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Title

Author

Abstract
Trauma is the most common cause of finger amputations along with other causes like congenital absences, diseases and malformations. This in turn impacts the physical, social and psychological well-being of the patient. In such cases the objective of finger prosthesis is to restore some amount of movement as well as natural appearance to the lost segments of the finger. This case report describes a method to fabricate a hollow silicone finger prosthesis using dowel pins.

Keywords: *Hollow finger prosthesis; silicone prosthesis; three piece mould; dowel pin*

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I. INTRODUCTION

Prosthetic rehabilitation aims at restoring function and mobility following amputation. Deformities and amputations of the hand can affect the socio-economic relationship of the patient, as hand movement plays an important role in day to day activities. Surgical reconstruction techniques have not been successful in finger amputations. The finger prosthesis should have increased grip strength and realistic look with life-like fingernails and thin margins for patient satisfaction.

Retention of the prosthesis is a major concern in fabricating finger prostheses. Adhesives, rings, implants, magnets, etc. can be used to aid in retention of prostheses. This article presents a case in which partially amputated fingers of the left hand are rehabilitated with hollow silicone prostheses.

II. CASE REPORT

A 39 year old male patient reported to Department of Prosthodontics for rehabilitation of partially amputated index finger and middle finger of his left hand (Figure 1). Patient lost his finger two years back in a traumatic injury. Two residual stumps were present in the left hand. The defect was at the mid-level of the intermediate phalanx of the index and middle fingers. The defect site was healed without any signs of swelling or inflammation. Patient had no history of previous prostheses.

The amputated left hand was lubricated with thin layer of petroleum jelly (Vaseline, Hindustan Unilever Ltd, Mumbai, India) to prevent adhesion of impression material to the hand and to facilitate easy removal from the impression. A suitable plastic container that fits the palm of the hand was used and holes were made to retain the impression in the container. The patient was advised to keep his hands in a relaxed position. Impression was made using irreversible hydrocolloid impression material (Zelgan 2002, Dentsply Pvt. Ltd., Gurgaon, Haryana, India). After the impression was made, the patient was asked to wiggle his fingers to separate the impression from the amputated hand. The impression was poured with dental stone (Kalstone; Kalabhai Pvt. Ltd. Mumbai, India). For snug fit of the prosthesis, the area of the residuum which was designated for contact of the silicone prosthesis was scraped 1mm uniformly.

For wax pattern fabrication, donor hand with dimensions and contour similar to the patient was used. To avoid the cumbersome procedure of hollowing out the solid wax pattern, a different technique was used. The impression of donor finger was obtained and poured with dental stone. Then an impression of the donor finger cast was made with addition silicone putty impression material (GC Flexceed Putty, GC India Dental Pvt Ltd). Modeling wax (Modeling wax no 2, Hindustan Dental Products, Delhi, India) was melted until it was flowable and then poured into the putty impression of the finger. The putty impression is rotated so that a uniform layer of wax coats on the inner surface of the putty impression and the excess is poured out. This process is repeated till an optimum thickness of wax coated the inner surface. After the wax completely hardens, the wax patterns were removed from the putty impression and adapted to the scraped digit molds. Similar wax pattern fabrication was done for other residual stump also.

The wax patterns were tried in the patient and assessed for fit, stability, alignment and contours in accordance with contralateral finger (Figure 2). One dowel pin each was attached at the distal end in the center along the long axis of the two residual stumps (Figure 3). Vaseline was applied over the residual stumps. The wax patterns were adapted to the fingers and sealed to the stump. A small rectangular hole was made on the ventral aspect of the wax pattern and die stone (Gyprock, Gujarat) was injected into this hole using a syringe

(Figure 4). After the setting of die stone, the wax patterns were invested in dental flasks. After dewaxing, a three piece mold consisting of the base part with attached stump, the counterpart of flask and the third part being the detachable part of the finger with sleeve in it were obtained (Figure 5).

Shade selection was done in the presence of the patient. Different base shades were selected for the ventral and dorsal aspects of the fingers (Technovent, Intrinsic shade, Bridgent, UK). First, the ventral aspects of the fingers were packed with silicone material (A 2186, Factor II, Lakeside, USA). Following this, the detachable parts were inserted and then dorsal aspects were packed in the counterparts. The flasks were closed tightly for easy flow of excess material.

The flasks were cured for a specified time followed by recovery of final prostheses which were then polished and finished (Figure 6). Extrinsic colors were used for staining the prostheses to give a life like appearance. (Figure 7). The patient was given instructions for the appropriate use and maintenance of the prostheses.

III. DISCUSSION

Most of the patients with body deformities are affected physically, emotionally and psychologically. The main concern with finger amputations is appearance rather than function. Finger prosthesis is the best line of treatment in cases where surgical replantation is not feasible.

Earlier, acrylic resin was used for fabricating finger prostheses.[(1)] The main disadvantages of this material were rigidity, discomfort and limited movements. This was overcome by the newly developed silicones. Silicones have chemical inertness, thermal and dimensional stability, elasticity, flexibility, and skin-like texture which gives them an upper hand to the other materials. But due to its color instability, technique sensitivity and high cost, they are not routinely used.(2)

In this case report, feasible finger prostheses were fabricated which were hollow, light weight and natural in appearance. The hollow wax pattern was fabricated by coating the inner surface of the wax pattern which in turn reduced the tedious job of carving out the wax from the solid wax pattern. A glove type finger prosthesis was fabricated by reducing 2 mm in the residual stumps to produce vacuum fit.[(3)]

IV. CONCLUSION

Partial loss of fingers affects each individual's physical and social well-being. To restore the patients' confidence and appearance, rehabilitation with finger prosthesis is the best option available. In this case, silicone hollow finger prostheses helped in providing function, comfort and esthetics to the partially amputated fingers. In this case report, an easier method of making the wax pattern hollow was done using dowel pins.

Figure legends:

Figure 1: Pre-operative view of amputated fingers
Figure 2: Wax pattern try in
Figure 3: Dowel pin with sleeve inserted into a separated stump
Figure 4: Die stone was injected through the hole
Figure 5: Three piece mould
Figure 6: Silicone material with intrinsic coloring agent
Figure 7: Post-operative view of finger prostheses