

# FABRICATION OF AN INTERIM ACRYLIC HAND PROSTHESIS: A CASE REPORT

\*Ann Mary Varghese, \*\*Kurien Varghese, \*\*Smita Sara Manoj, \*\*\*Shweta Thomas, \*\*\*Radhika Ravi

\*Assistant Professor, Department of Prosthodontics Crown and Bridge, Annoor Dental College & Hospital, Muvattupuzha, Ernakulam, Kerala, India, \*\*Professor, Department of Prosthodontics Crown and Bridge, Azeezia College of Dental Sciences and Research, Kollam, Kerala, India \*\*\*Assistant Professor, Department of Prosthodontics and Crown and Bridge, Al-Azhar Dental College, Thodupuzha, Idukki, Kerala, India. Corresponding Author: Dr. Ann Mary Varghese, Email: annmangalath@gmail.com

<https://doi.org/10.55231/jpid.2026.v09.i03.02>

## Abstract

*Hand defects significantly impact daily activities and psychological well-being. Prosthetic rehabilitation restores both function and confidence. This report describes the fabrication of a conventional interim hand prosthesis for a 65-year-old male patient with partial hand loss following traumatic amputation. Using traditional impression and acrylic molding techniques, a cost-effective prosthesis was fabricated, offering satisfactory aesthetics and psychological comfort. The described method remains a practical solution in resource-limited settings lacking access to advanced prosthetic facilities.*

**Keywords:** *hand prosthesis; interim prosthesis; psychosocial rehabilitation*

## Introduction

The loss of a hand due to trauma, congenital absence, or medical conditions can have a profound effect on both function and psychological well-being.<sup>1,2,3</sup> Prosthetic

rehabilitation restores aesthetics, functionality, and quality of life.<sup>2-4</sup> While definitive prostheses, such as silicone, implant-retained, and myoelectric designs, offer long-term solutions, an interim acrylic hand prosthesis serves as a crucial transitional phase in rehabilitation.<sup>1,5</sup> Interim prostheses help patients to adapt both physically and psychologically to prosthetic use, which is designed to maintain tissue contour and provide a transition for patients awaiting definitive prosthetic fitting.<sup>6</sup> Acrylic resins, widely used in dental and maxillofacial prosthetics, are preferred for interim hand prostheses due to their ease of fabrication, cost-effectiveness, and ability to provide a satisfactory aesthetic outcome. Compared to silicone, implant-supported and myoelectric options, acrylic prostheses offer a practical and affordable solution for short-term rehabilitation needs.<sup>7</sup> This case report describes a cost-effective and novel technique for the rehabilitation of a partially amputated hand with a custom-designed acrylic hand prosthesis by

# PROSTHETIC AND IMPLANT DENTISTRY

Official Publication of Indian Prosthodontic Society  
Kerala State Branch

using cold-cure acrylic with acceptable aesthetic results.

## Case Presentation

A 65-year-old male reported to the Department of Prosthodontics with a history of right-hand traumatic amputation sustained 20 years ago. The amputation resulted in the loss of all fingers and a significant portion of the upper palm, except for the thumb. The patient had been using a preformed hand prosthesis for two decades, which exhibited severe wear and deterioration. He expressed a desire for a replacement but cited financial limitations in acquiring an advanced prosthesis immediately. After a thorough discussion of available options, the patient elected to receive an interim acrylic resin prosthesis, with the intention of fabricating a definitive prosthesis at a later stage. The patient was informed about the functional and aesthetic limitations of the prosthesis.<sup>1,5,7-11</sup>

The impression of the amputated hand was made with irreversible hydrocolloid impression

material (Algitek; DPI), after coating the skin with petroleum jelly. For reinforcement, Type II dental plaster (MAARC Dental Plaster of Paris; Aarkay Group) was added as a supportive layer. Once set, the patient carefully removed his hand from the mold. The impression was then poured with Type III dental stone (Gold Stone; Asian Chemicals) using a vibrator to prevent voids, resulting in a positive replica.<sup>1,5,7-11</sup>

To achieve optimal anatomical accuracy, an impression of the patient's son's hand was also made and poured with Type III dental stone. This served as a reference model for wax pattern fabrication, aiding in contour development and symmetry with the contralateral hand.<sup>1,5,7-11</sup>

The wax pattern was sculpted using additional impressions, incorporating fine details such as minor creases and natural depressions. The length, shape, and fit of the wax pattern were verified for harmony with the adjacent hand, and necessary modifications were made to refine adaptation and aesthetics.<sup>1,5,7-11</sup>



Figure 1: Preoperative view of the patient's partially amputated right hand showing loss of all fingers and partial palm with the thumb remaining intact.



Figure 2: Impression of the amputated hand made using irreversible hydrocolloid reinforced with dental plaster for support.



