and skin junction other fingers were provided with adhesive for retention (Fig-11). Artificial fingernail of appropriate shade was procured and placed on replicated nail bed using medical grade adhesive. The patient was given instruction regarding finger prosthesis maintenance. Special instructions of avoiding moisture contact and direct sunrays exposure was given to the patient. The patient was recalled after one week for recall check up.



Figure 1: Preoperative view



Figure 2: Alginate impression made



Figure 3: Setting of alginate impression



Figure 4: Plaster of paris application



*Figure 5: Wax pattern*



*Figure 6: Dewaxing done*



*Figure 7: Silicone material with color pigments*



*Figure 8: Silicone material manipulated*



*Figure 9: Silicone material packed*



*Figure 10: Deflasking done*



*Figure 11: Finger prosthesis made with ring on index finger and adhesive on the others to give the prosthesis a life like appearance*

## DISCUSSION

Loss of any finger greatly affects the esthetics and functionality of an individual but can be restored to near normal functionality using appropriate prosthesis. Allen's classification is commonly used to describe the level of amputation for fingertip amputations. Type 1 injuries are those involving the pulp only. Type 2 injuries consist of injury to the pulp and nail bed. Type 3 injuries include distal phalangeal fracture with associated pulp and nail loss. Type 4 injuries involve the lunula, distal phalanx, pulp and nail loss.<sup>5</sup> In this conventional impression method is used which has a certain advantage over the older technique which is a less cumbersome, quick, easy and economical using minimal material. For making wax pattern the same person's unaffected hand can be used to eliminate the error in respect to size and shape.<sup>2,6</sup> We can also use the analogous finger technique<sup>6</sup> and wax was preferred over clay to make the pattern because residual oils from clay contaminate the mold surface, which interferes with the platinum catalyst employed in silicone prosthesis materials. The resultant wax was pliable enough to form into small shapes with fingers when warm and yet stiff enough to carve with an instrument when chilled.<sup>7</sup> Placing it in chilled water for some time prevents distortion of the pattern. Wet gauze technique was used to recreate surface details in case of lost surface details. The additional functional benefits of silicone prostheses include desensitization and protection of the painful hypersensitive tissue at the amputation site as it applies constant gentle pressure.<sup>3</sup> It has also been speculated that silicone gel improves the hydration of the stratum, making the scar tissue more pliable, and comfortable. The ideal color properties required in a maxillofacial prosthetic material must accept and retain intrinsic and extrinsic coloration as silicone prostheses do not have color longevity.<sup>2</sup> This allows the surface characteristics of the prosthesis to be closely matched to that of the remaining digits of the hand. The finger prosthesis requires an optimum retention for functions such as grasping, carrying, and holding. A significant advantage of using this technique is the exact duplication of the anatomical and the fine surface details of the digits. Various methods of retention are available i.e., using rings over the margins of the finger prosthesis, using medical grade adhesive, or by implant retained prosthesis that in turn enhances the function, comfort and improve quality of life of the patient.<sup>8-10</sup>

## CONCLUSION

The aesthetic appearance of the finger prosthesis plays an important role than function as good suspension alone is not sufficient for patient acceptance as for them high level of cosmetics is paramount. In this branch of prosthodontics with the advancement in skill, technology and materials, the rehabilitation of an amputated finger is no more an aesthetically

challenging task. When the prosthesis is fabricated with immense care, they can be made life-like by giving small and keen details like as a pleasing shape, thin margins, lifelike fingernails, realistic color and contours. A well fabricated aesthetic prosthesis not only helps the patient in providing his psychological support but also improve the quality of life of the patient.

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