

Local Flap Reconstruction for Distal Thumb Amputations: A Case Series

Basanta Maharjan¹, Dipendra Maharjan², Shefali Shrestha³, Ritesh Pokharel⁴

¹ Department of Orthopedics, KIST Medical College and Teaching Hospital, Imadole, Lalitpur, Nepal

² Department of Orthopedics, Nepal Army Institute of Health Sciences, Kathmandu, Nepal

³ National Open College, Lalitpur, Nepal

⁴ Department of Orthopedics, Maya Metro Hospital, Kailali, Dhangadhi, Nepal

Corresponding Author:

Dr. Basanta Maharjan

Department of Orthopedics
KIST Medical College and Teaching
Hospital, Imadole, Lalitpur, Nepal.
Email: basantm44@gmail.com

Article History:

Received date: May 15, 2026

Revised date: June 13, 2026

Accepted date: June 29, 2026

Published date: August 1, 2026

Online Access



DOI: 10.64772/mjapfn.2.2.72

Abstract

Distal thumb amputations result in substantial functional impairment because of the thumb's critical role in grip, pinch and fine motor activities. Local flap reconstruction remains an important option when microsurgical replantation is not feasible. Twelve patients with traumatic distal thumb amputations underwent reconstruction using First Dorsal Metacarpal Artery flaps 5 (41.70%), Moberg flaps 3 (25%), V-Y advancement flaps 3 (25%) and a cross-finger flap 1 (8.30%). The mean age was 29.75 years (range: 16–48 years), and 10 (83.30%) patients were male. All flaps survived completely. Complications occurred in 2 (16.70%) patients and resolved with conservative management. Full range of motion was achieved in 9 (75%) patients, while 3 (25%) had mild restriction. All patients returned to their pre-injury occupations, with a mean return-to-work time of 8.5 weeks. Local flap reconstruction provides reliable soft-tissue coverage, satisfactory functional recovery and low complication rates in distal thumb amputations.

Keywords: limb salvage; plastic surgery procedure; surgical flaps; thumb; traumatic amputation.

Introduction

Distal thumb amputations involve traumatic loss of the thumb tip, often affecting the pulp and nail complex. These injuries commonly result from crush, laceration, avulsion or machinery-related trauma and can cause substantially impair pinch strength, fine motor function, and activities of daily living because of the thumb's critical role in hand function.^{1,2}

Although replantation remains the preferred treatment when feasible, it may not be possible in cases of severe crush injuries, avulsion injuries, prolonged ischemia, limited microsurgical resources, or patient-related factors.³ In such situations, reconstruction aims to provide durable soft-

tissue coverage while preserving thumb length and function. Several local flap techniques, including the Moberg advancement flap, V-Y advancement flap, First Dorsal Metacarpal Artery (FDMA) flap, and cross-finger flap, have been described for distal thumb reconstruction.⁴

The aim of this case series was to describe the clinical characteristics, reconstructive techniques, complications, and early outcomes of patients with distal thumb amputation managed with local flap reconstruction at a tertiary care centre in Nepal.

Case Series

We present a retrospective case series of 12 patients

How to cite (Vancouver Style)

Maharjan B, Maharjan D, Shrestha S, Pokharel R. Local Flap Reconstruction for Distal Thumb Amputations: A Case Series. Med J APF Nepal. 2026;2(2):81-87.

© The Author(s) 2026 This work is licensed under a Creative Commons Attribution 4.0 International License. (CC BY-NC)



with traumatic distal thumb amputations managed using local flap reconstruction at a tertiary care hospital in Nepal between January 2025 and July 2025. All patients treated during the study period were included. Representative cases were selected to illustrate the spectrum of reconstructive techniques employed. Written informed consent for publication of clinical details and photographs was obtained from all patients.

The mean age was 29.75 years (range: 16-48 years), and 10 (83.30%) patients were male. The dominant hand was involved in 8 (66.70%) patients. Injury mechanisms included workplace injuries in 5 (41.70%) patients, road traffic accidents in 4 (33.30%), and other causes in 3 (25%). According to Allen’s classification, injuries comprised Type I in 2 patients, Type II in 4 patients, Type III in 5 patients, and Type IV in 1 patient.

