



DIVINE PROPORTION RESTORED -FINGER PROSTHESIS: A CASE REPORT

**Shiva naga
bramham
sukamanchi**

Post Graduate student, Department Of Prosthodontics, Mamata Dental College, Khammam.

**Sreenivasulu
Duggineni**

Reader, Department Of Prosthodontics, Mamata Dental College, Khammam.

**Ravikumar
Chitturi**

Head and Professor, Department Of Prosthodontics, Mamata Dental College, Khammam.

**ChalapathiRao
Duggineni**

Professor, department of prosthodontics, Mamata Dental College, Khammam.

ABSTRACT Finger and partial finger amputations are some of the most frequently encountered forms of partial hand loss. It causes devastating physical, psychosocial instability and economic damage to an individual. In such cases rehabilitation of amputated finger is of utmost importance. A well retained and colour matched finger prosthesis eliminates the constant reminder of the disability, and make the patient feel a capable person and not a physically challenged one. This article discusses a case report in which prosthetic rehabilitation was done with silicone finger prosthesis to give a life like appearance.

KEYWORDS : Silicone Prosthesis, Finger Amputation, Impression Technique, Digit Prosthesis.

INTRODUCTION

Loss of fingers can be due to trauma, congenital abnormalities and due to neoplastic disorders.¹ Finger absence causes loss of grip, security and marked psychological trauma.² Microsurgical reconstruction by reimpalntation or transplantation can be attempted to restore function of many finger defects. When surgical reconstruction in patients is not possible, contraindicated, unsuccessful or unaffordable, the prosthetic rehabilitation becomes a viable alternative in such conditions.³ The essential requirements of finger prosthesis are to restore both form and function.⁴ It means the prosthesis must assist in grip, absorb and transfer forces to hand,⁵ look natural and allow expression of gestures.⁶ The success of any prosthetic restoration primarily depends on its retention and stability. Various methods used to retain the prosthesis are adhesives, vacuum effect on the stump, use of osseointegrated implants.⁷ A well retained prosthesis with matching colour form and texture increases the patient acceptance and confidence. Therefore creating a prosthesis having a life like appearance is challenging since it requires not only great artistic and technical skills but also better understanding of the patient's aesthetic expectations.⁸ This case report describes prosthetic rehabilitation of finger defect with a silicone prosthesis

CASE REPORT

A 32 -year-old male patient reported to the Mamata dental college, Department of Prosthodontics, with a chief complaint of partially missing ring finger on his right hand. The patient had lost his finger due to traumatic injury 7 years ago. Clinical examination revealed that the amputation was partial involving mid-part of the middle phalanx of the right ring finger was missing [Fig 1]. The skin over the residual finger stump was completely healed with no signs of infection or inflammation. Silicone finger prosthesis was planned for the patient. An informed consent was taken from the patient before starting the treatment to ensure his willingness and co-operation.



Fig 1: Dorsal & Ventral views of affected hand

PROCEDURE

The patient's hand was lubricated with petroleum jelly to prevent the impression material from sticking to the amputated site. A suitably sized plastic box was used for making the impressions for both left and right hand using irreversible hydrocolloid impression material. During the impression procedure, the patient was instructed to keep the hand in a relaxed position without stretching. Impression material (Algitek) was loaded into the box and impression is taken [Fig 2]. After the material had set, the impression was retrieved. The impression was poured in a type III dental stone (kalabhai) without any voids to obtain a positive replica of the affected hand [Fig 3]. An impression of the left hand was also made using alginate impression material.



Fig 2: Alginate impression



Fig 3: Master Model poured with type III dental stone

Molten wax was poured into this impression to obtain a working wax pattern [Fig 4], which was sculptured to fit the stump replica of the mutilated finger on the stone cast [Fig 5]. Wax try in of the prosthesis was done. Fit, stability and seating of the wax pattern were evaluated and necessary corrections were made. Nail bed preparation was done by creating an undercut beneath the cuticle margin to retain the prefabricated artificial nail within the wax pattern. A fingernail was fabricated using polymethylmethacrylate and pigmented to match the patient's natural nails. The stump was then sectioned from the stone cast with the wax pattern. In order to give a snug fit to the final silicone prosthesis, scoring of 1 to 1.5 mm was done on the base of the stump [Fig 6]. The artificial nail was carefully removed from the wax pattern. Flasking of the wax pattern was done in such a manner that the ventral and dorsal aspects were separable. Dewaxing procedure was done and the wax residue was completely eliminated [Fig 7]. The mold was allowed to cool thoroughly prior to the shade matching and silicone packing procedure. Factor II medical-grade silicone MDX-4210 (RTV) was used for the fabrication of the prosthesis [Fig 8]. In the

presence of the patient, shade matching was done by adding intrinsic colors to the silicone material [Fig 9]. Characterization with shade variations was done on the dorsal and palmar surfaces during packing of the silicone material. Curing was done according to manufacturer's instructions. After complete polymerization, the prosthesis was retrieved, the flash was trimmed using a sharp blade and polished. Polymethylmethacrylate nail was reattached to the silicone prosthesis using cyanoacrylate adhesive.



