

Custom Made Finger Prosthesis to Rehabilitate Partially Amputated Finger

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A 55-year-old male patient was referred for fabrication of finger prosthesis. Patient lost a part of index finger of his right hand nine-month ago, in a road accident. Due to functional deficiency, he was facing difficulty at his workplace. Patient insisted to render treatment for amputated finger with pretrauma functioning, as early as possible. Clinical examination revealed that amputated index finger was completely healed with thickened end and scar present at the base and stable remaining stump. Finger stump was approximately 18 mm long [Table/Fig-1a,b].



[Table/Fig-1]: Preoperative photograph-Partially amputated index finger of right hand: (a) Dorsal view, (b) Ventral view.

Rehabilitation of the amputated finger was planned with customised silicone finger prosthesis. Patient was explained about the procedure and use of different materials. Informed consent was taken from patient.

Patient's hand was lubricated with petroleum jelly (Vaseline petroleum jelly, India), hand was boxed and irreversible hydrocolloid impression material (Alginate, Zelgan: DPI) was placed over palmar and dorsal surface. Impression of amputated residual finger stump was also made. Impressions [Table/Fig-2a] obtained were then poured in dental stone (Kalabhai, India), casts were retrieved [Table/Fig-2b] and wax pattern was fabricated.



[Table/Fig-2]: Impression making and cast fabrication: (a) Impression of affected hand, (b) Master cast.

Nail part was carved onto the wax pattern (Truwax Baseplate Wax, Dentsply) [Table/Fig-3a]. Wax pattern was tried at the finger stump to evaluate shape, size, fit and stability [Table/Fig-3b]. Intrinsic colours were selected and verified under natural daylight to obtain good characterisation [Table/Fig-3c]. The wax pattern was then flaked [Table/Fig-3d] and separating medium (Cold mould seal, Pyrax) was applied between two pours. Dewaxing was done and mould was

allowed to cool. Mould was packed with silicone rubber (Technovent M511 Maxillofacial Silicone, Technovent Limited, United Kingdom) avoiding air entrapment [Table/Fig-3e].



[Table/Fig-3]: Prosthetic procedural steps: (a) Wax pattern with nail carved, (b) Wax pattern trial, (c) Shade selection for colour matching, (d) Flasking of wax pattern, (e) Silicone packing.

The material was bench cured overnight and was then placed in a hot water bath for one hour at 45°C for final polymerisation. Final prosthesis was retrieved, finished and polished and coated with extrinsic colours. Base colour of silicone at nail region matched closely with nails of other fingers. Final prosthesis was seated on finger stump and verified for fit, colour, stability and functioning and was found to be satisfactory [Table/Fig-4a,b].



[Table/Fig-4]: Final digital prosthesis: (a) Impression of affected hand, (b) Master cast.

Patient was able to reproduce unrestricted movement of finger stump with prosthesis comfortably without any displacement of prosthesis. Patient was advised to use ring as mechanical aid for added retention. Six month follow-up showed good retention, aesthetics and functioning of finger prosthesis, transmitting pressure and position sense for functions like holding objects, writing or typing. No complications were present and underlying skin was healthy. Patient was very satisfied, confident, happy and thankful.

DISCUSSION

Partial or complete amputation of finger/s leads to severe functional deficit and aesthetic concerns with distressing emotional and psychological disturbance as well as social annihilation [1]. It restricts range of movement of remaining fingers with immediate loss of grasp and strength of hand [2]. Most digital injuries and traumatic amputation of fingers can be successfully treated by microsurgical reconstruction by re-implantation or transplantation. However, it may not be advisable or indicated in cases with infection, necrosis, severe crush injuries, cost factor, lack of facility, lack of awareness and treatment failure [3]. In such patients, finger prosthesis is treatment of choice which offers great functional, aesthetic and

psychological aid with a matching form, colour and texture. The goals of rehabilitation are to regain functional length, preserve sensitivity, prevent joint contractures and enable patient to carry out routine tasks [3,4]. Ideal finger prosthesis must improve grasp and grip of hand, transfer functional forces to hand; it should also look natural with realistic skin surface with seamless visual integration, allowing expression of gestures. At least 1.5 cm of residual stump should be present for satisfactory and retentive finger prosthesis [2,5].

Finger prosthesis improved patient's quality of life by enhancing aesthetics, function, and comfort. It offered functional, aesthetic, rehabilitative and psychological advantages to the patient along with restoring normal social and professional life. Natural resemblance and customisation met our patient's wish for inconspicuousness. Vacuum effect kept the prosthesis secured on residual stump without hampering finger and hand movements and closures. The prosthesis can be cleaned easily with soap and water; made of pleasant material and comfortable to wear; thin, tapered smooth edged which prevented pressure sores, with easy donning and removal and enhanced excellent counter support for other fingers with improved

grip and grasp [2,6]. Finger ring over the margin of prosthesis gave a pleasant look and less noticeable prosthesis [3,4].

CONCLUSION(S)

Prosthetic rehabilitation is a fast and reversible treatment procedure which also allows close monitoring of the surgical site.

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