Reconstruction was performed using FDMA flaps in 5 (41.70%) patients, Moberg flaps in 3 (25%), V-Y advancement flaps in 3 (25%), and a cross-finger flap in 1 (8.30%). Flap selection was based on defect size, location, and reconstructive requirements. Donor-

site skin grafting was required in 6 (50%) patients. Nail reconstruction was performed in 6 (50%) patients, using either native nail plate repositioning in 3 patients or an artificial nail plate splint in 3 patients. Representative clinical photographs of patients treated with a Moberg flap, V-Y advancement flap, FDMA flap, and cross finger flap are shown in figure 1, figure 2, figure 3 and figure 4 respectively.

All flaps survived completely. Among them, 1 (8.30%) patient developed transient venous congestion that resolved with conservative management, and 1 (8.30%) patient experienced partial donor-site skin graft necrosis that healed with dressings. No complete flap loss, infection, revision surgery, hypersensitivity or clinically significant cold intolerance were observed.

At final follow-up, full range of motion was present in 9 (75%) patients, while mild restriction was observed in 3 (25%). All patients resumed independent daily activities and returned to their preinjury occupations. Mean return-to-work duration was 8.5 weeks (range: 6-12 weeks), and mean follow-up duration was 6.9 months (range: 4-10 months).

Table 1: Clinical characteristics of patients with distal thumb amputations managed with local flap reconstruction (n= 12).

SN	Age/Sex	Dominant hand	Mechanism of injury	Allen classification [€]	Defect size (cm)	Flap used	Nail plate	Donor-site defect resurfacing
1.	24/M	Yes	Workplace Injury	Type II	1.00 cm × 1.00 cm	Moberg	Artificial	N/A
2.	34/F	No	RTA	Type III	1.50 cm × 1.00 cm	Moberg	Native	N/A
3.	16/M	Yes	Trap door injury	Type II	1.00 cm × 0.80 cm	Moberg	Artificial	N/A
4.	21/M	Yes	Workplace Injury	Type I	0.80 cm× 0.80 cm	V-Y	Artificial	N/A
5.	27/M	No	RTA	Type II	0.80 cm× 0.60 cm	V-Y	Native	N/A
6.	30/F	Yes	Kitchen grinder machine	Type II	1.00 cm × 0.50 cm	V-Y	Native	N/A
7.	40/M	Yes	Workplace Injury	Type III	1.00 cm× 2.00 cm	FDMA	-	FTSG
8.	28/M	Yes	RTA	Type IV	1.50 cm× 1.50 cm	FDMA	-	FTSG
9.	35/M	No	Sharp Object	Type III	1.00 cm× 2.00 cm	FDMA	-	FTSG
10.	31/M	Yes	Workplace Injury	Type III	1.00 cm × 1.50 cm	FDMA	-	FTSG
11.	48/M	No	RTA	Type I	Volar pulp defect 2.00 cm × 2.00 cm	Cross finger	-	FTSG
12.	23/M	Yes	Workplace Injury	Type III	2.00 cm × 1.50 cm	FDMA	-	FTSG

Abbreviations: RTA:Road Traffic Accident; FDMA:First Dorsal Metacarpal Artery flap; FTSG: Full Thickness Skin Graft; IPJ: Interphalangeal Joint; MCPJ: Metacarpophalangeal joint, N/A: Not Applicable, M: Male, F: Female

[€]Allen Classification of Fingertip Amputations: Type I: Amputation distal to the lunula (nail bed intact,

volar pulp only); Type II: Amputation at the level of the lunula (involves nail bed); Type III: Amputation proximal to the lunula but distal to the distal interphalangeal joint (loss of all nail and distal phalanx tip); Type IV: Amputation at or proximal to the distal interphalangeal joint

Table 2: Outcomes of patients with distal thumb amputations managed with local flap reconstruction (n= 12).

