

Fabrication of Silicone Hand Prosthesis: A Case Report

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Abstract

Prosthetic restoration of facial defects is an ancient art. Nowadays, maxillofacial prosthodontics has been tremendously integrated with oral oncology, trauma, and deformity. It has not only limited to face but progressing toward make-over and also toward rehabilitating other parts of body such as a hand and a foot. Success of prosthesis has always been limited to the availability of material fulfilling the ideal requirements along with skill of the specialist concerned. Fabrication of prosthesis for a child is even more challenging considering the growth and psychology of a child. Silicone has been integral part of maxillofacial prosthodontics armamentarium for many years. This case report is an attempt to rehabilitate congenitally missing hand of a child, with silicone as a material of choice.

Key words: Hand prosthesis, Missing hand, Silicone material

INTRODUCTION

Prosthesis refers to an artificial replacement of an absent part of the human body^[1] that enhances patient's esthetics, benefits the psychological well-being, and to great extent removes the social annihilation associated with lost part of a body.

Reconstructive surgery has limited role in rehabilitation of the lost body parts. The major role in rehabilitating the patient is, thus, played by the maxillofacial prosthodontist and the anaplastologist.^[2] Injuries and amputations due to trauma, accidents, or congenital absence of limbs were treated as something to be covered by a sleeve, or made to look similar to the missing limb or a missing part.

People, generally, associate the hand with a function. Hands also have an esthetic representation; they are a symbol; and they can emphasize the beauty of a gesture or the grace of a movement.^[3] In current days, there is a trend of showing off the amazing materials and engineering that goes into the creation of state of the art prosthesis.

This case report describes the rehabilitation of congenitally missing hand, with silicone hand prosthesis.

CASE REPORT

A 13-year-old male patient reported Department of Prosthodontics. He gave a history of congenitally and partially missing parts of the left hand [Figure 1]. On examination partially missing left hand appeared normal with no signs of infection, fully developed thumb and not so well developed four fingers.

Technique

Impression [Figures 2 and 3]

A wax mold was fabricated to contain the hydrocolloid impression material and the patient's hands were lubricated

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with petroleum jelly, to prevent adhering of impression material to the skin. The patient was instructed to keep his hand in normal resting position and not to strain or fold the thumb. Then, the impression material was placed

on palmer side of hand first to record the fine details and then on dorsal side of hand. Impression of opposite hand was also made in similar fashion, which served as guide in fabrication of wax pattern. The impression was then poured with type III dental stone, and thus, a positive replica was obtained.



Figure 1: Pre-treatment

Wax-up and nail fabrication [Figures 4 and 5]

Prosthesis for the left hand was sculpted in modeling wax, taking normal hand (right side) as a guide.

Nails were fabricated using chemically activated polymethyl methacrylate resin (combination of clear, white, and pink) and characterized using acrylic stains.

Flasking and de-waxing [Figure 6]

The wax pattern was then flaked, first pour was done covering complete dorsal aspect of wax pattern of hand and all undercuts were eliminated. De-waxed and the mold thus obtained facilitate easy packing of silicone material.

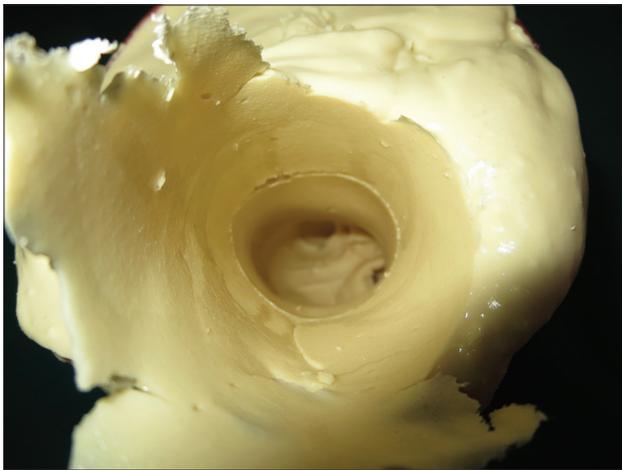


Figure 2: Impression of a left hand



Figure 4: Left hand with carved wax pattern, taken right hand as guide for carving details