Fig 4: Wax pattern



Fig 5: Try-In



Fig 6: Scoring of the stump



Fig 7: Flasking and Dewaxing

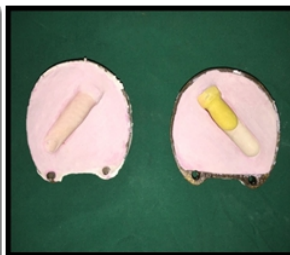


Fig 8: Medical grade silicone



Fig 9: Intrinsic Staining

Slight extrinsic staining was done for exact matching of the shade. Prosthesis was delivered to the patient and evaluated for the fit, shade and stability material [Fig 10]. Though the fit of the prosthesis is satisfactory and artificial ring [Fig 11] was given for additional retention and hide the margins of the prosthesis. Patient was educated about use and maintainace phase of the prosthesis. Patient was instructed not to expose the prosthesis to sunlight, higher temperatures and not to smoke as they stain the prosthesis yellow.



Fig 10: Before & After insertion of the prosthesis

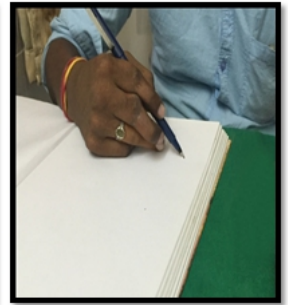


Fig 11: Artificial ring for additional retention

DISCUSSION

Hand is a major body part whose prime function is to grasp, hold, feel and manipulate items, it is also important for communication, body language and social contact.⁹ Fingers as organs of manipulation have an important role in function and esthetics. The amputation of one or more fingers of the hand, as the consequence of trauma or congenital absence of one or more phalanges, carries a serious reduction of hand function and social dysfunction for the patient.¹⁰ Even though microvascular surgery has come for the rescue of patients; technical difficulties, financial issues and non-feasibility of reconstruction surgery have still made prosthetic replacement an important treatment option for finger amputees.¹¹⁻¹²

Success of the prosthesis depends on the precision in planning; making the impression choosing the material that best suits the circumstances. Materials available for maxillofacial prosthesis are acrylic resin, acrylic copolymers, polyvinyl chloride copolymers, chlorinated polyethylene, polyurethane elastomers, etc.¹³ very commonly used materials include medical grade silicones and polymethyl acrylics. In the present case silicone is used as material of choice. The acceptance of prosthesis has been much higher with the use of custom restoration using silicone elastomer.¹⁴ Multiple layers of clear silicone over each layer of colour improves translucency and protects 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.¹⁵ Silicone finger restorations may have additional functional benefits. Many traumatic amputees experience painful hypersensitivity at the termination of finger remnants. The gentle, constant pressure of elastomeric prosthesis can help desensitize and protect the injured tip.¹⁶ The characterized acrylic nails used, mimic the natural nails in color and texture and provide more realism to the rehabilitation. Various methods of retention are available (rings , adhesive, or by implant retained prosthesis) which is the most important criterion for the success of any prosthesis. In present case report custom vacuum retained prosthesis were planned because stumps were of adequate length, for this the positive model was rectified to create suction for retention. Leow et al,¹⁷ studied optimal circumference reduction of finger models for a good prosthetic fit and found out that 5-7% circumference reduction in the finger was shown to be best among 1-3% and 8-9% of reduction. In the present case 5-7% of circumference reduction of the stump is done to create the passive vacuum fit. For additional retention and esthetics a retentive finger ring is given.

The coloring of silicone is a technically sensitive procedure. Basic skin tone color was formulated using intrinsic strains and slight extrinsic staining was done for exact matching of the shade. As color instability is attributed to uv light exposure, air pollution, cosmetics and strong solutions, patient is instructed not to expose to higher temperatures, sunlight and not to smoke to prevent staining.² Finally the prosthesis was delivered and patient was instructed about the home care maintenance of the prosthesis.

CONCLUSION

Successful prosthetic rehabilitation of patients with total or partial amputation is a challenging task as most of the patients look forward to functional rehabilitation. so the responsibility of the clinician lies in making the best use of the available materials and techniques to enable these less fortunate patients to re-enter the society as confidently as possible.

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