



Traumatic Amputation of the Thumb at the Proximal Phalanx: A Successful Reconstruction with Gillies' Technique and Reverse Radial Forearm Flap: A Case Report

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ABSTRACT

This case report describes a successful thumb reconstruction using a Gillies' lengthening procedure and a reverse radial forearm flap in a 31-year-old man who suffered a traumatic thumb amputation at the level of the proximal phalanx with approximately 0.5 cm of bony stump. An iliac crest bone graft lengthened the thumb, and the radial forearm flap provided sensate coverage. Postoperatively, the flap showed excellent viability, and the reconstructed thumb achieved near-contralateral length, improving hand function.

Keywords. amputation, thumb injuries, surgical flaps, bone transplantation, hand function restoration, Gillies' lengthening procedure

INTRODUCTION

Sensibility is vital to the thumb's role in pinch and grip, making it important to consider reconstructing an amputated thumb. Thumb reconstruction is a complex surgical procedure that aims to restore the thumb's function and appearance. The Gillies' operation, a pioneering technique developed in the mid-20th century, significantly advanced the field of thumb reconstruction.¹ Originally described by Sir Harold Gillies in 1946, the Gillies' operation involves lengthening a partially amputated thumb using a distally based flap and a bone graft. This innovative approach provided a solution for patients with thumb loss, particularly at the metacarpophalangeal joint level. A sensate flap, which provides skin coverage and sensation, is essential for successful hand reconstruction. The radial forearm flap is a versatile, reliable, and sensate option for covering skin defects, offering several advantages over other flap options.² This flap's ease of harvest and potential for simultaneous transfer with nerve, tendon, or bone allows for comprehensive reconstruction, addressing skin defects and sensory deficits in conjunction with osseous lengthening procedures like the Gillies' operation.

CASE

This is a case of a 31-year-old, left-handed man who suffered a traumatic amputation of his right thumb at the level of the proximal phalanx two months prior. He was initially brought to a nearby hospital, where debridement and closure were performed. The metacarpophalangeal (MCP) joint articular surface was intact. There remained 0.5 cm of the proximal

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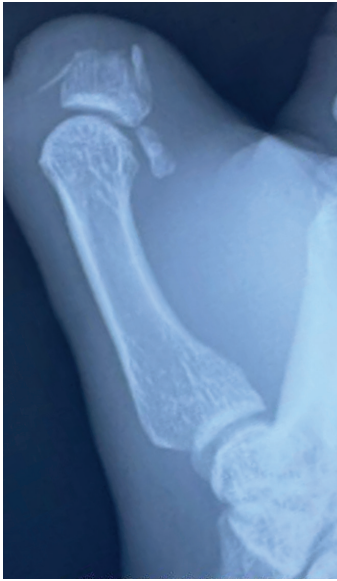


Figure 1. Injury film showing thumb X-ray: lateral view.



Figure 2. Repeat x-ray taken 20 days post-injury. Anterior-Posterior (AP) view of the affected thumb demonstrate persistent findings. (+) Bone lysis is noted, with smoother distal ends compared to initial imaging. No significant change in size is observed.



Figure 3. Preoperative clinical photographs [palmar (A) and radial (B) views] show no open wounds, signs of infection, erythema, or tenderness.

phalanx (Figure 1). Repeat radiographs after 20 days revealed bone lysis and smoother distal ends of the stump, which remained approximately the same size (Figure 2). Clinically, the stump was fully healed without open wounds or tenderness. The patient exhibited full range of motion of the MCP joint in flexion, extension, abduction, and adduction. Preoperatively, the patient’s Fil-Dash Score was 90, and the Sollerman hand function test score on the right hand was 65, compared to 80 on the left (Figure 3).

We lengthened the thumb as follows. We harvested a 4 x 1.5 cm tricortical graft from the iliac crest and shaped it into a peg proximally with a curvilinear distal edge (Figure

4). The peg was inserted into the medullary canal of the first metacarpal after drilling with a 4 mm bit to achieve a press-fit construct (Figure 5). Due to scarring and limited mobility of the stump, a reverse radial forearm flap was also performed. The flap was harvested together with an intact subfascial layer. The superficial radial nerve was preserved and anastomosed to the lateral antebrachial cutaneous nerve to maintain flap sensation. The flap demonstrated excellent color, turgor, and capillary refill. The final thumb length of 7 cm was comparable to the contralateral thumb (Figure 6). The flap remained viable through regular monitoring (Figures 7 and 8) Radiographs taken every two weeks showed a stable peg, no loosening, and signs of fusion (Figures 9 and 10).

