Case Report

Enhancing retention and esthetics of fabricated silicone finger prosthesis using stump reduction technique and customized acrylic nail: A unique approach

ABSTRACT
Prosthesis of any type is a necessity for a patient with defect to continue their daily life, on a socially acceptable level. The most commonly encountered forms of defects or loss include complete or partial finger amputations. One of the major concerns in the replacement of a partially amputated finger is inadequate retention of the prosthesis. This paper presents prosthetic rehabilitation of partially amputated index finger with a silicone prosthesis using reduced stump model technique and customized acrylic nail which enhances retention and esthetics of finger prosthesis.

Keywords: Customized acrylic nail, reduced stump model technique, silicone prosthesis

INTRODUCTION
Although appearance is not supposed to matter, and just a person inside is more important, but without an attractive appearance, no one is ever enticed to become acquainted with the inner person. Any defect compromising the looks of an individual has a crippling effect. A prosthetic camouflage can mask the defect and help individuals regain back the lost confidence in life. Most common defects encountered are hand defects in the form of complete or partial finger loss. These could be due to congenital abnormalities or traumatic injuries causing amputation.

Often used materials for finger prosthesis are room temperature vulcanizing silicones (RTV silicones). The advantages of RTV silicones are chemical inertness, flexibility, and elasticity.

These prostheses should have adequate esthetics, retention, function, and comfort to be acceptable for usage. This paper presents fabrication of silicone prosthesis with greater retention and esthetics using reduced stump model technique and customized acrylic nail.

CASE REPORT
An 18-year-old female patient reported with the complaint of a missing finger. History revealed partial loss of the right index finger in a traumatic injury caused by a mechanical lathe 6 months before presentation.

A complete hand examination was carried out which revealed a residual stump on the index finger of the right hand measuring 2.5 cm in height [Figure 1]. The residual stump showed no signs of inflammation or pathology which made it suitable for the fabrication of the prosthesis.

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After the case evaluation, a treatment plan was formulated which was then discussed with the patient. Before beginning the treatment, an informed consent was obtained from the patient as per the ethical norms.

**Procedure**

First, the impression of defective right hand was made. For that, a thin layer of petroleum jelly was applied to the hand to prevent adherence of impression material to the skin and hair. To get adequate working time, chilled water was used to manipulate irreversible hydrocolloid impression material. A part of the mixed irreversible hydrocolloid was spread on the surface of a rectangular stainless steel tray, and the palmar side of hand was placed over it. The patient was instructed to keep the hand in a normal relaxed position rather than holding it stiff, and then, remaining alginate was applied on the dorsal side of hand. This technique also allows the hand to be easily pulled out from the set impression with the fingers in flexion. The set alginate impression was reinforced with type II plaster of Paris to prevent tearing and distortion of the impression material. This impression was poured in type III dental stone, and a positive replica of the hand was retrieved. Then, an impression of the index finger was made. For this, disposable paper cup with adequate space for making an impression was selected. The patient was instructed to dip the amputated index finger into disposable glass and hold it in a relaxed manner, taking care not to touch the wall of glass. Impression was poured in dental stone and master model was obtained. Next, the impression of a donor index finger of the patient’s left hand was also made in a similar manner. Molten modeling wax was poured only around the wall of the impression hand until it had sufficient thickness. After cooling, the wax sleeve was retrieved from impression. This sleeve was adapted on the amputated stump of master cast and was further characterized so as to gain a complete harmony with the rest of the fingers. On the wax sleeve, a slit for nail insertion was made, separating the nail bed from the nail fold and nail wall. The wax sleeve was tried on the patient’s finger stump to determine the fit and esthetic (length, width, and contour) on both dorsal and ventral aspects, and required modifications were done.

