

## **Case Report**

### **Finger Prosthesis Made Easy: A Case Report**

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**Abstract:** Hand is a body part which is of major importance for communication, body language and social contact along with its basic function of grasping and feeling. Finger and partial finger amputations are some of the most frequently encountered forms of partial hand loss. It causes devastating physical, psychosocial instability and economic damage to an individual. Rehabilitation of amputated finger is of utmost importance and the first choice is microvascular reconstruction. But when surgical reconstruction in patients is not possible contraindicated, unavailable, unsuccessful or unaffordable, the prosthetic rehabilitation becomes an alternative in order to improve the psychological status of an individual. A well fitted and colour matched finger prosthesis eliminates the constant reminder of the disability; make a patient feel a capable person and not a handicap. It should be provided as soon as possible to raise the spirits and ease the mind of the afflicted. Modern well fabricated silicone finger prosthesis can be life-like and can assist the amputee in returning to society, socially as well as psychologically.

**Keywords:** Silicone, Prosthetic finger, Partial finger amputation.

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#### **INTRODUCTION**

Fingers play an important role in function and aesthetics. Function and form of fingers may be affected from congenital cause, diseases and most commonly trauma. Thus, absence of finger results in functional deficiencies and aesthetic problems [1-3]. Traumatic amputation of the fingers leads to psychological instability, functional loss and poor aesthetics [4].

When surgical reconstruction in patients is not possible, prosthesis can be provided for psychological, financial, functional, and rehabilitative reasons [2]. Prosthesis refers to artificial replacement of an absent part of the human body [9]. A well fitted and colour matched finger prosthesis eliminates the constant reminder of the disability; make a patient feel a capable person and not a handicap [2, 4].

Replacement of a missing individual finger by fabricating an artificial finger is challenging, requires

great skill in terms of artistic and technical expertise. It also requires understanding because the expectations regarding the aesthetics of the prosthesis of the patient are high [5, 6].

It can improve function by restoring length and providing opposition for the remaining digits, maintaining sensitivity through a thin lamina, protecting the sensitive residual finger, and transmitting pressure and position sense for activities such as writing or typing [1, 2, 7].

This case report describes a technique for fabrication of finger prosthesis to help to provide good aesthetics and adequate retention. Rehabilitation of patient with partially missing finger was done with silicone prosthesis. finger prosthesis.

## CASE REPORT

A 78 year old male patient reported to the Department of Prosthodontics, Crown and Bridge and Implantology, College of Dental Sciences, Davangere, Karnataka with the complaint of a partially missing finger. The patient revealed a history of having lost the digit in a traumatic injury caused by a mechanical lathe.

A complete examination of the hand revealed a residual stump terminating in the middle phalangeal region; light brown in colour on the index finger of the right hand measuring approximately 3cm. The first interphalangeal joint seemed intact with mild flexion movement possible. The area around the residual stump was keratinized without any sign of inflammation (Fig. 1).

A treatment plan was formulated to replace the finger with silicone prosthesis. As a part of protocol, and to ensure the patient's willingness and co-operation, an informed consent was signed before beginning the treatment.

## Fabrication

The fabrication of the silicone finger prosthesis consisted of making an impression of the stump, followed by fabrication of metal ring, wax pattern and laboratory procedures to obtain the silicone prosthesis.

- Hydrocolloid impression is made of the amputated stump of the right index finger and the left normal hand. Stone replicas are made of the amputated finger and contralateral normal hand (Fig. 2).
- Wax pattern of a ring is fabricated with a preformed lingual major connector wax (Fig. 3). It is made just loose enough to slide comfortably on and off the stone replica of the amputated finger. After casting it is tried on the patient's residual stump the fit is checked and grooves are placed (Fig. 4); then it is placed back on the stone replica of the residual stump.
- A 10 mm projection is added to the stone replica of the residual stump to obtain a hollow shell. Wax pattern is obtained by analogous finger technique, where moulding and

sculpture on another persons' finger is performed and adapted on the stone replica of the residual stump. Additional surface anatomy peculiar to the patients' adjacent fingers is reproduced on the wax pattern. Care was taken to provide space on the ventral aspect of wax pattern to enable movements of the residual stump and prevent kinking of the silicone prosthesis during these movements (Fig. 5).