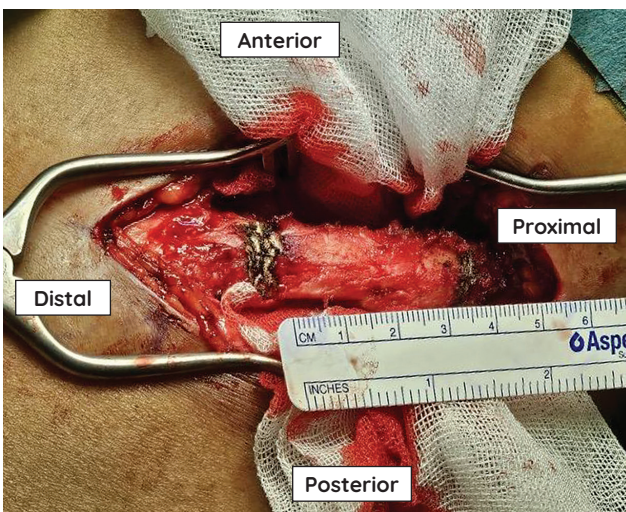


Figure 4. A 5 cm longitudinal incision was made along the long segment from the full thickness of the iliac crest. Tricortical graft measuring 4 x 1.5 cm was harvested.

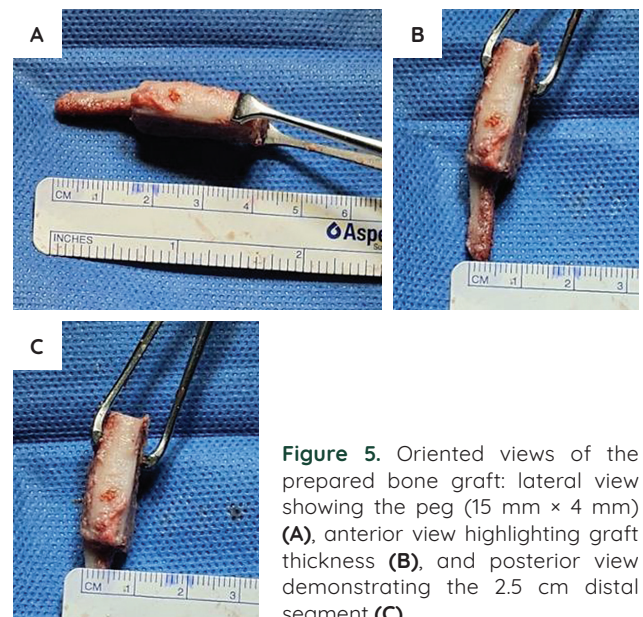


Figure 5. Oriented views of the prepared bone graft: lateral view showing the peg (15 mm x 4 mm) (A), anterior view highlighting graft thickness (B), and posterior view demonstrating the 2.5 cm distal segment (C).

At six weeks postoperatively, the patient's Fil-Dash Score was 72, compared to 90 preoperatively, and the Sollerman hand function test score on the right hand was 77, compared to 65 preoperatively (Figure 11).

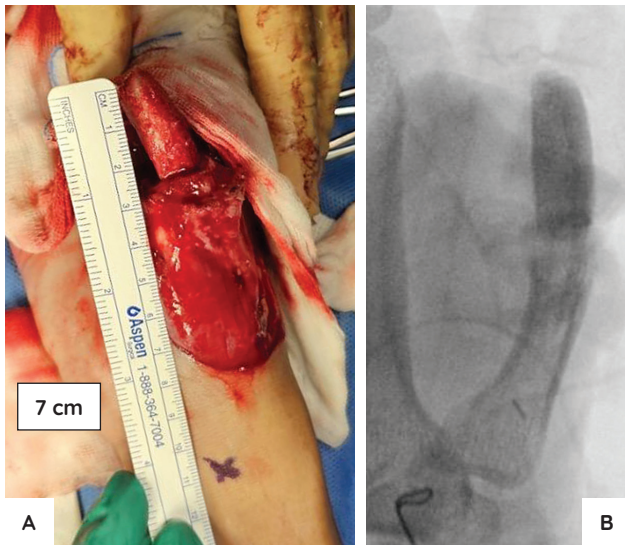


Figure 6. Intraoperative image showing the reconstructed right thumb with a total length of 7 cm achieved (A). Lateral view (B) confirm alignment and graft positioning.

