



**ORIGINAL RESEARCH PAPER**

**Prosthodontics**

**PROSTHETIC REHABILITATION OF AN AMPUTATED FINGER**

**KEY WORDS:** Amputated digit, Amputated finger, Prosthetic finger, Silicone finger.

<b>Dr. Chippalapally Arun Kumar</b>	Senior Resident, Department of Prosthodontics, Government Dental College, Hyderabad.
<b>Dr. G. Naveen Kumar*</b>	Senior Resident, Department of Prosthodontics, Government Dental College, Hyderabad. *Corresponding Author
<b>Dr. Kancharidasu Vamshikiran</b>	Senior Resident, Department of Prosthodontics, Government Dental College, Hyderabad.
<b>Dr. Brahmandabheri Nithisha</b>	Senior Resident, Department of Prosthodontics, Government Dental College, Hyderabad.
<b>Dr. Nallamilli Mamata</b>	Senior Resident, department of Prosthodontics, Government Dental College, Hyderabad.

**ABSTRACT**

Maxillofacial prosthodontics is an art and science which provides life like orofacial structure appearance to the missing structures of an individual. Loss of finger results in devastating physical, psychosocial and economic distress to an individual. It is an expression associated with grief, depression, anxiety, loss of self-esteem and social isolation. The field of prosthodontic practice is not restricted to orofacial alone, it also pervades into restoring missing body structures. Digit prosthesis is an example of extra facial prostheses which can be designed and fabricated by maxillofacial prosthodontist. This article will provide sequential insight in role of a prosthodontist in fabrication of digit prosthesis.

**INTRODUCTION**

Human body is unique and every part has its own importance and is irreplaceable by nature. Loss of body part especially one as visible as finger can be emotionally upsetting and causes Psychological Trauma to the individual. Finger is a type of digit, an organ of manipulation and sensation found in the hands of humans and other primates. 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.

"Amputation", derived from the Latin word "amputare"(to excise, to cut out) has been defined as the "removal of part or all of a body part enclosed by skin."

Finger and partial finger amputations are some of the most frequently encountered forms of partial hand loss. The most suitable treatment depends on the sort of injury and the involvement of other digits. Numerous techniques are available to restore fingertip amputations, with the common goal to reduce pain and preserve sensation at the tip. Prosthetic rehabilitation becomes a viable alternative when surgical reconstruction in patients is not possible. Maxillofacial prosthodontics : Branch of prosthodontics concerned with the restoration and/or replacement of the stomatognathic and craniofacial structures with prosthesis that may not be removed on a regular or elective basis."

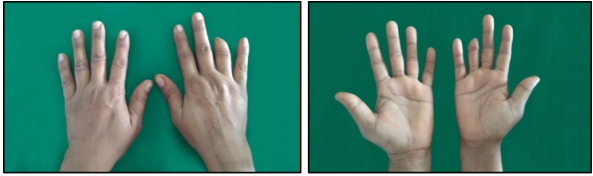
The field of prosthodontic practice is not restricted to intraoral and extraoral prosthesis alone, but also deals with extrafacial prosthesis.

Before the management of an amputee, the functional requirements of the individual and management options must be discussed with the patient. A complete hand examination should be performed, estimating the amount of injury to the fingertip, angles and levels of amputation, loss of tissue,

involvement of nail, involvement of other fingers, neurovascular involvement, and function of the hand. After assessing the fingertip injury, a treatment plan should be formulated. Management starts with history elicited from the patient regarding the nature of the injury, age, hand dominance, occupation, recreational activities (including playing sports and musical instruments), previous history of hand injuries or problems, and other systemic diseases that affect wound healing.

**CASE REPORT**

45 years old female patient name suramma reported to the Department of Prosthodontics in government dental college Hyderabad, with the complaint of a partially missing finger. The patient revealed a history of having lost the digit in a traumatic injury caused by a mechanical lathe. The amputation was partial, involving the mid part of the middle phalanx of the right ring finger (fig :1).The wound was completely healed , and the surrounding skin showed no signs of inflammation and infection.

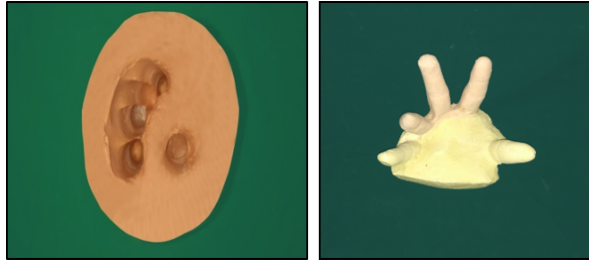


**Fig:1a, 1b Dorsal And Ventral Views Of The Affected And Unaffected Hand**

Treatment options for this case were 1.osseointegrated implants 2.silicone prosthesis 3. Acrylic prosthesis. Material of choice selected in this case was Silicone as it has advantages as following were colour stable, biologically inert, easier to process, Retain physical & chemical properties at wide range of temperature and Stone molds can be used.

