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Toe prosthesis: Recreation of Anatomic Toe Using RTV Silicone

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Abstract

A toe prosthesis is a life like representation of missing toe. Amputation of a body part can be due to systemic or vascular diseases, infections, trauma etc. A male patient reported to the department of prosthodontics with chief complaint of missing toe. After recording history & clinical examination traditional techniques were used to rehabilitate the amputated toe using RTV silicone**.**

Keywords: Prosthetic rehabilitation, RTV silicone, Toe prosthesis.

Introduction

Amputation is removal of all or part of a body. It can be due to various reasons like diabetes mellitus, osteomyelitis, peripheral embolism, peripheral vascular diseases, thrombosis, thrombocytosis, necrotizing soft tissue infections, malignant sarcomas, accidental traumas.[1] Amputation of a body part not only affects the functional & aesthetic requirement but also the socioeconomic status of the patient.[2]

As appearance plays a unique role in communication and expressing emotions, objective of maxillofacial prosthetics should focus on restoring patient's appearance and allow self assurance that can connect with his former life. Immediate post amputation care & management reduces patient discomfort helping them to adjust with the post surgical phase.[1] This is a case report of a 62 year old patient with amputated toe rehabilitated RTV silicone elastomer prosthesis as RTV silicone has an improvement over other materials.[3]

Case Report

A 62 year old patient reported to the department of prosthodontics with a chief complaint of amputed first

right toe. Patient gave history of road accident 5 years back followed by surgical amputation of the toe. Past medical history revealed that he was diabetic and under medication since 20 years.

Figure 1: Preoperative view of affected toe & unaffected toe

Impression Making

Prior to impression making affected and unaffected foot were prepared & applied petroleum jelly. Both feet were covered with irreversible hydrocolloid impression material for making impression. Impression material was then covered by surgical gauze followed by a layer of type II dental plaster. The assembly was carefully removed once the plaster was completely set & impressions were poured using type III dental stone **(Fig.2).**

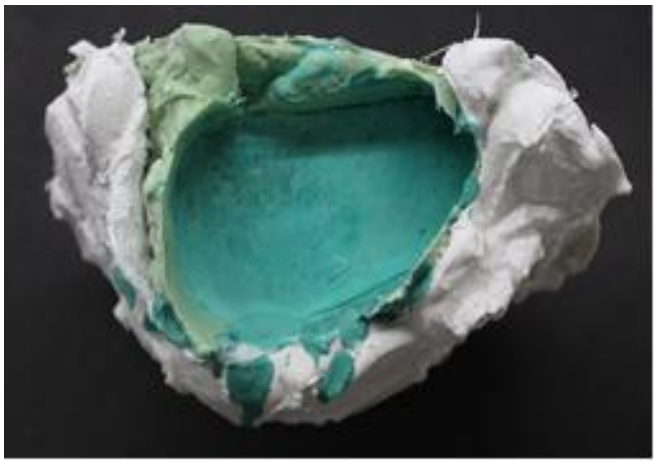

Figure 2: Primary impression poured in dental stone

Fabrication of Wax Pattern

A putty impression of the unaffected toe was made. Molten wax was poured into the putty impression to fabricate a wax pattern. Later the wax pattern was carved & modified to replicate his amputated toe **(Fig.3).** Try in of the wax pattern was done **(Fig.4).** A nail was fabricated using heat cure acrylic resin & attached to the wax pattern.

Figure 3: Wax pattern fabrication

Figure 4: Wax pattern try-in

Cast Scoring

Overall reduction of around 0.5 mm was done to accommodate the silicone prosthesis & improve the fitting. Anti-rotational vertical grooves (1-1.5 mm) was scored to prevent rotation of the prosthesis around the stump **(Fig. 5).** A custom-made mold was prepared from dental stone followed by investing & dewaxing the was pattern **(Fig. 6 & Fig. 7).**