DISCUSSION

The Gillies' thumb lengthening procedure is regarded as one of the most effective methods for thumb reconstruction, particularly around the metacarpophalangeal joint, and can be performed as a single-stage operation. As described by Reid in 1980, this technique yields a functional grasp that is comparable to that of an intact index finger.¹ The Gillies' procedure serves as a standalone method for thumb lengthening and often incorporates bone grafting and skin coverage, making it the preferred technique in our case.

Intraoperative findings of significant scarring and restricted stump mobility necessitated the use of a sensate reverse radial forearm flap in combination with the Gillies' procedure.^{3,4} Yajima et al. note that the disadvantages of the reverse radial forearm flap include the prolonged time required for reinnervation due to the length of the nerve pedicle, as well as the relatively diminished sensation when compared to the native digits.² Additionally, the procedure creates a secondary defect on the anterior forearm that necessitates coverage with a split-thickness skin graft, resulting in a permanent and visible cosmetic deformity.

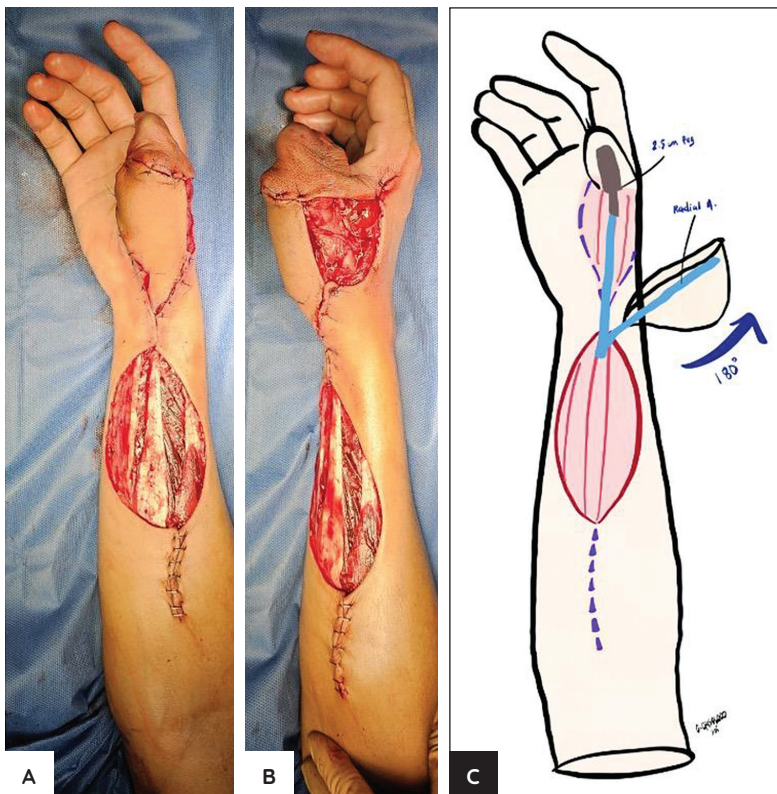


Figure 7. Radial forearm flap elevation and inset. Intraoperative view of the left forearm in supination, showing the elevated radial forearm flap with fascia and radial artery dissected from proximal to distal (A), Pronated view of the same forearm showing flap mobility and vascular pedicle length (B), Schematic illustration showing 180-degree rotation of the flap and its inset into the dorsoradial defect of the first metacarpal, secured to the native metacarpal stump (C).



Figure 8. Split-thickness skin graft coverage. Volar view of the forearm and hand showing a split-thickness skin graft (STSG) placed over the anterior forearm donor site (A). Dorsal view demonstrating the STSG inset over the dorsum of the reconstructed thumb. The graft was harvested from the contralateral thigh (B).



Figure 9. Postoperative follow-up at 2 months. Dorsoradial view of the reconstructed thumb showing good graft take without signs of infection or necrosis (A). Dorsal forearm view showing a well-healed skin graft over the flap donor site (B). Volar view of the forearm and hand demonstrating intact skin grafts and healing along the radial forearm flap harvest and inset site (C).