SN	Age (years)	Range of motion	Return to work	Complications	Follow-up duration
1.	24/M	Full	7 weeks	-	5 months
2.	34/F	Mild restriction at IPJ	9 weeks	-	6 months
3.	16/M	Full	8 weeks	-	6 months
4.	21/M	Full	7 weeks	-	5 months
5.	27/M	Full	6 weeks	-	4 months
6.	30/F	Full	6 weeks	-	4 months
7.	40/M	Full	10 weeks	Venous congestion postoperative day 2 (resolved with conservative management by postoperative day 5)	10 months
8.	28/M	Full	9 weeks	-	8 months
9.	35/M	Full	8 weeks	-	8 months
10.	31/M	Full	8 weeks	-	8 months
11.	48/M	Mild restriction at MCPJ	12 weeks	-	9 months
12.	23/M	Mild restriction at IPJ	12 weeks	Partial FTSG donor site necrosis noted at 2-week follow-up (healed by 6 weeks)	10 months

Abbreviations: FTSG:Full Thickness Skin Graft, IPJ:Interphalangeal Joint, MCPJ:Metacarpophalangeal joint, M:Male, F:Female



Figure 1: Thumb-tip amputation in a 34-year-old female following a road traffic accident, demonstrating an Allen Type III injury with a 1.50 cm × 1.00 cm defect. (a-d) Preoperative clinical photographs showing the extent of pulp and soft-tissue loss. (e) Intraoperative elevation of a Moberg flap with meticulous dissection and preservation of both neurovascular bundles. (f-h) Advancement and inset of the flap. (i-j) Immediate postoperative views demonstrating satisfactory flap perfusion and adequate defect coverage. (k-l) Follow-up at 9 weeks showing complete flap survival, stable soft-tissue coverage, and an acceptable cosmetic appearance.

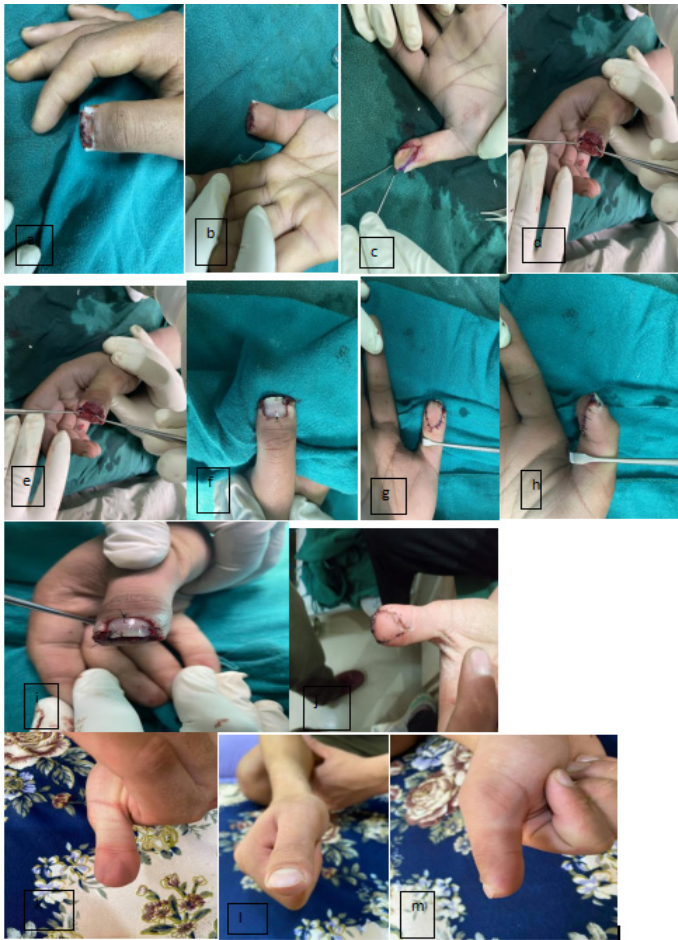


Figure 2: Transverse thumb-tip amputation in a 27-year-old male demonstrating an Allen Type II injury with a 0.80 cm × 0.60 cm defect. (a-b) Preoperative clinical photographs showing the extent of pulp loss. (c-d) Intraoperative markings and design of the V-Y advancement flap on the volar aspect of the thumb. (e-f) Sequential elevation and mobilization of the flap. (g-h) Advancement and inset of the flap over the defect, with primary closure of the donor site in a Y configuration. (i-j) Immediate postoperative views demonstrating satisfactory flap inset, tension-free closure, and adequate flap perfusion. (k-m) Follow-up at 6 weeks showing complete flap survival, stable soft-tissue coverage, and an acceptable cosmetic appearance.



