10.5368/aedj.2017.9.2.2.4

REHABILITATION OF THE PATIENT WITH FINGER PROSTHESIS ALONG WITH ACRYLIC RESIN CUSTOM MADE NAIL- A CASE REPORT

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ABSTRACT: Hand is a body part which is of major significance for communication, body language and social contact along with its fundamental function of grasping and feeling. Finger and partial finger amputations are some of the most frequently encountered forms of partial hand loss in India which causes devastating physical, psychosocial and economic damage to an individual. Rehabilitation of amputed finger is of utmost importance and the first choice is micro vascular reconstruction. But when it is contraindicated, unavailable, unsuccessful or unaffordable, the prosthetic rehabilitation is an alternative for improving the psychological status of an individual. Silicone finger prosthesis with modern prosthetic designs, fabricated with immense care, can be life-like and can assist the amputee in returning to society socially as well as psychologically. This case report presents the fabrication of custom-made silicone finger prosthesis along with acrylic resin custom made nail in an attempt to avoid costly procedures and provide best possible esthetic results.

KEY WORDS: Amputation, finger prosthesis, maxillofacial prosthesis, custom made nail.

INTRODUCTION

Finger or partial finger amputations are the most frequently encountered forms of partial hand loss. There are different types of amputations some which are self amputation, congenital amputation, and traumatic amputation which may result from a factory, farm, home, motor vehicle accidents, electronic appliances including industrial accidents, terrorist attacks and any kind of disease such as diabetic, gangrene and infection.[1] Finger absence causes loss of grasp, safekeeping and marked psychological suffering to the patient.[2]

Numerous microsurgical techniques such as toe-foot transfer, foot lengthening procedure and use of osteocutaneous flaps may offer opportunities to reconstruct the lost or missing phalanges.[3] In case of any contraindications or failure of these surgical methods, esthetic finger prosthesis is an option for the restoration of the handicap.[4] Prosthesis refers to artificial replacement of an absent part of the human body.[5] A prosthesis can often restore a "near-normal function".[6] The finger prosthesis requires an optimum retention for functions such as grasping, carrying and holding.[7]

The conventional method of prosthesis is replacing the lost finger by an artificial digit. The artificial digit is made of a silicone elastomer.[8] 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.[9]

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.[10]

Case report

A 64 year male patient reported to the Department of Prosthodontics and Crown and Bridge, People's University, Bhanpur, Bhopal with the chief complaint of missing teeth and wanted replacement of the same. Patient was unaware of the treatments available for accidental digital amputation. There was partial loss of his middle finger of right hand since 22 years. When told about such kind of treatment available, he was keen in getting it done. So, simultaneous replacement of missing teeth and rehabilitation of the missing finger was initiated. Clinical examination revealed that distal phalange and middle phalange were missing **(Fig. 1).** The skin over the residual proximal phalange was completely healed with no signs of inflammation. Silicone finger prosthesis along with customized acrylic nail was planned for the patient.

Clinical procedure

The patient's hand was lubricated with petroleum jelly. A suitable sized cardboard box was used to confine the impression material. A thin mix of irreversible hydrocolloid

Fig.1

Fig.2

Fig.3.

Fig..4

Fig. 1: Preoperative photograph

Fig. 2: Stone cast obtained from the impression of the affected right hand fingers.

Fig. 3: Stone cast obtained from the impression of unaffected left hand fingers.

Fig. 4: Scoring of the nail

Fig. 5: Wax pattern fabricated

Fig.5

a)

b)

Fig. 6: a) Flasking of the wax pattern of nail. b) Dewaxing done.

Fig.7. Final custom made acrylic nail with exact shade is obtained.

Fig.8. Try- in of the wax pattern with custom made acrylic nail.

Fig.9. Flasking of the wax pattern seated on the sectioned stump.

