

Surgical Management of Thumb Amputation Using Littler Island Flap: Technique and Results

Turcu E.G.^{1,2}

¹Senior Lecturer “Carol Davila” University of Medicine and Pharmacy, Bucharest, Romania

²MD PhD, plastic surgeon, Department of Plastic Surgery, “Bagdasar Arseni” Clinical Emergency Hospital, 12 Berceni Road, 041915, Bucharest, Romania, ORCID 0009-0002-4698-807X

ABSTRACT

Distal phalanx amputations of the thumb impair hand function and aesthetics. Littler innervated island flaps provide sensate coverage with minimal donor-site morbidity.

We present a case of a 45-year-old male sustained traumatic amputation of the right thumb distal phalanx (F1) at the level of the interphalangeal joint of the thumb. Reconstruction utilized a Littler innervated island flap from the radial aspect of the IV-th finger. Functional outcomes including range of motion, pinch strength, and two-point discrimination were assessed at 6 months postoperatively. Functional reconstruction of the thumb after an amputation at the interphalangeal joint is of great importance because the function of the thumb represents 50% of the function of the hand.

Flap survival was 100%. The patient regained satisfactory thumb opposition, tip sensibility (two-point discrimination 6 mm), and pulp contour. Return to occupational activities occurred without limitations.

Littler island neurovascular flap is reliable for distal thumb amputations, achieving early functional recovery, preserved sensibility, and favorable aesthetics. Functional outcomes usually involve regaining pinch strength and opposition, along with manageable donor-site morbidity and expected postoperative recovery.

KEYWORDS: Littler flap, thumb amputation, hand surgery, reconstructive surgery, neurovascular island flap.

ARTICLE DETAILS

Published On:
10 January 2026

Available on:
<https://ijpbms.com/>

INTRODUCTION

Traumatic distal phalanx amputations of the thumb present both functional and psychological challenges. Sensory restoration and maintenance of pulp contour are essential for grip and pinch function. Reconstructive options include local flaps, free flaps, and replantation.

The Littler flap, a neurovascular flap harvested from an adjacent finger, offers good coverage with preserved sensation and minimal donor-site morbidity. Although initially described for volar finger reconstruction, its application in thumb reconstruction is increasingly reported. This case demonstrates the functional and aesthetic outcomes following reconstruction with Littler neurovascular island flap of a distal thumb amputation at proximal phalanx level.

Individuals with traumatic thumb amputations encounter significant functional and psychological difficulties. The thumb influences grasping, manipulation, and pinching activities, rendering it vital for hand functionality. Consequently, the loss of the thumb can adversely impact an individual's daily activities, work productivity, and overall quality of life. In practical practice, reconstructive methods such as Littler island flap plasty are crucial for achieving aesthetic outcomes and sensory restoration following thumb amputations.

After a traumatic thumb amputation, the loss of function can be very serious. The thumb's opposability allows humans to perform tasks that are both simple and complex, from holding utensils to typing on keyboards. Research shows that not having a thumb makes it much harder to grip things and do

Surgical Management of Thumb Amputation Using Littler Island Flap: Technique and Results

other things that require dexterity (1). Studies also show that patients often have trouble with tasks that require fine motor skills, which can greatly limit their ability to work (1). This functional impairment does not exist in isolation; it is exacerbated by the psychological distress resulting from the loss of a significant hand function after traumatic thumb amputations.

People who have had traumatic thumb amputations may have a wide range of emotional responses. People often feel sad, angry, or anxious when they have to deal with changes to how they see themselves and their physical identity (2). Losing a thumb can make you feel inadequate and frustrated, especially in situations where manual dexterity is important (2, 3). Sposato et al. (3) emphasize that psychosocial reactions can profoundly influence mental health and overall well-being, rendering psychological support a crucial element of post-amputation care. Psychosocial support and rehabilitation are essential for recovery and adapting to new situations (3).