Figure 3: Dorso-oblique thumb-tip defect following a sharp object injury in a patient with an Allen Type III injury and a 1.00 cm × 2.00 cm soft-tissue defect involving the dorsal and oblique aspects of the thumb tip. (a-c) Preoperative clinical photographs demonstrating the extent of soft-tissue loss. (d-f) Intraoperative markings and elevation of a First Dorsal Metacarpal Artery flap from the dorsum of the index finger, with the flap designed over the vascular pedicle. (g-i) Harvest and transposition of the flap to the dorso-oblique thumb defect, with coverage of the donor site using a full-thickness skin graft harvested from the medial forearm. (j-l) Follow-up at 8 weeks demonstrating complete flap survival, stable soft-tissue coverage, satisfactory flap integration, and functional recovery.



Figure 4: Volar pulp defect of the thumb following a road traffic accident, demonstrating an Allen Type I injury with a 2.00 cm × 2.00 cm soft-tissue defect. (a-c) Preoperative clinical photographs showing the extent of pulp loss. (d-f) Intraoperative views demonstrating elevation and harvest of a cross-finger flap from the dorsum of the adjacent index finger. (g-h) Inset of the flap onto the thumb pulp defect, with coverage of the donor defect on the index finger using a full-thickness skin graft harvested from the medial forearm. (i) Division of the flap at 3 weeks. (j-l) Follow-up at 12 weeks demonstrating complete flap survival, stable soft-tissue coverage, and satisfactory wound healing.

Discussion

Distal thumb reconstruction aims to restore durable soft-tissue coverage while maintaining function and minimising donor-site morbidity. In the present series, all flaps survived completely, only two minor complications were observed, and all patients returned to their pre-injury occupations. These findings demonstrate that local flap reconstruction remains a practical and reliable option for distal thumb defects, particularly in settings where microsurgical reconstruction may not be readily available.

The Moberg advancement flap was used in three patients with small volar thumb defects. Because the flap advances sensate glabrous skin based on the intact neurovascular bundles, it remains one of the most widely accepted techniques for distal volar thumb reconstruction. Baumeister et al. reported favourable functional outcomes and preservation of thumb mobility following Moberg flap reconstruction.⁵ Elsewify et al., in a systematic review of 169 patients, found high flap viability rates with favourable aesthetic outcomes and a low incidence of postoperative complications.⁶ Similarly, all Moberg flaps in our series survived completely without complications, supporting its continued role as a dependable option for appropriately selected volar thumb defects.

Three patients underwent reconstruction with a V-Y advancement flap. This technique remains attractive because it preserves thumb length, uses local tissue, and avoids donor-site morbidity. In their review, Chakraborty et al. highlighted favourable sensory, functional, and aesthetic outcomes following V-Y advancement flap reconstruction in Allen type II-IV fingertip injuries.⁷ Thoma and Vartija also emphasised the safety and reliability of the V-Y flap when appropriate advancement principles are followed.⁸ The technical simplicity of the procedure and minimal resource requirements make it particularly valuable in resource-limited settings. The outcome reported by De Francesco et al. further supports the effectiveness of V-Y advancement techniques for thumb-tip reconstruction.⁹

The FDMA flap was the most frequently used reconstructive option in our series, accounting for five cases. Originally described by Foucher and Braun, this flap expanded reconstructive options for larger thumb defects by providing reliable vascularised tissue from the dorsum of the index finger.¹⁰ Couceiro et al., in their review of the FDMA flap family, reported consistently high survival rates and satisfactory functional outcomes.¹¹ Similarly, Kola demonstrated successful thumb reconstruction using Foucher's flap with acceptable complication rates.¹² Our outcomes compare favourably with published reports and further support the versatility of the FDMA flap for larger distal thumb defects.

