A Modified Retentive Technique for Fabrication of Finger Prosthesis: A Case Report

ABSTRACT

Hand is a body part which is important for communication, body language and social contact along with its basic function of grasping. Finger and partial finger amputations are some of the most frequently encountered forms of partial hand loss. For that when surgical reconstruction in patients is not possible or it is contraindicated, unavailable, may be unsuccessful or unaffordable, the prosthetic rehabilitation becomes an alternative option. Maxillofacial prosthesis replaces the lost body parts by using the silicone materials. These prosthesis support the patient physically as well as psychologically to enhance their confidence and social acceptance. This case report describes the rehabilitation of a patient with missing finger using silicone prosthesis.

KEYWORDS partial finger amputation, prosthetic finger, RTV silicone

INTRODUCTION

Prosthesis refers to artificial replacement of an absent part of the human body. These artificial substitutes serve primarily to improve the patient’s appearance and to support them psychologically. They play an immense role in making the patient more socially acceptable.

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. When surgical reconstruction in patients is not possible, prosthesis can be provided for psychological, financial, functional, and rehabilitative reasons. 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. 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.

Most of the prostheses are made from room temperature vulcanizing silicones (RTV silicones). The advantages of RTV silicones include chemical inertness, flexibility and elasticity. The prosthesis can be retained either by mechanical methods or by the use of adhesives. Implant retained prostheses have proven to be satisfactory, but they are economically not feasible. As the fingers have the most important role in daily activities, replacement of the missing finger becomes the most challenging job for the clinician.

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.

CASE REPORT

A 52-year-old male patient reported to the Department of Prosthodontics of Tatyasaheb Kore Dental College & Research Centre with the complaint of a partially missing fingers. History revealed that the patient lost his two digits 15 years ago in a traumatic injury caused while working in the factory. The amputated stump was well-healed.
A complete examination of the hand revealed a residual stump terminating in the middle phalangeal region. The first interphalangeal joint seemed intact with mild flexion movement possible. The area around the residual stump was without any sign of inflammation (Fig. 1). A treatment plan was formulated to replace the finger with silicone prosthesis.

The advantages and limitations of replacement of the finger were explained to the patient.

**FABRICATION OF THE PROSTHESIS**

**Making the impressions and casts**

An irreversible hydrocolloid impression material (DENTSPLY India Pvt. Ltd.) was chosen for making impressions. Impressions of both the hands were made by using plastic containers of sufficient length and diameter to confine the impressions. The patient was asked to dip his hands into the container without touching the sides or the bottom of the container (Fig. 2). The material was allowed to set and the hands were removed gently after the material was set (Fig. 3). The impressions were poured in the dental stone and the casts were retrieved (Fig. 4). The normal hand was used as a reference to duplicate the size, shape and orientation of the finger.

**Fabrication of special acrylic retentive caps**

To retain the prosthesis to the remaining finger stumps, special finger retentive caps were fabricated using clear self-polymerised resin. Self-polymerised resin was mixed and applied on the finger stumps to cover a small surfaces of the stumps and allowed to polymerize (Fig. 5).

After setting they were removed and finished and polished. The retentive caps were properly fitted to the stump.

**Selection of a donor and making wax patterns**

A donor hand for making the wax pattern was essential to avoid the laborious task of sculpting. Using the cast of the normal hand as reference, a donor’s hand was selected from one of the patients from departmental OPD (outpatient department). Impression of the donor finger was made by making the index and pouring it in the modelling wax. After the wax cooled down, it was retrieved from the impression and tried on the cast. Final carving and adjustments were made to...
adapt the pattern with retentive acrylic caps on the cast. The completed wax pattern was tried on the patient’s finger-stump (Fig. 6).

**Colour matching and incorporation of nail**

The most critical step was to match the colour of the prosthesis to the patient’s skin colour. By observing the basic skin colour, the intrinsic were added to the silicone material to obtain the natural shade. The nail was fabricated and kept ready by using autopolymerising clear acrylic resin, trimmed to the appropriate size and shaped with the proper curvature matching the adjacent nails. Around 1 mm of nail bed was scraped in the wax pattern and the nail was inserted in that space. Two piece moulds were used (Fig. 7).

RTV silicone material was mixed with intrinsic colours and was packed into the mould. Curing was done for 24 hours at room temperature. Prosthesis was finished and polished. Extrinsic stains (MP Sai Enterprise, Mumbai) were used for final characterisation and colour matching with the adjacent fingers.

Prosthesis was seated on finger stumps with the help of special acrylic cap and adhesive. Acrylic cap provide extra mechanical retention (Fig. 8).

**DISCUSSION**

Successful prosthetic rehabilitation of the patients with missing body parts is a challenging task, but it is our responsibility to make the best use of the available materials and techniques to provide the cost effective treatment modalities. Hands may be affected by many conditions varying from congenital abnormalities to disease, but the greatest cause of functional impairment is trauma. Currently, many severely injured and traumatically amputated digits can be saved by microsurgical replantation. But in some patients, reconstruction is contraindicated or unsuccessful.

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. Colour matching was the most critical aspect of lifelikeness. It should not be affected by climatic variations, heat resistant and must not be stained by ordinary materials. Prosthesis must be cleaned easily and should not irritate the skin.

Construction of any prosthesis needs to fulfill the aesthetic demands of that particular body part as it offers...
the psychological, functional and rehabilitative advantages. By restoring the natural appearance to the hand, a prosthesis eliminates the trauma caused by constant reminder of the handicap and, thus, offers true psychological therapy.\(^4\)

**CONCLUSION**

Rehabilitation of any missing part of the body simulating to the natural colour, shape, size and texture is the primary responsibility and intention of a clinician. Fabrication of the prosthesis in a conventional manner has its own limitations as long as the aesthetics and function are concerned. Loss of a finger has been found to affect the person psychologically. In such situations restoring aesthetics with sufficient retention becomes the prime concern. Thus a custom-made finger prosthesis using silicone polymers is aesthetically acceptable, partially restores some degree of functionality and is comfortable for patients. In spite of that providing the best to our patients should be our aim.

**REFERENCES**