

CASE REPORT

A CLINICAL CASE REPORT ON RESTORATION AND REHABILITATION OF GROSS ANATOMIC LIMB DEFECTS

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ABSTRACT: Rehabilitation of missing body parts has been an enigma. Various techniques were put forward for fabrication of these missing parts. Missing digits is a congenital anomaly in various syndromes. Here is a case report of male child with congenitally missing fingers of the hand and digits of the toes. Gloves and Socks type of prosthesis was fabricated with RTV silicone, which not only replaced missing fingers and digits but also enhanced self-esteem of the patient.

KEYWORDS: Glove prosthesis, Socks prosthesis, RTV silicones, limb prosthesis.

INTRODUCTION: "It is a God's given gift of every human to appear human." Missing damaged or lost parts of the body can be quite disfiguring and has great psychological impact on the self-esteem of the individual. Thus rehabilitation of these missing or lost parts of the body is deemed mandatory to uplift the individual's confidence and wellbeing. Maxillofacial Prosthodontics is one of the emerging branches of Prosthodontics concerned with restoration and rehabilitation of gross anatomic defects whether acquired or congenital. It not only leaves the operator with a greater job satisfaction but it also tests the Prosthodontists's ability, skill and knowledge.

Limb malformations occur in approximately 6/10,000 live births, with 3.4/10,000 affecting the upper limb and 1.1/10,000 affecting the lower limbs. Abnormalities of the limbs vary greatly and they may be either partial or complete absence of one or more digits. Congenital anomalies affect 1% to 2% of newborns of which 10% are upper-extremity abnormalities.¹ The most widely accepted classification of congenital limb anomalies was proposed by Frantz and O'Rahilly and presented by Swanson. The system defines the anomalies according to the embryonic failure during development and relies on the clinical diagnosis for categorization.

The anomalies in which limb defects are common include "ADAM complex"-(Amniotic deformity, adhesions, mutilations) also known as amniotic band rupture sequence (ABRS), Adams oliver syndrome, ectrodactyly, syndactyly, symbrachydactyly etc. ABRS occurs due to partial rupture of amniotic sac. This rupture involves only amnion, chorion remaining intact.^{2,3} Fibrous bands of the ruptured amnion float in amnion fluid and can encircle and trap some part of the foetus. This rupture results array of defects ranging from limb reduction defects, amputations, ring constrictions, distal syndactyly, talipes equinovarus, neural tube defects, limb/ body wall deficiency, extrathoracic heart, growth restrictions. Adams-Oliver syndrome has a wide spectrum of anomalies ranging from aplasia cutis congenita, cutis marmorata telangiectatica congenita and transverse limb defects. Ectrodactyly refers to deficiency or absence of one or more of central digits of hands and feet.

This particular case report cannot be categorized into any of the above conditions as the patient had only the limb deficiency and systemic conditions were stable and normal.

CASE REPORT

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Fabrication of Prosthesis: Impressions were made using irreversible hydrocolloid impression material (Algitex, Dpi, Mumbai.). A plastic container of sufficient length and diameter was chosen to confine, carry and manipulate the impression material. The container was chosen such that the length of it is equal to length of the forearm of the patient and was tried with the patient's hands in to provide adequate clearance of at least 2cms around for the impression material. Regular setting alginate was mixed using cold water to increase the working time and poured into the containers. The patient was asked to dip his hands and legs individually vertically into the container without touching the walls of the bottom of the container. The material was allowed to set and the hand and legs were removed quickly in a jerking motion after the material was set. Impressions of both the hands and legs were made in a similar manner.

The impressions were poured in stone and casts were made. A suitable donor hand and leg were selected for making the wax patterns to avoid the laborious task of sculpting. Using the cast of the hand and leg as reference, a donor hand was selected for the patient from among the patients visiting our department. Impressions of the hand and legs of the donors were made using irreversible hydrocolloid impression material in the same manner explained above and modeling wax was melted and poured into the impression material. After the wax was hardened, wax model was retrieved from the impression and were tried on the patients casts. Final carving and adjustments were made to blend the margins with the respective patient casts (Fig 3). The completed wax patterns were tried on the patient.