A cross-finger flap was used in one patient with a larger volar defect. Chitta et al. highlighted the usefulness of cross-finger flaps when local thumb tissue is inadequate.¹³ Earlier studies by Kleinert et al. and Woon et al. reported reliable flap survival and satisfactory long-term outcomes following cross-finger reconstruction of thumb pulp defects.^{14,15}

The low complication rate and favourable functional outcomes observed in this series support the use of local flap techniques for distal thumb reconstruction.

The limitations of this case series include its retrospective design, small sample size, and single-centre experience. Additionally, standardized objective assessments of sensory and functional outcomes were not performed. Further studies with larger sample sizes and standardized sensory and functional assessments are recommended to validate these findings.

Conclusions

Local flap reconstruction appears to be a practical and reliable option for distal thumb amputations in resource-limited settings when replantation is not feasible. It provides durable soft-tissue coverage with satisfactory functional recovery and a low rate of complications. Further studies with larger sample sizes and longer follow-up are required to confirm these findings.

Source of Funding: None

Acknowledgement: None

Conflict of Interest: None

Author's Contributions and ORCID iDs

Dr. Basanta Maharjan: Conceptualization, Literature review, Data collection and analysis Manuscript writing

 : <https://orcid.org/0009-0007-9973-8505>

Dr. Dipendra Maharjan: Literature review, Manuscript writing

 : <https://orcid.org/0000-0002-7433-0286>

Dr. Shefali Shrestha: Data analysis, manuscript review

 : <https://orcid.org/0009-0001-7439-2911>

Dr. Ritesh Pokharel: Manuscript Editing

 : <https://orcid.org/0009-0006-6861-1360>

References

- Ahangar P, Akbaribazm M, Rahimi M, Pirmohamadi H. A Case Series Study in New Restorative Surgery in Thumb Amputation: The Adiposofaciocutaneous Flap Technique for Distal Thumb Amputation Replantation. *Trauma Case Rep.* 2024; 52:101052. DOI: [10.1016/j.tcr.2024.101052](https://doi.org/10.1016/j.tcr.2024.101052)
- Liu Y, Miller EA, Wee CE, Prsic A, Eble DJ, Kao DS. Osteoplastic Thumb Reconstruction in the Immediate Setting: A Case Series. *Plast Reconstr Surg Glob Open.* 2022;10(6): e4385. DOI: [10.1097/GOX.0000000000004385](https://doi.org/10.1097/GOX.0000000000004385)
- Chung MMT, Chow EYY, Ip WY. Coverage of Fingertip Traumatic Amputation in Lesser Digits with Modified Volar Advancement Flap. *J Am Acad Orthop Surg Glob Res Rev.* 2025;9(12): e25.00202. DOI: [10.5435/JAAOSGlobal-D-25-00202](https://doi.org/10.5435/JAAOSGlobal-D-25-00202)
- Silva JB, Busnello CV, Gros A, Becker AS, Leal BLM. Analysis of Thumb Pulp Reconstruction Based on Different Local Flaps: A Systematic Review. *J Hand Microsurg.* 2024;16(4):100126. DOI: [10.1016/j.jham.2024.100126](https://doi.org/10.1016/j.jham.2024.100126)
- Baumeister S, Menke H, Wittemann M, Germann G. Functional Outcome After the Moberg Advancement Flap in the Thumb. *J Hand Surg Am.* 2002;27(1):105-114. DOI: [10.1053/jhsu.2002.30921](https://doi.org/10.1053/jhsu.2002.30921)
- Elsewify O, Barone N, Elhawary H, Das De S, Efanov JI. Outcomes Associated with Moberg and Modified Moberg Flaps in Thumb Reconstruction: A Systematic Review. *J Hand Surg Asian Pac Vol.* 2023;28(2):252-265. DOI: [10.1142/s2424835523500297](https://doi.org/10.1142/s2424835523500297)
- Chakraborty SS, Kala PC, Sahu RK, Dixit PK, Katrolia D, Kotu S. Fingertip Amputation Reconstruction with VY Advancement Flap: Literature Review and Comparative Analysis of Atasoy and Kutler Flaps. *World J Plast Surg.* 2021;10(3):8-17. DOI: [10.52547/wjps.10.3.8](https://doi.org/10.52547/wjps.10.3.8)
- Thoma A, Vartija LK. Making the V-Y Advancement Flap Safer in Fingertip Amputations. *Can J Plast Surg.* 2010;18(4):e47-e49. PMID: 22131847
- De Francesco F, Marchesini A, Mani O, Zingaretti N, Parodi PC, Riccio M. Thumb Tip Reconstruction for Apical Substance Loss Using a Bipedunculated Homodigital V-Y Advancement Flap: Our Experience. *J Hand Microsurg.* 2025;17(5):100319. DOI: [10.1016/j.jham.2025.100319](https://doi.org/10.1016/j.jham.2025.100319)
- Foucher G, Braun JB. A New Island Flap Transfer from the Dorsum of the Index to the Thumb. *Plast Reconstr Surg.* 1979;63(3):344-349. DOI: [10.1097/00006534-197903000-00008](https://doi.org/10.1097/00006534-197903000-00008)
- Couceiro J, de Prado M, Menendez G, Manteiga Z. The First Dorsal Metacarpal Artery Flap Family: A Review. *Surg J (N Y).* 2018;4(4):e215-e219. DOI: [10.1055/s-0038-1675369](https://doi.org/10.1055/s-0038-1675369)
- Kola N. Thumb Reconstruction Using Foucher's Flap. *Open Access Maced J Med Sci.* 2016;4(1):70-73. DOI: [10.3889/oamjms.2016.017](https://doi.org/10.3889/oamjms.2016.017)
- Chitta M, Malathi L, Joseph A. Cross-Finger Flap to the Thumb: Quest for an Alternate Donor. *Indian J Plast Surg.* 2020;53(2):287-292. DOI: [10.1055/s-0040-1714181](https://doi.org/10.1055/s-0040-1714181)

