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Silicone Finger Prosthesis - An Aesthetic Treatment Option for Partial Finger Amputation: 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, RTV Silicone, Finger Prosthesis, Mechanical Retention

1. Introduction

Traumatic amputations of the fingers represents serious insult to the hand, resulting in dramatic impairment of hand function.'[1] The ideally constructed prosthesis must duplicate the missing parts so precisely that the casual observer notices nothing that would draw attention to the prosthetic reconstruction'.[2] Extraoral maxillofacial prostheses is vital that such facial prostheses are not instantly (abnormally) recognized by casual observers as replacements".[3] 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.[4] 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.

2. Case Report

A 25-year-old male patient reported to the Department of Prosthodontics and Implantology with a chief complaint of missing right middle finger digit till second phalange (Fig 1). History revealed that the patient lost his finger 15-year ago because of traumatic injury. The amputated stump was healed well. The advantages and limitations of the treatment was explained to the patient.

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.

Hydrocolloid impression of the little finger of the right hand was made, and modeling wax poured into the impression to duplicate the lost finger. 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 3). 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 4).

Factor 2 Series Materials and stains were used.(Fig 5,6) The base colour was made by mixing the colors with the silicone. Palmar surface of the finger was matched first with a lighter shade (Fig 7). Next the stump was 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(Fig 8). The material was allowed to cure in the steam for one and a half hour. Prostheses were finished with using silicon burs. To better match the skin color external staining was also carried out. The prefabricated artificial nail was properly shape 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 9,10) 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 metacarpalphalangeal 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 11).

Figure 1: Pre-treatment photograph

Figure 2: Stone model of the amputed finger

Figure 3: Wax pattern fabrication

Figure 4: Stone mould of the amputed finger

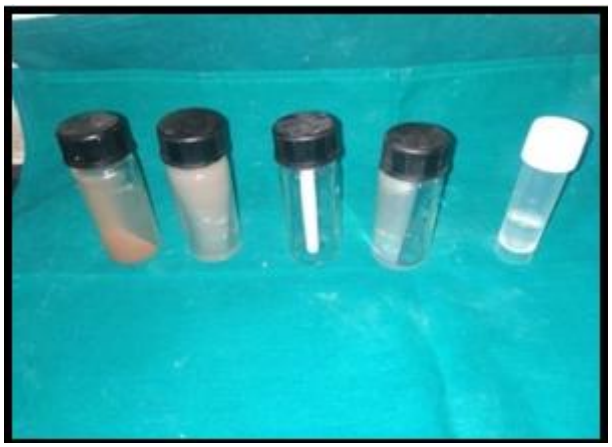

Figure 5: Factor 2 Silicone

Figure 6: Stains-Factor 2

Figure 7: Lighter shade silicon for palmer surface

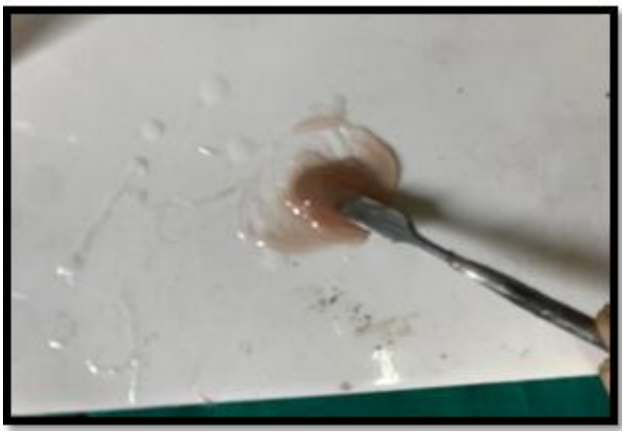

Figure 8: Darker shade silicon for dorsal surface

Figure 9: Finger Prosthesis-Dorsal Surface

Figure 10: Finger Prosthesis-Palmer Surface

Figure 11: Finger Prosthesis Delivered

3. Discussion

A silicone prosthetic finger has a major aesthetic advantage, and a considerable functional benefit, compared to a bare finger stump, and may prove very successful in helping a patient return to a normal life after digital amputation."[5] The stump of the amputated finger should be minimum 1.5 cm in length to fit the standard digital prosthesis.[1] 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.

The conventional method of prosthesis is replacing the lost finger by an artificial digit. The artificial digit is made of a silicone elastomer.[9] these silicones which are available can be rendered to match the skin color of the patient and give a more realistic appearance. Mostly the silicones which are used for this purpose are Room temperature vulcanizing silicones (RTV) as they offer chemical unresponsiveness, biocompatibility, flexibility and elasticity.[10] The other prosthetic mechanism is by using of bone anchored implant retained silicone finger prosthesis as an alternate. Bone anchoring method is used since 1994 as described by Branemark.[11]

4. Conclusion

The custom-made finger prosthesis is esthetically acceptable and comfortable for use in patients with amputated fingers, resulting in psychological improvement and personality. Fabrication of highly esthetic finger prosthesis requires great practical and artistic expertise. This case report describes the prosthetic rehabilitation of patient with amputated finger using silicone finger prosthesis along with custom made acrylic nail.

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