Figure 3: Stone cast of the amputated hand obtained from the impression. (right) Impression of the patient's son's hand poured with wax to obtain a reference wax pattern for contour and symmetry. (left)



Figure 4: Wax pattern sculpted to achieve anatomical contour and surface details for the interim hand prosthesis.

The wax pattern was invested in a custom-made box to facilitate flasking. The model was flasked using Type III dental stone, while Type IV die stone (Gyp Rock Die Stone; Rajkot Dental Depot) was used in the wax-up area to enhance surface hardness. Standard de-waxing procedures were followed. Internal staining of the dorsal and ventral surfaces was performed separately to match the patient's skin tone. A separating medium was applied before acrylic processing.<sup>1,5,7</sup>

A mixture of oil paint (Camel Artist Oil Colours; Kokuyo Camlin) and self-cure acrylic monomer was prepared to match the patient's complexion. Clear cold-cure acrylic powder (DPI Cold Cure Acrylic; DPI) was incorporated with the pigmented monomer to form a homogeneous mix. The nail portion was fabricated using a combination of

pink and clear auto-polymerizing resin to match the adjacent fingernails. The mold was packed with the prepared acrylic, and standard flasking procedures were followed.<sup>1,5,7</sup>

The flask was carefully opened, and the prosthesis was retrieved. Finishing and polishing were performed, and external characterizations, such as fine lines and creases, were added to enhance realism.

The patient was recalled for a trial fit, and the prosthesis was delivered after final adjustments. Chairside external staining using oil paint enhanced colour precision. The patient was provided with detailed instructions on maintenance, including cleaning with mild soap and lukewarm water and avoiding exposure to strong solvents. Regular follow-ups were



Figure 5: Flasking and dewaxing procedure showing mold preparation for acrylic processing



Figure 6: Intrinsic staining using oil paint mixed with acrylic monomer to match the patient's skin tone



Figure 7: Definitive prosthesis showing external characterization with creases and skin tone detailing. Post-insertion view showing the prosthesis in position with wristband camouflage at the junction between the prosthesis and natural hand.

# PROSTHETIC AND IMPLANT DENTISTRY

Official Publication of Indian Prosthodontic Society  
Kerala State Branch

scheduled to assess the patient's comfort, fit, and satisfaction.<sup>1</sup>

The patient was delighted with the function and aesthetics of the interim prosthesis. The prosthesis successfully restored a degree of hand functionality while improving the patient's confidence and social interactions.<sup>1</sup>

## Discussion

The rehabilitation of hand amputees has been explored extensively, with various prosthetic options available, including silicone, myoelectric, and acrylic resin prostheses. Studies have shown that silicone hand prostheses provide superior aesthetics, flexibility, and durability compared to acrylic alternatives.<sup>2</sup> However, their high cost often limits accessibility, particularly in resource-limited settings.<sup>12</sup> Myoelectric prostheses offer functional benefits through electromyographic (EMG) control, but they are expensive and require periodic maintenance.<sup>13</sup> Acrylic resin prostheses, as demonstrated in this case, provide a cost-effective solution with acceptable aesthetics and function. Similar findings have been reported in cases of acrylic finger prostheses, where heat-cured acrylic material provided an affordable and aesthetically acceptable alternative.<sup>9,14</sup>

This case underscores the importance of prosthetic rehabilitation, particularly in financially constrained individuals, where interim solutions like acrylic resin prostheses provide temporary yet meaningful benefits. The patient in this report experienced improved self-confidence and social integration, aligning with similar outcomes reported in the literature.<sup>15</sup>

Fabricating an acrylic resin prosthesis presents several challenges. The impression-making stage requires precise techniques to capture anatomical details for optimal fit and comfort.<sup>16</sup> Additionally, achieving a lifelike colour

match through intrinsic and extrinsic staining is crucial but challenging, as acrylic materials lack the translucency of silicone.<sup>17</sup> Another significant limitation of acrylic resin prostheses is their lack of flexibility, which reduces comfort and adaptability during prolonged use. Furthermore, these prostheses are less durable and require periodic maintenance or replacement, making them less ideal for long-term wear.<sup>18</sup>

The longevity of an acrylic resin prosthesis depends on usage, maintenance, and material properties. Literature suggests that acrylic hand prostheses typically last 2–5 years before requiring replacement. To improve outcomes, advancements in material science, such as incorporating flexible acrylics or hybrid materials, may enhance durability and comfort. Additionally, periodic follow-ups are essential to assess wear and tear and explore transitions to more advanced prosthetic solutions, such as silicone or myoelectric prostheses.