14. Kleinert HE, McAlister CG, MacDonald CJ, Kutz JE. A Critical Evaluation of Cross-Finger Flaps. J Trauma. 1974;14(9):756-763. DOI: [10.1097/00005373-197409000-00003](https://doi.org/10.1097/00005373-197409000-00003)
15. Woon CYL, Lee JY, Teoh LC. Resurfacing Hemipulp Losses of the Thumb: The Cross-Finger Flap Revisited: Indications, Technical Refinements, Outcomes, and Long-Term Neurosensory Recovery. Ann Plast Surg. 2008;61(4):385-390. DOI: [10.1097/SAP.0b013e3181640873](https://doi.org/10.1097/SAP.0b013e3181640873)

Bios

Dr. Basanta Maharjan is a Consultant Orthopedic, Hand and Reconstructive micro-surgeon, working at KIST Medical College and Teaching Hospital. He has attained fellowship in hand and reconstructive microsurgery from Singapore & Japan. He is passionate about sarcoma surgery, limb salvage and complex reconstruction, dedicated to preserving limbs, restoring function and lives.

Email: basantm44@gmail.com

Dr. Dipendra Maharjan is working as Associate Professor in Department of Orthopedics at Nepal Army Institute of Health Sciences. He has completed fellowship in Musculoskeletal Onco-surgery from Gujarat, India.

Email: ptosis@gmail.com

Dr. Shefali Shrestha has completed her MBBS from Kathmandu Medical College and Teaching Hospital and later obtained an MBA from The British College. She is currently pursuing MHCM from National Open College. Her professional aspiration is to develop a career in hospital management and healthcare leadership.

Email: shrestha.shefali.ss@gmail.com

Dr. Ritesh Pokharel is a Consultant Orthopedic Surgeon at Maya Metro Hospital, Dhangadhi with a special interest in hand surgery and microsurgery. He is committed to serving underserved populations in rural Nepal and is passionate about delivering accessible, high-quality healthcare to needy patients.

Email: riteshpokharel@ymail.com