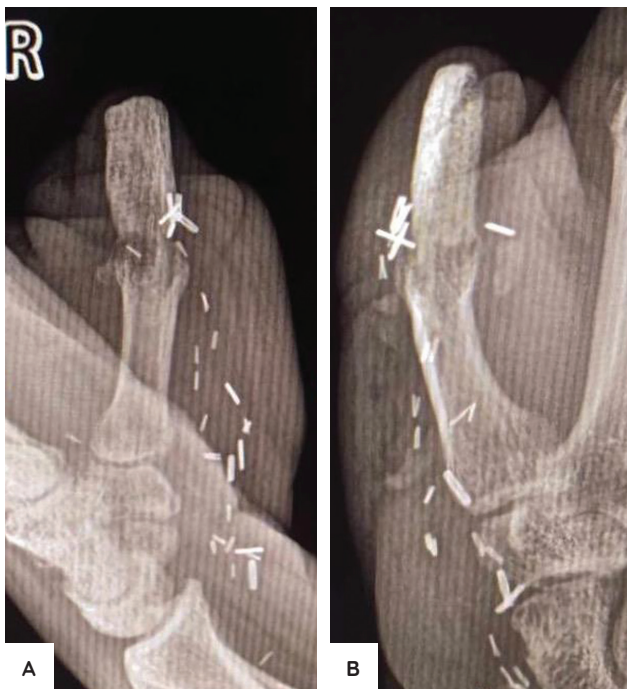


Figure 10. Radiographic evaluation at 2 months postoperatively. Lateral view (A) and anteroposterior (AP) view (B) of the right thumb demonstrate stable fixation and radiographic evidence of graft incorporation without signs of loosening, fracture, or infection.

CONCLUSION

This case demonstrates the successful reconstruction of a traumatically amputated thumb at the proximal phalanx level using a Gillies' lengthening procedure with iliac bone graft and a reverse radial forearm flap with nerve coaptation. This dual approach effectively achieved both adequate length and sensate soft tissue coverage, leading to improved hand function as evidenced by the postoperative Fil-Dash and Sollerman scores at six weeks. While acknowledging the limitations associated with the reverse radial forearm flap, such as the potential for prolonged reinnervation and donor site morbidity, the early functional outcomes in this case highlight the value of this combined technique in addressing complex thumb reconstruction challenges where both skeletal length and sensibility are critical for functional recovery. Further long-term follow-up will be essential to fully evaluate the sustained functional benefits and sensory recovery in this patient.

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Figure 11. Clinical follow-up at 4 months postoperatively. Volar view showing well-healed radial forearm flap donor site and integration of the flap into the reconstructed thumb (A). Radial view of the hand demonstrating soft tissue bulk and flap contour over the neothumb (B). Dorsal view highlighting stable skin graft incorporation without signs of infection, breakdown, or contracture (C).

ETHICAL CONSIDERATION

Patient consent form was obtained before manuscript submission.

STATEMENT OF AUTHORSHIP

All authors certified fulfillment of ICMJE authorship criteria.

CREDIT AUTHOR STATEMENT

CC: Conceptualization, Methodology, Software, Validation, Investigation, Resources, Data Curation, Writing – original draft preparation, Writing – review and editing, Visualization, Supervision, Project administration, Funding acquisition; **GG:** Conceptualization, Writing – review and editing, Supervision, Funding acquisition; **RS:** Conceptualization, Writing – review and editing, Supervision, Funding acquisition

AUTHOR DISCLOSURE

The authors declared no conflict of interest.

DATA AVAILABILITY STATEMENT

No datasets were generated or analyzed for this research.

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REFERENCES

1. Reid DAC. The Gillies' thumb lengthening operation. *Hand.* 1980;12(2):123-9. PMID: 6997143 DOI: 10.1016/s0072-968x(80)80002-7
2. Yajima H, Tamai S, Yamauchi T, Mizumoto S. Osteocutaneous radial forearm flap for hand reconstruction. *J Hand Surg Am.* 1999;24(3):594-603. PMID: 10357541 DOI: 10.1053/jhsu.1999.0594
3. Moazin OM, Bhat TA, Suraya F, et al. Spiral wrap-around technique in the reverse radial artery fasciocutaneous forearm flap for thumb reconstruction: a report of an innovative technique. *Cureus.* 2023;15(5):e50999. PMID: 38259402 PMCID: PMC10802925 DOI: 10.7759/cureus.50999
4. Budi DPS, Sadabaskara M, Budhy F, Sinaga BD. Iliac crest bone graft with radial forearm flap for thumb reconstruction: a case report. *Trauma Case Rep.* 2024;54:101106. PMID: 39318766 PMCID: PMC11417553 DOI: 10.1016/j.tcr.2024.101106

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