Littler neurovascular island flap is an important reconstructive technique for restoring thumb functionality and aesthetics. An innervated island flap from adjacent digits is transposed to restore sensory perception and structural integrity of the thumb. The efficacy of this approach is underscored by the underlying anatomy; the flap aids in the physical rehabilitation of the thumb and addresses the sensory deficits commonly associated with amputation. Literature indicates that patients undergoing this sort of repair frequently report favorable sensory outcomes, aligning with the goals of enhancing both functioning and aesthetics.

Effective sensory restoration is crucial in thumb repair. Peraut et al. (4) reported instances in which secondary restoration of fingertip sensibility by Littler's heterodigital neurovascular island flap enhanced outcomes subsequent to traumatic injury. The psychological consequences of restoring sensory feedback are profound: enhanced feeling can markedly improve an individual's quality of life and sense of normalcy, alleviating the psychological effects of the initial injury (4). People generally connect how they look with how well they work, and reconstructive surgery that looks well can boost confidence and lessen feelings of shame about amputation (2).

Alterations in body image can lead individuals to retreat from social interactions and adjust their behavior. An aesthetically pleasing repair mitigates humiliation and promotes social reintegration, which is crucial for mental health recovery following an amputation (5). When executed properly, reconstructive procedures such as Littler island flap can enhance the appearance of the region, which is a crucial aspect of the recuperation process.

The timing of the surgery is crucial for the rehabilitation process following a traumatic thumb amputation. Initial

rebuilding efforts can mitigate the adverse effects of phantom limb sensations and other psychological issues arising from acute post-traumatic stress. Graham et al. (5) demonstrate that prompt surgical intervention following trauma not only expedites healing but also enhances psychological well-being by alleviating the long-term consequences of the trauma.

CASE REPORT

The article presents a case of a 45-year-old male patient who was admitted to the emergency room approximately 3 hours after suffering a crushing injury (work accident) resulting in an amputation of the right thumb at the level of interphalangeal joint. The amputated segment of the thumb was not brought to the hospital for possible replantation. In this situation, the only reconstructive option was to preserve the length of the remaining thumb and reconstruct the soft tissue defect secondary to the amputation. Clinical examination of the wound revealed a crushed wound that exposed the distal epiphysis of the 1st phalanx of the right thumb.

The X-ray exam of the right thumb confirmed complete amputation of the 2nd phalanx at the interphalangeal joint without revealing fractures of the proximal phalanx or remaining foreign bodies. Taking into account the functional importance of the thumb and the need to cover the head of the 1st phalanx with adequate innervated tissue, we opted for Littler insular neurovascular flap plasty. The insular skin flap was projected along the neurovascular pedicle on the radial border of the phalanges II and III of the fourth finger. We used regional anesthesia.

The dissection was meticulously performed including the radial neurovascular pedicle of the fourth digit in the flap. The pedicle was mobilized proximally to ensure sufficient length for transposition, paying attention to its integrity and preventing torsion.

Before transposing the flap, the head of the 1st phalanx was remodeled and the articular cartilage was removed to allow coverage with the Littler flap. A subcutaneous tunnel large enough to allow tunneling and transposition of the neurovascular insular flap to the thumb defect was then created.

The flap was transposed ensuring that there was no tension or compression of the neurovascular pedicle at the subcutaneous tunnel level.

The donor site on the fourth finger was closed primarily using a full-thickness skin graft.

The postoperative evolution was favorable. The flap demonstrated good viability, stable vascularization, and progressive sensory recovery. The patient regained functional use of the thumb, with satisfactory aesthetic and tactile outcomes at subsequent follow-up evaluations.

