Rehabilitation of amputed thumb with a silicone prosthesis

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Abstract

Creating prosthesis, having realistic skin surface and seamless visual integration with the surrounding tissues, requires both artistic and technical skill. Anatomical design, thin margins, lifelike fingernails and realistic color/contours are essential for patient satisfaction. Prosthesis is especially useful in case of lost body parts, as reconstructive surgery cannot fully restore aesthetics. This case report describes a simple technique for fabricating silicon finger prosthesis for a patient.

Key words: Finger amputation, finger prosthesis, silicone elastomers

INTRODUCTION

Trauma to the finger or the hand is one of the most common types of injury resulting in deformity, altered aesthetics and psychological disturbances. Skilled hand surgeons can sometimes reattach the finger or thumb using microsurgery. Although this is the first choice of treatment, however when it is contraindicated or unaffordable, the prosthetic rehabilitation of the amputed part is considered for improving the aesthetics and the psychological status of the patient.[1] Silicone is the preferred material for the replacement of a lost part. However, these prostheses are primarily designed for aesthetic rehabilitation, nevertheless they can also improve the function due to the restoration of normal shape and length of the finger, and transferring sensations such as pressure.[2,3] This case report describes a simple technique for fabricating silicon finger prosthesis for a patient after an accident in childhood

CASE REPORT

A male patient aged 23 years, reported to the Prosthodontics Department for the reconstruction of the missing thumb of the left hand due to an accident 10 years back. Examination indicated amputated thumb at the middle phalanx [Figure 1]. It was decided to place implant retained finger prosthesis; however, patient was not ready for any surgical intervention. Hence, silicone finger prosthesis with mechanical retention was suggested for the patient.

Impression of the affected hand was made. A thin layer of petroleum jelly was applied on the patient's hand to prevent adherence of the impression material to hair and skin. Irreversible hydrocolloid was selected for impression making. A plastic container having adequate clearance of at least 5 mm around for the impression material and of sufficient length to cover the hand was used to confine the impression material. Alginate impression material (Zelgan, Dentsply India Pvt. Ltd., India) was manipulated using cold water to increase the working time and was poured into the containers. The patient was asked to dip his hand vertically into the container taking care that the sides or the bottom of the container was not in contact. After the material was

Figure 1: Pretreatment dorsal aspect of the hand

set, the hand was removed quickly in a jerking motion. This impression was poured with Dental stone (Kalrock, Kalabhai Karson, Mumbai, India) to obtain the cast [Figure 2].

An impression of the right hand of the patient was also made and used as a guide to carve and make wax pattern of the missing thumb. Wax pattern made was hollowed from the inside by sculpting and placed on the amputed finger cast. During try-in, the length and fit of the wax pattern was verified and checked for harmony with the adjacent fingers [Figure 3]. Necessary modifications were then made to improve the adaptation of the wax patterns to the remaining stump to improve mechanical retention; the anatomy was then checked and refined to improve aesthetics.

While flasking the inner surface of the wax pattern was poured separately, and indexing was done to reorient the stump after dewaxing procedure. A two-part mold was obtained after dewaxing. Reduction of 1-1.5 mm was done on the stump all around and was reoriented on the obtained mold [Figure 4]. This produced a prosthesis, which was smaller in diameter by 1-1.5 mm and it stretched over the amputated stump to provide retention.[4]

The room temperature vulcanizing silicone (MP Sai Enterprises, Mumbai, India) was intrinsically pigmented according to the skin of the patient. The base color was dispensed, and intrinsic stains were mixed to achieve the desired shade. Color matching of the dorsal and ventral surface was done separately in natural light [Figure 5]. The silicone was manipulated and packed into the flask and pressed lightly. Curing was done for 24 h at room temperature. Once the final prosthesis was retrieved, the excess material was trimmed with scissors and final finishing was accomplished using silicone burs.

