

## Aesthetic rehabilitation of a partially amputated finger - A case report.

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**Abstract** – Partial or complete loss of a digit has an emotional, psychological, functional and financial burden on the patient. High expectations of the patient to receive an aesthetic, life-like prosthesis makes it a challenging task. This clinical report portrays a simple method of fabricating a silicone prosthesis for a partially amputated digit. Retention is achieved by scoring the master cast which creates a vacuum to snugly fit the silicone over the skin tissues.

**Keywords:** Amputation, finger prosthesis, silicone.

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### Introduction

Hand may be affected by many conditions varying from congenital abnormalities to diseases, but greatest cause of functional impairment is trauma. Traumatic amputation of the fingers represents a serious insult to the hand, resulting in dramatic impairment of hand function. In addition to immediate loss of grasp, strength and security, the absence of finger may cause marked psychological trauma.<sup>[1]</sup>

A prosthesis can often restore a near normal function in distal phalange amputations.<sup>[2]</sup> Individuals who desire for finger replacement usually have high expectations of the appearance from the prosthesis. Various methods like titanium implants, osseointegrated abutment, silicone elastomers are in use for replacing missing finger. Passing through various materials, the acceptance rate has been much higher with an individually sculpted custom restoration using silicone elastomer.<sup>[3]</sup>

This case report presents the aesthetic rehabilitation of amputated distal finger with a custom-made prosthesis fabricated using silicone elastomers having adequate retention function, comfortable to use and aesthetically acceptable to the patient.

### Case Report

A 13-year-old female patient reported to the department of Prosthodontics with the chief complaint of a partially missing index finger of the left hand with a history of trauma 3 years back (Figure 1).

On examination there was no sign of inflammation at the site of amputation of the distal phalange. The skin was firm and the healing satisfactory. X ray was made to check for the possibility of any bony prominence (Figure 2). The patient was asked to place his left hand in the normal resting position and it was lubricated using petroleum jelly. Impression was made using irreversible hydrocolloid (Algitex,DPI ) and then poured in dental plaster(Kalabhai Kaldent Plaster) to make a positive replica. (Figure 3a and 3b)

Impression of the amputated finger was made similarly and poured in type 3 gypsum (Kalabhai Kalstone) for the final processing of the silicone prosthesis (MP Sai Enterprise, RTV silicone) (Figure 4). A putty index (Coltene President) of the contra- lateral index finger was made to act as a guide for the fabrication of the wax pattern (DPI).

The stump of the model was prepared by uniformly reducing it by 1.5 mm all around so that the silicone stretches and fits on the tissue with a snug. The wax pattern was fabricated using the putty index of the contralateral finger, the wax was then hollowed out and modifications were made so that it looked like the missing part of the digit (Figure 5)

The wax pattern was flaked and mold created using lost wax technique (Figure 6 and 7).

The colour of the prosthesis was matched with the colour of the patient's skin of the dorsal and ventral aspect of the hand in broad day-light. To give it a more realistic look extrinsic staining was also done once the finger was retrieved and the extra silicone trimmed with sharp scissors. To complete the prosthesis an artificial nail was modified to mimic a real nail which was later painted with nail paint to match with the patient's other nails (Figure 8,9,10,11). A cyanoacrylate adhesive was applied to bond the nail to the silicone surface. Patient was given home care instructions and recall visits were planned consecutively.

## Discussion

Prosthetic rehabilitation is reversible, medically uncompromised and allows the surgical site to be closely monitored.<sup>[4]</sup> Various materials have been used in the past like wood, leather, polyurethane, acrylic and polyvinyl chloride (PVC) to fabricate an aesthetic prosthesis, but silicone rubber has proved to be the most favourable in achieving the desired life like effects.<sup>[5]</sup>

The acceptance of prosthesis has been much higher with the use of custom restoration using silicone elastomer.<sup>[3]</sup> The

conjecture from recent studies suggest that silicone gel improves the hydration of the stratum corneum of immature hypertrophic scars.<sup>[6]</sup> With the property of elasticity of silicone elastomer, it is possible to enhance retention by scraping grooves into the positive model and create a vacuum.<sup>[7]</sup> Multiple layers of clear silicone over each layer of colour improves translucency and acts as a barrier for the coloration from environmental damage. The overall durability and stain resistance of silicone is far superior to any other material currently available for finger restorations. Almost all stains, including ballpoint ink, newsprint, clothing dyes, and food colorings can be removed easily with water and soap.<sup>[8]</sup> Silicone finger restorations has many other additional functional benefits. Many traumatic amputees experience painful hypersensitivity at the termination of finger remnants. The gentle, constant pressure of elastomer prosthesis can help desensitize and protect the injured tip.<sup>[9]</sup> In this prosthesis we rectified the stump mold so that the pressure was distributed evenly based on the capability of the tissues and was not localized at a single point to create a passive vacuum fit.

Placing a decorative ring over the margin of a finger prosthesis ending at metacarpal-phalangeal joint will make changing color of the hand less noticeable although the distal joint functions will be slightly restricted.<sup>[10]</sup> The ability to match skin tone requires a keen eye, good understanding of color therapy and meticulous attention to detail.

Significant advances in the field of material science have led to the production of new silicones with improved characteristics and improved methods of prosthesis coloration.<sup>[11]</sup> Amongst the recent advances, Smart Hand and i-LIMB allow implementation of various grasping

strategies.<sup>[12]</sup> Today's technology allows for fabrication of prosthesis in the absence of the patient using computer-based design. The fit of the prosthesis is achieved by impressing the stump on stereolithography models.<sup>[13]</sup>

### Conclusion

An artificial finger prosthesis provides for a lucrative solution to camouflage the outrageous defects of fingers or hands. The anatomy of the residual stump of the defect plays an important role in dictation of mode of retention and the genre of esthetics to be achieved. Rehabilitating the defects can be very rewarding to the maxillofacial prosthodontist.

The case report discussed above describes a cost effective and simple approach to rehabilitation of a partially amputated finger made using silicone elastomers and a striking balance was seen to be found with adequate retention and optimal esthetics.

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Figure 1



Figure 2

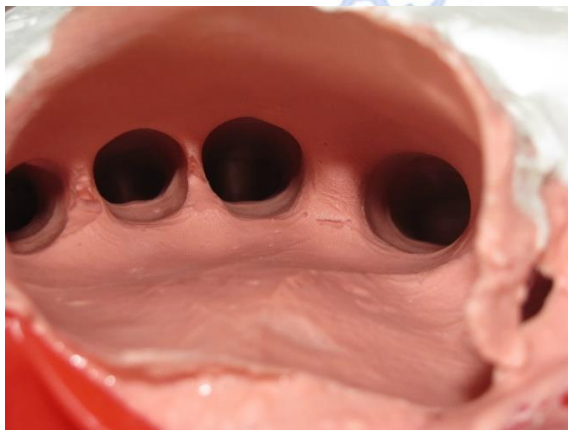


Figure 3a



Figure 3b



Figure 4



Figure 5



Figure 6



Figure 7



Figure 8



Figure 9



Figure 10



Figure 11