After the wax trial the models were subjected for the flasking procedure. Customized flasks were made using card boards and a two part flasking technique was followed for the hand (gloves) prosthesis and a three part flasking technique was used for the leg (socks) prosthesis for easy retrieval. To maintain uniformity in the thickness of the glove a horizontal stand was fabricated at the distal end of the stump of the hand and was attached to it, so that it forms a suspension during the flasking procedure like a jig. The existing natural fingers were cut from the wax model and flasking was carried out (Fig 3). Dewaxing was done and all the wax residues were eliminated using steam jet. Stump preparation was done in order to fabricate glove type prosthesis. A reduction of 2-2.5 mm was done all around on the stone casts. A round bur of 2mm diameter was taken and dimpling was created uniformly all over the stone model and there after reduction was done. This would produce the stump with uniform reduction all over the prosthesis with a smaller diameter which can be stretched over the amputated stumps to provide retention.

CASE REPORT

RTV Silicones were mixed and color matching was done and packing was carried out. The material was set to polymerize for 24hrs and after 24hrs the prosthesis was carefully retrieved from the mold and finishing was done (Fig 5, 6). For both the prostheses a slit was made along the crease on the nail bead area, where nail was to be inserted. The nail portion was inserted into the slit and a cyanoacrylate adhesive was applied on the under surface of the nail for bonding with the silicone surface and placed back on the mold to achieve a stronger bond to the nail bed. The excess length of the nail was trimmed and smoothed using sand paper. Finally the prosthesis was delivered to the patient and he was happy to wear them (Fig. 7, 8).

DISCUSSION: As Chalian states “Its Gods given right of every human to appear as human”. Disabilities may compromise the individual in terms of both functionality and esthetics and have a great psychological impact on the self-esteem of the individual. Fingers of the hands help in carrying out functions like grasping and feeling, hands they also have an esthetic impact. They can emphasize the beauty of a gesture or the grace of a movement. Limb defects can be congenital, trauma or may due malformations. Congenital anomalies like ectrodactyly, oligodactyly, syndactyly are some of the conditions with prominent limb defects. These conditions are often associated with other characteristics forming a syndrome. Amniotic bands are the commonest cause of limb malformations as depicted by the literature. Various materials have been used in the fabrication of the extraoral prosthesis like wood, clay, leather, enameled porcelain, acrylic resin and silicone elastomers.⁴ Over the past decades, silicone elastomers have proven to be the most promising material. Silicones are preferred over other material because of their improved texture, light weight and life like appearance. These silicones are a combination of organic and inorganic compounds. Various methods have been used for the fabrication of wax pattern for the finger prosthesis such as donor technique, or using the impression of the contra-lateral side. The former technique was chosen because fine details were replicated with ease and less labour.^{5,6}

CONCLUSION: When the option of surgical reconstruction has been ruled out, then the viable and alternative approach is prosthetic rehabilitation with silicone prosthesis. The prosthesis not only serves to rehabilitate the anatomic defect but gives the psychological booster to improve the quality of life of the individual.

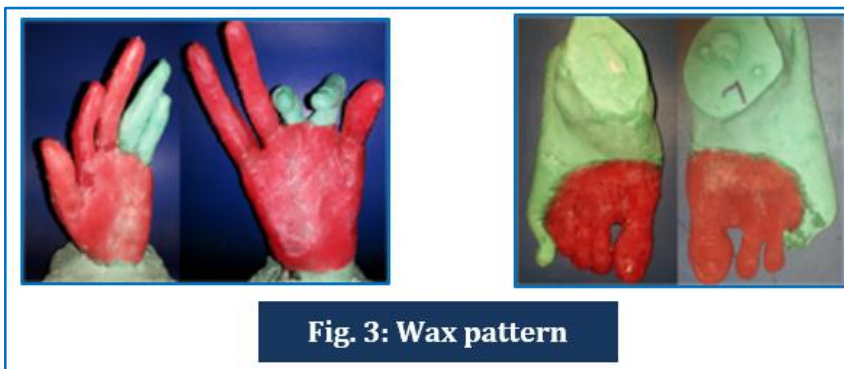


**Fig. 1: Pre-operative dorsal view
Of the upper extremities**



**Fig. 2: Pre-operative (dorsal)
view of the lower extremities**

CASE REPORT



CASE REPORT

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