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Prosthetic rehabilitation of a patient with congenitally malformed toes: Case report

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ABSTRACT

The aim of this article is to present a case with malformed toes which was rehabilitated by toe prosthesis. A 24-year-old female was suffering with problem of malformed toes due to which she was facing problems in her family as people used to point out the malformation and insisted to get it rectified because they believed that it will bring bad luck to them. Surgical reconstruction would have been a better option but the patient was not ready to undergo multiple surgeries, and poor economy was also a limitation; hence, prosthesis was planned for this case. In this case, conventional wax elimination technique was used to fabricate a poly-methyl-meth-acrylate (PMMA) toe prosthesis for a female patient to improve esthetics and better marital life.

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1. Introduction

Maxillofacial Prosthodontics is an art and science which deals with the replacement of missing parts of maxillofacial region while reestablishing the function, esthetics, and comfort of the patient with respect to her physical, social, psychological, and economical status. Toes and fingers are missing/deformed usually due to developmental anomaly, trauma, or burn.[1,2] This does not only hamper the function but also leads to psychological problem as well.[2,3] The aim of this article is to present a case with malformed toes which was rehabilitated by toe prosthesis. Further, the emphasis has been laid down on the fact that the physical, social, psychological, and financial state of the patient are more important than the techniques and the materials; a technique may be good for one patient but it may not be a good and viable option for others.[4] Impression making, carving of prosthesis, and processing of material for fit and color matching have been presented. Toe ring, which is routinely worn in India by females, was incorporated in the prosthesis to aid in retention; further, the patient was asked to use slippers which helped in retaining the prosthesis and concealing the discernible margins.

2. Case description

A 24-year-old married female patient was referred to the Unit of Prosthodontics, Faculty of Dental Sciences, from Department of Plastic Surgery, Banaras Hindu University, Varanasi with a problem of malformed toes due to which she was facing problems in her family as people used to point out the malformation and insisted to get it rectified. Clinical examination of left foot revealed that the great toe and two neighboring toes were malformed. Small stumps of toes were remaining with skin fused on the dorsal side (Fig. 1). The

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Fig. 1 – Preoperative view of malformed toes.

surrounding tissues appeared to be normal without any inflammation of skin. Surgical reconstruction would have been a better option but the patient was not ready to undergo multiple surgeries, and poor economy was also a limitation; hence, prosthesis was planned for this case.

For making the impression, the foot was lubricated to avoid the adhesion and painful entanglement of the hair. A mold of the patient's foot was made by adapting the impression compound over the foot. This mold was used for making impression with the help of irreversible hydrocolloid (Zhermack Tropicalgin). The vents were prepared to allow the easy uniform flow of material (Fig. 2). This alginate impression made was poured in die stone using vibrator to avoid the voids and get finer surface than dental stone (Fig. 3).

Cast of the foot was refined and toe prosthesis was carved in pink modeling wax. The toes were carved in slightly flexed form which is the usual relaxed state. To give the pitted appearance, rather than a false looking surface with shine, the prosthesis was tapped by a brush (Fig. 4).

The wax prosthesis was tried on the foot for evaluation of fit and comfort. The patient was asked to walk on the floor with prosthesis in place. Aluwax (M P Sai, Mumbai) was placed on the ventral surface of the prosthesis and the patient was asked



Fig. 2 – Impression of the foot made in Irreversible hydrocolloid.



Fig. 3 – Cast prepared in die stone.



Fig. 4 – Wax pattern prepared on cast.

to walk on the floor so that the ventral side of prosthesis gets molded according to the foot movement (Fig. 2d). A ring was incorporated in the prosthesis so that it can be inserted in her ring finger for retention of the prosthesis.

The prosthesis was replaced on the cast and the margins were again adapted by heating it time and again. The material used for this was poly methyl-meth-acrylate (PMMA) to which oil paint used for fabric painting was added to achieve a shade slightly lighter than the ventral surface of the foot. Then the prosthesis was processed by using conventional wax elimination technique (Fig. 5). The prosthesis after minimal finishing and polishing was tried on patient's foot. She felt pain while walking at some sites, so trimming was done at pressure points which were located by using Zinc Oxide Eugenol paste as a disclosing agent. Retention of the prosthesis was not optimum and she had discomfort also; thus, it was relined



Fig. 5 – Conventional wax elimination technique was used.

with cold cure acrylic and movements were made. The color of the prosthesis was not matching the neighboring tissues so it was painted with Camel [R] colors by mixing in liquid of self-cure acrylic (Figs. 6 and 7). Despite all the efforts, margins were discernible, so a pair of 'slippers' was selected to hide the margin (Fig. 8). Finally, the prosthesis was delivered to the patient.

3. Discussion

Body defect due to missing/malformed toes leads to significant psychological trauma. Long-term success of the prosthesis mainly depends on its retention and orientation.[5] Loss of fingers and toes causes disfigurement and there is a taboo in India that the malformed or missing toes, especially of a female, bring bad luck. Thus, missing/malformed toe is not merely a personal problem but a social problem. Prosthesis can improve esthetics and to some extent function as well; however, it depends on the remaining stump of the toe. If the missing phalange is only distal one, then the chances of improvement of function are better.[6]



Fig. 6 – Final toe prosthesis.



Fig. 7 – Post-operative view.



Fig. 8 – Slippers used to conceal the margins and enhance stability.

Reconstruction of missing/malformed toe by a full thickness graft may be a better option than the prosthesis because it will be more biological; however, it is tough to achieve correct size and contours by such plastic surgeries. Moreover, it requires multiple surgeries and generally not financially viable as well. Thus, the prosthesis retained by conventional means have to be used in place of osseointegrated implants or surgical reconstruction in case of patients who cannot afford such procedures.[7] Prosthesis is usually a bigger problem in Asian subcontinent because here the weather is generally hot and humid, hence sweats a lot and causes irritation to skin.[1]

There are various acrylic and silicone materials available for the fabrication of the prosthesis; acrylic is traditionally popular being economical. However, silicone is better for color matching, margin adaptability, and overall improved aesthetics.[8] Silicone prosthesis reproduces the details in life like surface topography and contour in an excellent manner. Moreover, very thin margins can be prepared to have better color matching and avoid discernible margins in silicone which is not feasible in case of acrylic. However, silicone fails more frequently in load bearing areas like foot/toes. Acrylic has been used successfully to rehabilitate almost all kind of defects in past because of its low cost.[9,10] Addition of stains to the acrylic can change its physical nature and reason of maxillofacial prosthesis failure is low color stability. There are usually two types of stains, inorganic and organic, with former having the ionic bond.[10] With development of materials and technology, we can treat the patient and can help them to live relatively better life. As the technology is growing, it is making the treatment easier and gives relatively better results, however, making the treatment costlier and taking it away from the common man; in this context, we will have to consider the fact that need should be the driving force and not the affordability.

4. Conclusion

Treatment is the process of making a patient comfortable physically and mentally considering his social and economical conditions. Reconstruction of missing/malformed toe by a full thickness graft may be a better option than the prosthesis because it will be more biological; however, it is tough to achieve correct size and contours by such plastic surgeries. Moreover, it requires multiple surgeries and generally not financially viable as well. In this case, toe ring was used to retain an acrylic prosthesis fabricated by conventional wax elimination technique and slippers were utilized to further stabilize the prosthesis.

Conflicts of interest

The authors have none to declare.

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