CASE REPORT

REHABILITATION OF AMPUTED FINGERS BY USING SILICONE MATERIAL IN CONVENTIONAL METHOD – A CASE REPORT

Dedeepya N.R.[1], Indira Padmaja B.[2], Raja Reddy N.[3], Srivastav C.S.[4]
[1, 2, 3, 4]C. K. S. Teja Institute of Dental Sciences and Research, Tirupati, Andhra Pradesh

ABSTRACT

Finger amputations are most commonly seen due to traumatic injuries, sometimes it may also be attributed to congenital malformations and diseases which may lead to physical and psychological imbalance of an individual. Rehabilitation of an amputated finger may cause psychosocial comfort to an individual. The fabricated prosthesis must be comfortable, cosmetically pleasing and must be easy to put on and remove to an individual. The aim of this case report is to conduct rehabilitation of two amputated fingers of the left hand in a simple and easy way which is retentive, aesthetic and well maintained.

KEYWORDS
Amputated finger, prosthesis, rehabilitation, silicone material.

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Address of correspondence

Dr. N.R. Dedeepya
C. K. S. Teja Institute of Dental Sciences and Research, Tirupati, Andhra Pradesh

E-mail id- dedeepya.nr@gmail.com

Introduction

Normally humans have five digits termed phalanges on each hand. They enable us to interact with our environment and help in many day-to-day functions. Loss of even one finger produces significant aesthetic and functional deficiencies.[1] Replacement of lost fingers includes two most commonly used methods which include endoprosthesis e.g., implants and exoprosthesis e.g., silicone prosthesis, prosthesis using attachments. Among the various materials used for fabrication of prosthesis, silicone material has the highest acceptance rate. This case report presents rehabilitation of two amputated fingers using silicone material in an easy and simple method.[2]

Case presentation

A 25-year-old male patient came to the department of prosthodontics, with a chief complaint of partially missing and unaesthetic look of fore finger, middle finger of left hand. (Figure:1). History revealed that the patient lost his fingers 5 years back due to traumatic injury. The amputation was partial, involving the mid-part of the middle phalanx of both fore finger and middle finger of the left hand. A complete hand examination was carried out. On physical examination there was no pain on palpation and the surrounding skin showed no signs of inflammation and infection. The patient had no history of previous prosthesis. As the patient was unwilling for surgical procedure, fabrication of conventional silicone prosthesis was planned.

Method of fabrication

Impression making:

A thin layer of petroleum jelly was applied to the patient's hand prior to making an impression. A wide plastic container was used for making an impression according to the size of the palm of the affected hand. An impression of contralateral fingers of the opposite hand was also made. An irreversible hydrocolloid impression material (Jeltrate, Dentsply) was used for making an impression by asking the patient to place his hand in a relaxed state in a chosen wide container. After the material set, the patient was asked to carry out light movement and remove the palm from the impression.

Preparation of model:

The impression was poured with ADA type III dental stone to create a positive replica of amputated fingers and associated structures (Figure 2).

Wax pattern fabrication:

Modelling wax (Y-Dent MDM Corporation) was melted and poured into the impression of contralateral fingers of the opposite hand to duplicate the anatomic details of the lost finger. The amputated finger stumps were cut and the overall diameter of the stumps were reduced (about 1cm) by using tungsten carbide bur in-order to produce an undersized finger sleeve (Figure 3). This was done in-order to obtain the snug fit of the prosthesis. The wax pattern was placed over prepared finger stumps and necessary modifications like thickness and anatomy were done.

Trial of wax pattern on patient's hand:

Wax pattern trial was done in-order to check fit and alignment with respect to adjacent fingers. Following

successful try-in, the nail bed was reduced to allow for acrylic nail placement (Figure 4).

Flasking and processing of finger prosthesis:

After satisfactory trial, the wax pattern was then flasked using type-II dental plaster into conventional denture curing flask using two pour techniques. Necessary precautions were taken to avoid incorporation of air bubbles and to avoid undercuts for easy opening of the flasks and easy retrieval of set silicone prosthesis. Dewaxing was done and mold was obtained.

The finger stumps were carefully separated without breaking the mold. Separating media was then applied both on the mold and on the stump in-order to attain easy retrieval of silicone prosthesis. The maxillofacial RTV silicone material was mixed with the chosen pigments given by the manufacturer avoiding incorporation of air bubbles. The mix was divided into two parts one for the dorsal and one for the ventral portion of the fingers. Shade matching was done with the pigments given by the manufacturer under daylight. The shade was checked with ventral and dorsal aspects of the fingers (Figure 5).

Once satisfactory shade was obtained packing of maxillofacial silicone material was done with respect to dorsal and ventral portions (Figure 6). The flask was closed and left undisturbed for 24 hours for polymerization. Deflasking was done and finger prosthesis was carefully removed from the flasks. Excess silicone material was cut with scissors. The fit and shade of the finger prosthesis were evaluated on the patient. The customized metal ring was used as an auxiliary aid of retention.

Finally, an acrylic nail was fabricated using auto-polymerized acrylic resin material (DPI cold cure). The fabricated nail shell was trimmed to confirm the nail bed that had been created on the silicone finger prosthesis.

Discussion

The amputation of one (or) more fingers of the hand, as the consequence of trauma (or) congenital malformation leads to serious reduction in hand function and social dysfunction for the patient.[2,3] Allen's classification is commonly used to describe the level of amputation for fingertip amputations. Type I injuries are those involving the pulp only. Type II injuries consist of injury to pulp and nail bed. Type III injuries include distal phalangeal fracture with associated pulp and nail loss. Type IV injuries involve the lunula, distal phalanx, pulp and nail loss.[4] The level of amputation also affects the outcome of the result. The more the length of the residual stump, the better the retention is achieved. Osseointegrated implants have been used to retain the prosthesis. But implant treatment is more expensive and it requires a surgical procedure and good bone quality to be successful.[5]

The traditional method of prosthesis is replacing the lost finger by an artificial digit. The artificial digit is made of silicone elastomer. The finger prosthesis requires an optimum retention for functions such as grasping, carrying and holding. Owing to a wider rate of acceptance, comfort, durability, stain resistance of customized silicone prosthesis and patient's unwillingness to go for any surgical procedure involving implants, the above explained method of fabrication of prosthesis was opted. The additional functional benefits of silicone prosthesis includes desensitization and protection of the painful hyper sensitive tissue at the amputation site by constant gentle pressure exerted over the affected area.[6] It has also been speculated that silicone gel improves the hydration of the stratum making the scar tissue more pliable and comfortable. [7]

Conclusion

Prosthesis is an artificial substitute for replacement of a congenitally malformed or missing body part. For most patients, the aesthetic appearance of an amputated finger plays a more important role than function as they face social stigma. With the advancement in skill, technology and materials available today, the rehabilitation of an amputated finger is no more aesthetically challenging. When fabricated with immense care they can be made life-like. A well fabricated aesthetic prosthesis can help in providing the patients with psychological support.

Authors Contribution

Dedeepya N.R.: Case recording, manuscript editing
Indira Padmaja B.: Literature search, manuscript editing
Raja Reddy N.: Case report review, literature search
Srivatsav C.S.: Manuscript drafting

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FIGURES

Figure 1: Patients' preoperative picture with amputated fingers on left hand

Figure 2: Stone cast of the hand

Figure 3: Stone cast is trimmed to prepare undersized finger sleeve for tight contact

Figure 4: Wax trial on patient

Figure 5: Shade matching with intrinsic staining

Figure 6: Final Prosthesis delivered after extrinsic staining and finishing