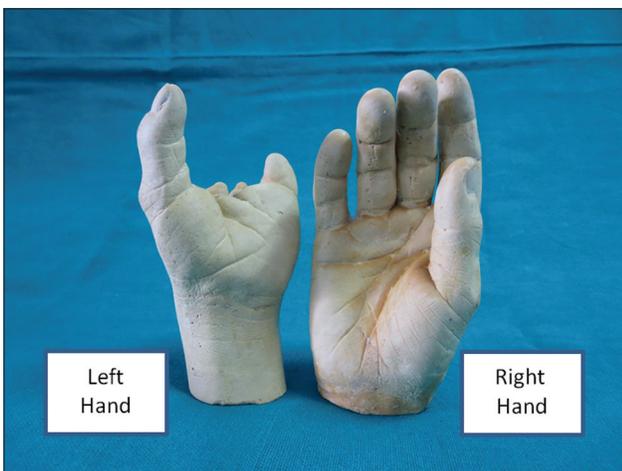


Figure 3: Positive replica obtained after pouring of impression



Figure 5: Nails were fabricated using clear acrylic resin

Shade matching and packing [Figure 7]

The shade matching was done in patient's presence under natural day light. Shade matching for the dorsal and ventral surface was done separately.

Silicone (Cosmesil) was packed in the mold obtained after dewaxing, the base color was dispensed, and intrinsic stains were mixed to achieve the desired shade. The dorsal part and sole of foot were packed separately and characterized individually.

Curing

The material was allowed to cure for 24 h at room temperature. Residual silicone outside the flask was used to check for polymerization.

Finishing

Final prosthesis was retrieved and sharp blade was used to trim the excess flash.

Final finishing was accomplished using silicon burs.

Nail implantation^[4]

To complete, the prosthesis artificial nails which were fabricated earlier were implanted. A cyanoacrylate adhesive was, then, applied on the under surface of the nail for bonding with silicone surface to achieve a realistic look.



Figure 6: Flasking of wax pattern



Figure 7: Silicone packing and characterization

Final insertion [Figure 8]

The final prosthesis was placed on the patient's hand. The patient was instructed about the use and maintenance of prosthesis.

Follow-up was done. The patient was able to use the prosthesis well, which was comfortable and happy.

DISCUSSION

Finger absence can cause marked psychological trauma. Reconstruction of such defect has gained importance in recent years. When surgical restoration is unsuccessful, contraindicated, or unavailable, prosthesis definitely provides great psychological help.

Over the past decade, silicone elastomers have proven to be the most promising material. Silicones are preferred due to their improved texture, light weight, and life-like appearance. These silicones are a combination of organic and inorganic compounds. Antioxidants and vulcanizing agents transform the raw mass from a plastic to a rubbery resin during processing.

Retention is of prime concern and is important for esthetics, function, and comfort, thus enhancing quality.

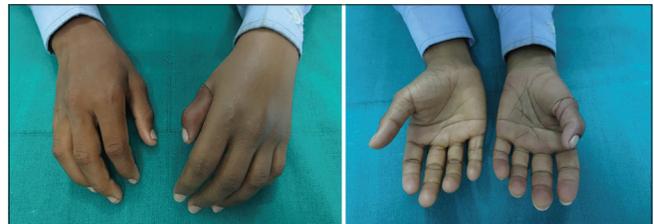


Figure 8: Post-insertion of prosthesis



Figure 9: Before

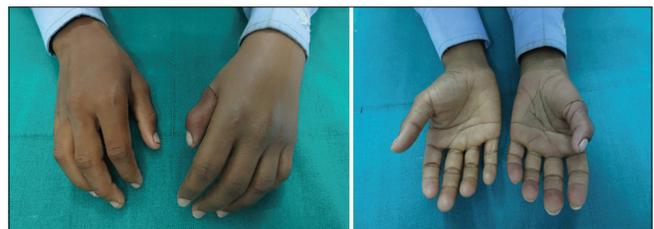


Figure 10: After

At present, the methods for prosthesis retention to the remaining part of the finger include ring, double ring, adhesives, and osseointegrated implants. Normally, the vacuum effect on the stump is sufficient to retain the finger.^[5] In the present case report, vacuum has been used as an aid for retention, which has yielded a satisfactory retention of prosthesis [Figures 9 and 10].

CONCLUSION

One among the various extraoral defects are amputated fingers. Loss of a finger has been found to affect the person psychologically. In such situations restoring esthetics with sufficient, retention becomes the prime

concern. Thus, a custom-made prosthesis using silicone polymers is esthetically acceptable, which partially restores some degree of functionality and comfort for patient.

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