**STEPS IN FABRICATION OF THE PROSTHESIS**

Primary impression made using irreversible hydrocolloid and cast was poured using dental stone (fig:2)



**Fig:2a,2b Preliminary Impression and Master Cast**

The ring finger model is then reduced by trimming with a bur. This is best achieved by following the margin line of the prosthesis and cutting to the depth of a 2 mm rose head steel bur. This means that the undersize sleeve when placed in position on the tissue of the residual stump will create a passive vacuum fit. The fabrication of the prosthesis consisted of the fabrication of a sleeve, the wax pattern followed by laboratory procedures to fabricate it into silicone rubber prosthesis. Scoring of the stump should be done to know the how much compressibility of surrounding skin, (fig:3)



**Fig:3 Scoring Of The Stump**

**Wax pattern fabrication :** Can be done by 2 methods

1. By Selection of an appropriate donor: The impression of donor's fingers is made with condensation silicone in putty consistency. Molten Wax is poured into the impression. This technique allows the avoidance of laborious task of sculpting.
2. By the impression of the unaffected side – Duplication is done with alginate.

**Try in:** wax pattern's length and fit is verified on patient's hand.(fig:4)



**Fig:4 Wax Pattern On Stump And Wax Pattern Try In**

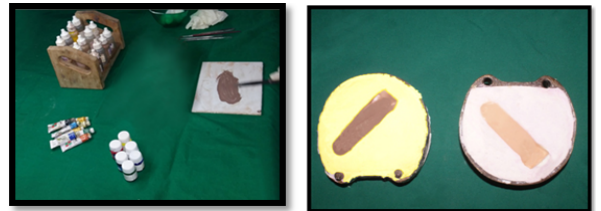
Wax Patterns are invested in typeIII dental stone, using three pour techniques. The mold is dewaxed and separating medium is applied (Fig:5)

**Color Matching And Packing:**

The silicone (RTV) and pigments are mixed intrinsically to match patient's skin. Color matching for the ventral and dorsal surfaces is done separately in day light. It is packed in the mould (Fig:6). Curing is done for 24 hours at room temperature. Prostheses are finished with alpine stones and silicone burs.



**Fig:5 Flasking And Dewaxing**



**Fig:6 Characterisation And Packing**

**Final prosthesis:**

to disguise the junction line between the silicone finger prosthesis and residual stump, a wide metal ring or a plastic strip bandage is placed over the margin using a cyanoacrylate adhesive. The final prosthesis is inserted into the residual stump and the fit and color matching is evaluated (Fig:7). The prosthesis use, maintenance and care instructions are given to the patient. Patient's follow up: For prosthesis evaluation the patient is asked to return on Day 1, 7. There after a 6 month follow up is done.



**Fig:7 Final Prosthesis**

**DISCUSSION:**

Loss of any finger affects esthetics and functionality , greatly impacting dexterous individuals. The lost body parts can be replaced by using artificial substitutes like acrylic and silicone.

The material chosen for fabrication is RTV silicone (VST 50 F silicone elastomer, medical grade) which has a wider rate of acceptance owing to their comfort , durability and stain resistance. Additional functional benefits of silicone prosthesis include desensitization, protection of the painful hypersensitive tissue at the amputation site by constant gentle pressure exerted over the affected site. The characterized acrylic nails used, mimic the natural nails in color and texture and provide more realism to the rehabilitation. Various methods of retention are available (rings , adhesive, or by implant retained prosthesis) which is the most important criterion for the success of any prosthesis. The most challenging cases are those where suction is not feasible or is compromised, as is same in case of short or fleshy residual finger. In present case report custom vacuum retained prosthesis were planned because stumps were of adequate length, for this the positive model was rectified to create suction for retention. A 5-7% of circumference reduction of the stump is done to create the passive vacuum fit. For additional retention and esthetics a retentive finger ring is given. The coloring of silicone is a technically sensitive procedure. Basic skin tone color was formulated using intrinsic strains and slight extrinsic staining was done for exact matching of the shade. As color instability is attributed to uv light exposure, air pollution, cosmetics and strong

solutions, patient is instructed not to expose to higher temperatures, sunlight and not to smoke to prevent staining.

Finally the prosthesis thus fabricated was delivered, providing desired aesthetics, function and psychological boost to the patient.

**CONCLUSION:**

Successful prosthetic rehabilitation of patients with total or partial amputation is a challenging task as most of the patients look forward to functional rehabilitation. So the responsibility of the clinician lies in making the best use of the available materials and techniques to enable these less fortunate patients to re-enter the society as confidently as possible.

**REFERENCES:**

1. James CH (2003) Amputations of hand. Campbell's operative orthopaedics, 10th edn. Mosby Inc., St. Louis, pp 611-622.
2. Pillet J (1981) The aesthetic hand prosthesis. *Orthop Clin N Am* 12:961-970.
3. Murdoch G (1967) Levels of amputation and limiting factors. *Ann R Coll Surg Engl* 40(4):204-216.
4. The glossary of prosthodontic terms. *The journal of prosthetic dentistry*, volume 94.
5. Mechanical properties of a new facial prosthetic material; John F Wolfaardt *jpgd feb 1985 vol 53*.
6. Silicon finger prosthesis: A clinical report; PC .Jacob, *Journal of prosthodontics*, 2012, 631-633.