An artificial nail was fabricated with cold cure clear acrylic resin which was characterized using intrinsic stains. Color and shade matching was done with the nail of adjacent fingers. The acrylic nail was finished, polished and stained extrinsically to obtain white margins and other details. The size and position of the acrylic nail were established, cynoacrylate adhesive was then applied on the under surface of the nail for bonding with a silicone surface [Figure 6]. The fit and appearance of the prosthesis were checked in the patient [Figure 7] and the patient was instructed about the maintenance of the prosthesis. A 6-month follow-up was planned to assess retention and aesthetics.

Figure 2: Dental stone model of the left hand with amputed thumb

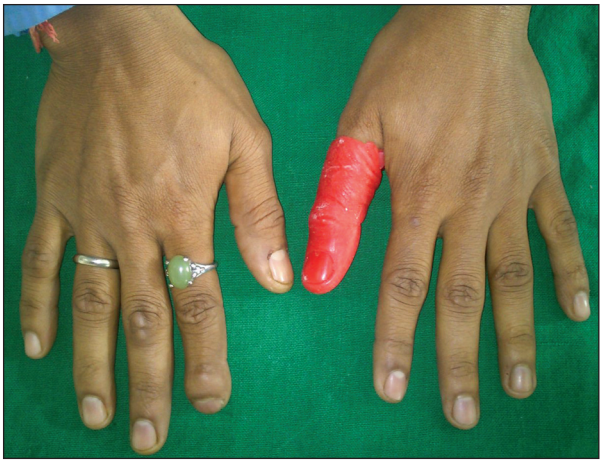

Figure 3: Try-in of the wax pattern of thumb prosthesis

Figure 4: Mold after dewaxing

DISCUSSION

Various materials such as wood, clay, leather, enameled porcelain, acrylic resin and silicone elastomers are used in the fabrication of extraoral prosthesis. Among these acrylic resin and silicone are the most commonly used

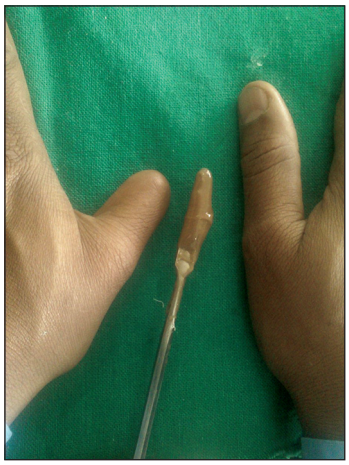

Figure 5: Color matching with the contralateral thumb

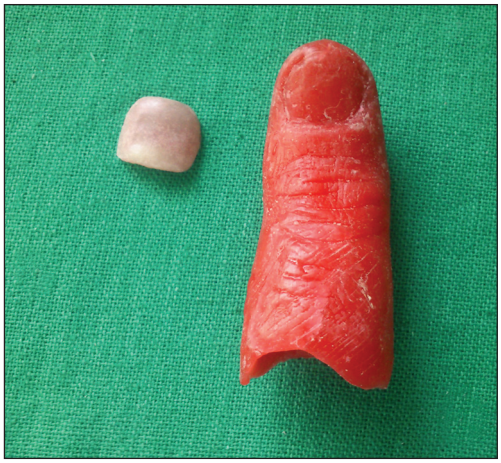

Figure 6: Custom made acrylic nail

Figure 7: Posttreatment photograph with final prosthesis

materials for rehabilitation.[5] Acrylic resin can be easily characterized and presents great durability, but is hard and uncomfortable to the patient. While silicone has texture and flexibility similar to the skin and is more comfortable to the patient.[6,7] Moreover, a clear to translucent silicone rubber is compatible with all the intrinsic and extrinsic coloring systems available. Maxillofacial prostheses require frequent replacement because the elastomers and its coloring agents undergo changes. These changes are attributable to a wide spectrum of environmental factors.[8-10] Due to several of these desirable features silicon finger prostheses was a viable method for restoring amputated fingers in our case.

CONCLUSION

The use of silicon finger prostheses is a viable method for restoring amputated fingers as it provides comfort, improvement in function, the psychological advantage, and desirable cosmetic outcome.

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