**Stump reduction technique**

To ensure uniform reduction of stump model, a two piece plaster mold with orientation grooves was made using the master stump model. Then, a layer of modeling wax of 1 mm thickness was adapted to the mold surface. The two piece plaster mold was aligned and sealed back together with plaster tape, and the mold was poured in type III dental stone. A uniformly reduced stump model by 1 mm of the circumference was obtained. This aided in vacuum retention, providing an overall snug fit to the prosthesis without causing any pressure discomfort.

**Investment technique**

The trial wax sleeve was sealed to the reduced stump model, and the base of the stump model was indexed for proper reorientation into the mold after dewaxing. Investing was done with type III dental using three pour technique where in the first pour ended at the junction of dorsal and ventral surface of the wax pattern. A second pour covered the entire wax pattern and then a final pour up to the brim of the flask after separating medium was applied in between all the pours. Once the stone had set, dewaxing was carried out and the mold was allowed to cool. Appropriate shade matching of dorsal and ventral aspects of the finger was done during daylight by adding some intrinsic colors with RTV medical-grade silicone. The mold was then packed with the corresponding shade silicone material both in the

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**Figure 1:** Right hand with partially amputated index finger

**Figure 2:** Alginate impression material reinforced with type II plaster
dorsal and ventral half and allowed to bench cure overnight. The silicone prosthesis was finished using sharp scissors and silicone burs.

**Custom acrylic nail fabrication**

A putty index of the nail of left index finger was used to get the desired contour [Figure 8]. The nail was fabricated using self-cure acrylic resin. Shade matching and characterization were done using a combination of shades of clear, white, and pink acrylic to mimic anatomy of half-moon shape of distal nail matrix, nail plate, and free edge of the adjacent nails. The acrylic nail was made 2 mm larger proximally so as to be inserted into the slit made along the crease of nail impression. A cyanoacrylate adhesive was coated on the under surface of the acrylic nail for bonding with the silicone surface.

The prosthesis was inserted and the patient was asked to wear a finger ring to conceal the junction [Figures 9 and 10]. The patient was satisfied with the fit and the appearance of the prosthesis. Instructions were given regarding usage and maintenance of the prosthesis. The recall visit was carried out in an interval of 1, 3, 6, and 12 months. The patient was satisfied and comfortable with the prosthesis.

**DISCUSSION**

Fabrication of a digital prosthesis is as much an art as it is a science. Patient acceptance majorly depends on the retention and esthetics of the prosthesis.

The literature has revealed several methods used to increase retention of the prosthesis such as retentive finger rings, providing a suction tunnel on the socket of the stump, medical grade adhesives, and implants.

Leow et al. studied optimal circumference reduction of finger models for a good prosthetic fit of a thimble-type prosthesis for distal finger amputations and concluded that 5%–7% circumference reduction of the finger was shown to be best among 1%–3% and 8%–9% of reduction.

In our article to enhance the retention of prosthesis, we followed a unique technique to decrease the residual stump.
For this, we made a plaster mold lined with a layer of wax to obtain a uniformly reduced stump model. The advantage of this technique included enhanced retention of the prosthesis, comfortable to use due to its passive fit, and even distribution of positive pressure on the tissue underlying the prosthesis.

Custom nail was fabricated to achieve a lifelike appearance, translucent nail with pinkish touch-up simulating the anatomical nail bed to show through. The secure attachment of the nail was achieved by sandwiching method obtained by slightly lifting the nail fold and nail wall on the proximal and each collateral side of the slit and inserting the nail after applying adhesive.

CONCLUSION

A defect which looks insignificant to an observer may not necessarily be so to the patient, to whom the perception of it can be magnanimous. Rehabilitation of such a defect in the patient’s acceptance level is all that is important for the long-term success of the prosthesis. The primary keys for patient compliance are esthetics and retention of the prosthesis. A well-fabricated retentive prosthesis with a lifelike appearance can overcome patient’s fear of attracting needless attention and improve their overall well-being.

Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Conflicts of interest
There are no conflicts of interest.
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