Figure.5: Orientation lines for scoring

Figure 6: Investing of the waxed up cast with customized acrylic nail

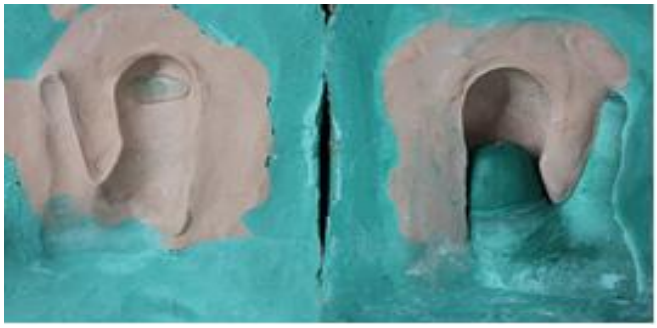

Figure 7: Mold obtained after dewaxing the wax Pattern

Shade Matching & Packing

Part A & Part B of the RTV silicone was weighed out & mixed thoroughly using a spatula according to manufacturers instructions. Omber, ochre red & blue colors were mixed to obtain asian skin one.[4] The color obtained was compared with patient skin tone & necessary corrections in color tone was made. Color matching of dorsal & ventral part was done separately (Fig.8 & Fig. 9). The mold was applied with separating medium & allowed to dry for 30 minutes. After dying it was kept ready for packing Once the required shade was obtained, it was packed into the mold.

Figure 8: Shade matching of dorsal side

Figure 9: Shade matching of ventral side

Processing & Finishing

After packing mold was closed by placing the counter over it & clamped under hydraulic pressure. The prosthesis was allowed to vulcanize in room temperature for 24 hours. It was then carefully retrieved from the mold, excess material was trimmed & finished (Fig. 10). Chairside characterization was done using extrinsic color. An adjustable toe ring was attached do the prosthesis using adhesive for additional retention (Fig, 11). Post insertion care & instructions were given.

Figure.10: Finished final prosthesis

Figure.11: Final prosthesis with toe ring as an additional retentive aid.

Discussion

Appearance has a great influence on how you feel about yourself. Amputation of a body part can have several reasons. It affects an individual's self esteem & self confidence. Reconstruction of such defects has cosmetic, functional & psychological involvement.

Ambrose Pare in 1575 was the first to describe facial prosthesis. Several materials have been used till date for fabrication of prosthesis. Amongst which silicone elastomers are the most preferred material of choice.[5]

Silicone compared to other materials have various qualities like, (1) Resistance to ear of thin margin (2) Tensile strength and the resulting elongation providing flexibility of the prosthesis (3) Ease of molding (4) Color stability (5) Water absorption (6) Non toxicity and non-sensitivity to the host tissues.[6,7]

Rehabilitation of amputated toe demand consideration of various factors like quality & quantity of remaining tissues, pathological condition of the site, support from remaining tissues retention features etc.[8] Also maxillofacial prosthodontist should have deep knowledge about the aesthetic, biologic, chemical and fabrication properties of materials used for prosthesis fabrication.[9] This would allow the dentist to fabricate prosthesis with excellent aesthetics, function and durability.

A prosthesis with good care and post insertion maintenance improves the longevity of the prosthesis. Post insertion instructions include:

1. Cleansing of prosthesis every day with water and soap, both inside and out.
2. Avoid overnight use of the prosthesis. Continuous use can cause irritation of skin.
3. Exposure of prosthesis to extreme temperatures has to be avoided.
4. Care should be taken while walking so as to not step over sharp objects.[10]

A well fabricated prosthesis with inadequate retention is a failure. So retention is an important factor in the success of a prosthetic rehabilitation.[11,12] Majority of the digital prostheses are retained by a vacuum effect on the stump provided stump of the amputated finger should minimally be 1.5 cm in length. In case of reduced retention various other retentive methods are been applied.[13,14]

Most commonly adopted retention features in fabrication of a prosthesis are anatomic under cuts, magnets, adhesives, silicone sleeves, implants etc.[11] This case utilized combination of retention from anatomic undercut & an adjustable toe ring as an additional retention feature.

Conclusion

Rehabilitation of ana amputated body part with a realistic prosthesis have a direct impact on an individual's social & mental health. So a maxillofacial prosthodontics should have deep knowledge on aesthetics, biological & chemical properties of material, fabrication & manipulation techniques that would contribute to a satisfactory outcome.

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