Fabricating large hand prostheses poses additional challenges. One of the primary difficulties encountered in this case was the inability to use a regular flask for flasking and packing due to the prosthesis's size. This limitation made the heat-cure acrylic option impractical. The patient was informed about the functional and aesthetic limitations of self-cure acrylic material, and with his consent, it was decided to proceed with a self-cure acrylic prosthesis. While self-cure acrylic provides a cost-effective alternative, its mechanical properties are inferior to heat-cured acrylic in terms of strength and durability.<sup>16</sup>

Additionally, during the fit-in stage, a noticeable transition was observed between the prosthesis and the patient's natural hand. To address this aesthetic concern, a wristband was used to effectively camouflage the junction, ensuring a

more natural appearance and improving patient satisfaction.

## Conclusion

A quick, convenient, and affordable method of making a hand prosthesis has been presented. Self-cure acrylic is clearly not the best material for a hand prosthesis, but considering the financial constraints of the patient and the ease of fabrication, this material was chosen to fabricate the interim hand prosthesis. The glove-like prosthesis is easy to wear and remove. The patient was comfortable and satisfied with the fit and aesthetics of the prosthesis.

## DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this work, the author(s) used ChatGPT and Claude to summarize a few portions of the original written draft of the case report. All content generated with the assistance of these tools was reviewed and edited by the authors to ensure accuracy with the scholarly standard of the work. The authors take full responsibility for the content of the manuscript.

## References

- Colvenkar S, Kota S, Chalapathi M, Bandari G, Sriteja D. Acrylic Finger Prosthesis: A Case Report. *Cureus*. 2022Nov;14(11):e30974
- Pillet J. Esthetic hand prostheses. *J Hand Surg Am*. 1983;8(6):778-81
- Graham EM, Hendrycks R, Baschuk CM, et al. Restoring form and function to the partial hand amputee: prosthetic options from the fingertip to the palm. *Hand Clin*. 2021;37(2):167-87
- Pereira BP, Kour AK, Leow EL, Pho RW. Benefits and use of digital prostheses. *J Hand Surg Am*. 1996;21(2):222-8.
- Rangi MK, Motwani BK, Shetty RM, Sahu SK. Fabrication of Silicone Hand Prosthesis: A Case Report. *Int Res J Cli Med* 2016;1(4):30-33.
- Leow ME, Prosthetist C, Pho RW. Optimal circumference reduction of finger models for good prosthetic fit of a thimble-type prosthesis for distal finger amputations. *J Rehabil Res Dev*. 2001;38(3):273-9.
- K RK, Bandela V, M B, S V GR. Acrylic finger prosthesis: a case report. *J ClinDiagn Res*. 2014 Aug;8(8): ZD07-8
- Dewan S, Kalra T, Kumar M, Bansal A. Prosthetic Rehabilitation of Amputated Fingers Using Thimble Prosthesis: A Novel Methodology. *Dental Journal of Advance Studies* 2019;7:131-134.
- Ragher M, Chatterjee A, Patil S, Chatterjee D, Bhat V, Dandekeri S, et al. Finger Prosthesis Made Easy: A Case Report. *Scholars Academic Journal of Biosciences* 2014; 2(11):841-844
- Nipane R, Ahmed CM, Seethi F, Khan FA, Kunturkar A, Bumb PP. Fabrication of Silicone Hand Prosthesis: A Case Report. *Int J Sci Stud* 2022;10(3):8-11.
- Yeshwante B, Parasrampur N, Baig N. Prosthetic Rehabilitation of an Amputated finger. *IOSR Journal of Dental and Medical Sciences* 2014; 13(10):10-17.
- Atkins, D. J., Heard, D. C. Y., & Donovan, W. H. (1996). Epidemiologic overview of individuals with upper-limb loss and their reported research priorities. *Journal of Prosthetics and Orthotics*, 8(1), 2-11.
- Zuo, K. J., & Olson, J. L. (2014). The evolution of functional hand replacement: From iron prostheses to hand transplantation. *Plastic and Reconstructive Surgery*, 134(6), 1283-1292.
- Ciocca, L., Scotti, R., & Mazzoni, S. (2011). Rehabilitation of a patient with an ear amputation by means of a computer-assisted design and rapid prototyping: A patient report. *Journal of Prosthetic Dentistry*, 106(5), 268-278.
- Sykes, L., Yeung, L., & O'Reilly, C. (2019). Psychosocial impact of upper limb prostheses: A systematic review. *Disability and Rehabilitation: Assistive Technology*, 14(7), 704-713.
- Haug, S. P., Andres, C. J., & Moore, B. K. (1999). Color stability and colorant effect on maxillofacial elastomers. Part III: Weathering effect on physical properties. *Journal of Prosthetic Dentistry*, 81(4), 438-443.
- Gonzalez, M., Garcia, J., & Castaneda, D. (2020). Advances in prosthetic hand materials: A review. *Journal of Biomedical Materials Research*, 108(3), 582-597.
- Perez-Maanes, R., Viña-Fernández, R., & Chamorro, S. (2016). 3D printing in prosthetic design and fabrication: A systematic review. *Prosthetics and Orthotics International*, 40(5), 582-589.