A Simplified Silicone Finger Prosthesis- A Boon to Handicapped: Case Report

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ABSTRACT

The unfortunate loss of all or part of a finger caused by traumatic amputation may have a negative impact on physical and psychological well-being of a person. An esthetic prosthesis can offer psychological, functional, and rehabilitative advantages. One of the major problems with the prosthetic replacement of a partially amputated finger is inadequate retention of the prosthesis. There are numerous means by which we can enhance the retention. And the most routinely used are adhesives, adhesive tape, magnets, and implants. The present article describes a technique which utilizes passive vacuum fit and mechanical aid such as ring for retention. Such treatment can be opted for in cases of financial constraints.

KEYWORDS: Partial Finger Amputation, Amputee, RTV Silicone, Finger Prosthesis, Mechanical Retention

INTRODUCTION

The hand gesture is definitely the most balant example of non–verbal communication. Complete or partial finger amputations are the most commonly encountered forms of partial hand losses. Common causes are traumatic injuries, congenital absence or malformations. The camouflage of amputation through prosthesis usage can shield an amputee from social stigma and help improve the emotional healing process. These artificial substitutes serve primarily to partially restore some degree of functionality and comfortable for patient use.

A maxillofacial prosthesis restores and replaces the lost body parts using artificial substitutes. Most commonly used materials for this purpose are room temperature vulcanizing silicones (RTV silicones). The advantages of RTV silicones are chemical inertness, flexibility, and elasticity.[1] They can also be easily molded and colored. Prosthesis constructed must assist in grip should look natural, allowing expressions of gesture.

This report describes the fabrication of silicone finger prosthesis for a patient who has partial finger loss caused due to trauma. Retention was achieved by passive vacuum fit and also by use of mechanical aid such as ring. Such treatment avoids costly procedures and is the cost-effective choice for patients with financial constraints.

CASE REPORT

A 42-year-old male patient reported to the Department of Prosthodontics and Implantology with a chief complaint of missing left little finger digit till second phalange (Fig 1). History revealed that the patient lost his finger 5-year-ago because of traumatic injury. The amputated stump was healed well. The advantages and limitations of the treatment was explained to the patient.

Fabrication

- ✓ A plastic container was chosen to confine the impression material and was tried on the patient's hand to provide adequate clearance of at least 5 mm around for the impression material. Regular setting alginate was mixed and poured into the container. The patient's hand was dipped vertically into the container without touching the sides or the bottom of the container. The Impression was poured in type IV dental stone and cast was made (Fig 2).
- ✓ Hydrocolloid impression of an amputed finger was made and replicated in a dental stone material. To ensure a snug fit of the prosthesis to the tissue, the stump was reduced overall by around 0.5–1 mm, so that silicone can stretch and flex over the stumps as prostheses were fit. (Fig 3)
- ✓ Hydrocolloid impression of the little finger of the right hand was made, and modeling wax poured into the impression to duplicate the lost finger (Fig 4). After the wax had cooled down, it was retrieved from the impression and tried on the cast. Modifications in sculpting were done to resemble the digits of other hand. The completed wax pattern was tried on the patient (Fig 5). Provision for finger nail was made on the wax pattern.
- ✓ Stump with a keyed base and wax pattern was flasked. Dewaxing was carried out, and two part mould was obtained (Fig 6).
- ✓ Cosmesil Series Materials and stains were used. The base colour was made by mixing the colors with the silicone. Palmar surface of the finger was matched first with a lighter shade. Next the stump was

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inserted in place and the color on the dorsal surface, usually a darker shade, was matched and characterization was incorporated and the packing was done. The material was allowed to cure in the steam for one and a half hour (Fig 7).Prostheses were finished using burs provided by the company. To better match the skin color external staining was also carried out.

- ✓ The prefabricated artificial nail was properly shaped and trimmed to the required size. Cyanoacrylate adhesive was then applied on the under surface of the nail for bonding with silicone surface to achieve a realistic appearance (Fig 8)
- ✓ The final step was the placement of the prosthesis on the patient's hand in lieu of the missing finger. Since the prosthesis was extended up to the metacarpal-phalangeal joint, the patient was asked to wear a finger ring to mask the junction. The patient was given proper instructions to use and maintain the prosthesis. (Fig 9).

Fig 1: Pre-treatment photograph

Fig 2: Stone model of the defect,

Fig 3: Scoring of the stump

Fig 4: Wax pattern fabrication

Fig 5: Wax pattern try in

Fig 6: Stone mould of the defective finger

Fig 7: Post curing of the prosthesis

Fig 8: Prosthesis try in,

Fig 9: Satisfied patient

DISCUSSION

The most common causes of finger amputations are trauma, congenital absence, and malformations.[2] Advances in micro vascular reimplantations have helped save severely injured and traumatically amputed digits. However, in most of the patients, micro vascular reconstruction is contraindicated, unavailable or unsuccessful. It is in this group of patients that the prosthesis can be provided.[3]

Individuals who desire for finger replacement usually have high expectations for the appearance of the prosthesis.[4] Prosthetic rehabilitation is a quick, reversible procedure, medically uncompromised and it allows the surgical site to be closely monitored.[5]

Over time, various materials have been used and have been developed further. Wood, leather, polyurethane and polyvinyl chloride (PVC) have been used to produce esthetic prosthesis, but silicone rubber has proved to achieve the desired life like effects.[6] Customized silicone prostheses have a wider rate of acceptance, owing to their comfort, durability, and stain resistance, which are far superior to any other extraoral maxillofacial materials. Additional functional benefits of silicone prostheses are desensitization and protection of the painful hypersensitive tissue at the amputation site by exerting constant gentle pressure over the affected area. Silicone gel also improves the hydration of the stratum, making the scar tissue more pliable and comfortable.[7]

Various methods of retention are available. Due to the elastic property of silicone elastomer, it is possible to enhance retention further by scraping grooves into the positive model, creating separate vacuum chambers.[6] It can also be achieved by medical grade adhesives, can be vacuum retained on the stump, placement of finger ring and osseointegrated implants.[8] A lubricant should be used to lubricate the skin to facilitate donning and doffing of the prosthesis.[6]

Placing a decorative ring over the margin of a finger prosthesis will make changing color of the hand less noticeable although the distal joint functions will be slightly restricted.

CONCLUSION

Partial or complete finger amputations are one of the common cases of hand loss. These are rehabilitated by various products among which RTV silicones are widely accepted and most commonly used. Its chemical innertness, elasticity and flexibility makes it the apt choice for any digital mutilations that caters to patient's esthetic demand and aid in prosthesic product delivery.

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