- This wax pattern was then seated in a flask with dental stone material covering it up to the sides. Markings were made on the cast to ensure the correct location of the stump. The undercut formed was to lock the stump to counter balance before flasking procedure. Indices were made on the mould surface to provide a definite location of the mould components. After applying separating medium (DPI) it was counter flased and dewaxed (Fig. 6).
- Appropriate shade matching was done during day light. Following completion of these separate colour matches (dorsal and ventral surfaces), the colour were added to the corresponding areas of the mould surfaces. This was followed by the addition of base colour silicone and further application of localized patch colour pigments. After attaining the closest possible match on colour of the material, both halves of the mould were closed, placed under bench press and cured overnight.
- On completion of curing, the mould is removed. The prosthesis was trimmed, finished and checked on the patient's right hand. Prefabricated acrylic nails were attached with cyanoacrylate resin on the silicone nail bed (Fig. 7). Simple functions like holding cup and writing with pen are checked (Fig. 8).
- The prosthesis is retained by the metal ring incorporated in the silicone prosthesis and an elastic band worn over the prosthesis on the residual stump. It provided adequate retention to perform regular tasks.



**Fig. 1: Preoperative photo showing residual stump on right hand and normal left hand**



Fig. 2: Irreversible hydrocolloid impression of the residual stump on right hand and normal left hand



Fig. 3: Wax pattern for ring around stone replica of residual stump



Fig.6: Stone flask with metal ring embedded in wax pattern and orientation grooves



Fig. 4: Try in of the metal ring on the residual stump



Fig.7: Postoperative dorsal surface with elastic retentive band and artificial nail attached to silicone finger prosthesis



Fig. 5: Wax pattern of donor finger with wax beading



Fig. 8: Postoperative picture showing patient performing simple task

## DISCUSSION

### Patient Selection

Patient selection is important; not every patient may be suitable for prosthesis. Deciding factors for a successful fit, acceptance and subsequent use depends on an adequate stump and patient's realistic expectations. Through selection the number of patients can be minimized for "medical prosthesis".

### Preservation of the Proximal Interphalangeal Joint

For the determination of functional capability of the prosthesis the level of amputation and length of stump preserved were important. It is important to preserve the proximal interphalangeal joint, because mobility of the finger will not be restricted to the metacarpophalangeal joint.

### Color Matching

Color matching was the most critical aspect of lifelikeness. The color of the hand is affected by physiologic factors, psychological factors, ambient temperature, positioning of the hand, and any recent activities undertaken by the hand.

Surrounding lighting conditions also affect the perception of color, an optical phenomenon known as "metamerism" [8]. In addition, a period of deconditioning following the injury lightens the color and softens the rugged skin tones of the working hand.

### Psychological Benefits

The hand is very much involved in communication, in expression, and in arts and dance. However, this is often taken for granted until one incurs a physical loss to the hand [10]. The stigma of being incomplete or fear of being talked about as deformed or ugly makes the patient want to conceal the "defective" hand resulting in a total loss of all active and passive functions of the hand. Following disfigurement, the psychological response of shock, anger, despair, depression, and then acceptance takes time and may be incomplete in some cases, unless the person has adequate support or explanation [10, 11]. Fitting a digital prosthesis repairs the body image and allows the patient to expose his or her hand with confidence.

## CONCLUSION

The loss of all or part of a finger following traumatic amputation may have a negative impact on physical and psychological wellbeing. An esthetic prosthesis can offer psychological, functional, and rehabilitative advantages.

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