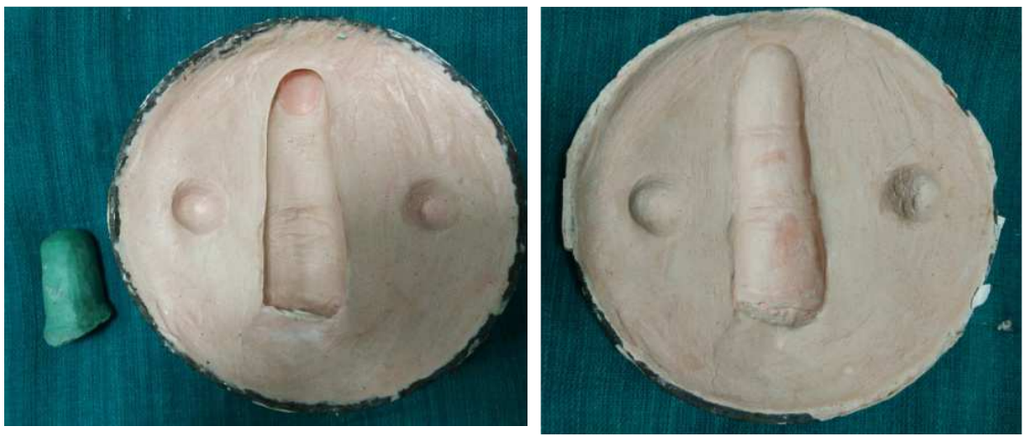

Fig.10. Dewaxing done and wax residue completely eliminated

Fig. 11: Final prosthesis retrieved.

Fig. 12: Placement of the final prosthesis and the border was masked by the placement of ring.

impression material was poured over the palmer side first and then over the dorsal side to prevent tearing of the impression during retrieval. During the impression procedure, the patient was instructed to keep the hand in a relaxed position without stretching. After the material has set, the impression was retrieved. The impression was poured in a dental stone without any voids to obtain a positive replica of the affected hand **(Fig. 2).** Following the same procedure impression was made for the middle finger of the opposing left hand and impression was poured in dental stone to obtain a positive replica of the unaffected hand **(Fig. 3).**

Duplication of the distal phalange of the middle finger of the unaffected side is done so that the custom made acrylic nail can be fabricated. The scoring of the nail upto 2- 3mm is done of the duplicated distal phalange of the finger with the help of round end bur to get space for the wax pattern **(Fig. 4).** Wax pattern is fabricated over the 2-3 mm thick scored area **(Fig. 5).** Flasking and dewaxing is performed to get the mould for the nail fabrication **(Fig. 6: a and b).** Packing is done by mixing both white and pink heat cure poly methyl methacrylate to get exact shade of nail of that of the patient and curing is carried out. Finishing and polishing of the nail is done and final custom made acrylic nail is obtained **(Fig. 7).**

Separate impression is duplicated of the unaffected middle finger and molten wax was poured into this impression to obtain a working wax pattern, which was sculpted to fit the stump replica of the mutilated finger on the stone cast and custom made acrylic nail is adapted to this pattern. Wax try-in of the prosthesis was done and necessary corrections were made **(Fig. 8).** The stump was then sectioned from the stone cast with the wax pattern. In order to give snug fit to the final silicone prosthesis, scoring of 1 to 1.5 mm was done on the base of the stump. Flasking of the wax pattern was done in such a manner that the ventral and dorsal aspects were separable plus the stump is retrievable after dewaxing **(Fig. 9).** Dewaxing procedure was done and the wax residue was completely eliminated **(Fig. 10).** 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 fabrication of the prosthesis. In the presence of the patient, shade matching was done by adding intrinsic colors to the silicone material and packing was done on the palmer side by removing the stump and then above it after placing it back in position silicone on the dorsal side is poured with syringe. Curing was done according to manufacturer's instructions. After complete polymerization, the prosthesis was retrieved and finishing was done **(Fig. 11)**. Placement of the prosthesis was done and the border of the prosthesis was masked by the placement of the ring **(Fig. 12).**

Discussion

Although severely injured and traumatized digits can be treated by microsurgical reimplantation, prosthetic rehabilitation can present great psychological help to the patient when surgery is contraindicated, ineffective, or unaffordable.[11] Prosthetic replacement can be considered in these situations to restore the finger with a functional prosthesis with a matching color, form and texture to improve and enhance the patient's confidence.[12] Advances in the field of material science have led to the evolution of silicone materials with improved biological individuality and coloration methods.[13]

Although various modes of retention and fabrication are available for the retention of finger prosthesis such as implants, medical grade adhesives, rings and attachments, the degree of retention mainly depends upon the length and form of the residual stump. In this case, vacuum retention provided by the snug fit of the prosthesis was enough for the retention of the prosthesis and ring was only used to mask the border of the prosthesis and give more natural emergence profile. Even various types and forms of prefabricated nails are available but the custom made color matched acrylic nail give more lifelike appearance.

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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