Surgical Management of Thumb Amputation Using Littler Island Flap: Technique and Results

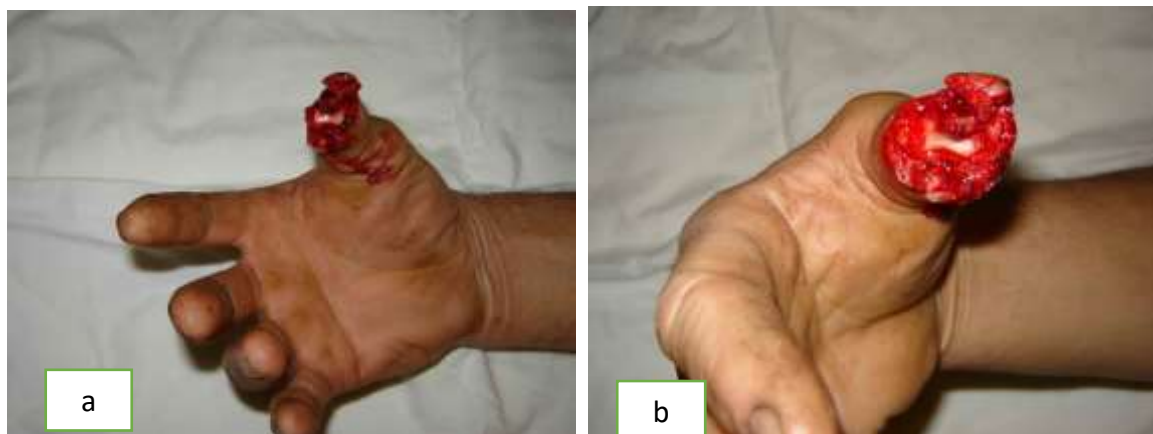


Fig.1 (a,b) Preoperative view



Fig.2 Preoperative markings

Fig.3 Preoperative X-ray exam



Fig.4 Littler neurovascular island flap

Fig.5 Preoperative aspect at 2 weeks

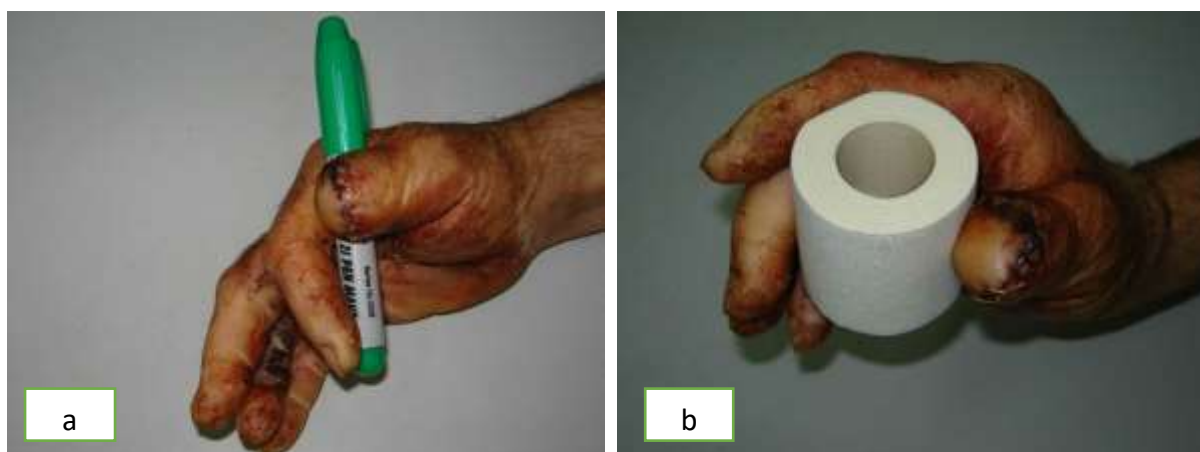


Fig.6 (a,b) Postoperative aspect at 3 weeks

RESULTS

The postoperative evolution was favorable and no complications or unforeseen situations were identified that would require reinterventions or other treatments.

Progressive sensory recovery was observed during follow-up, with static two-point discrimination reaching 6 mm at 6 months postoperatively, indicating satisfactory discriminatory sensibility. Functional evaluation showed full restoration of thumb opposition, allowing effective tip pinch and grip required for daily and occupational activities. The reconstructed pulp showed a stable and defined shape, closely resembling the native thumb, while the healing at the donor site was simple and associated with minimal morbidity. Six weeks after surgery, the patient was able to go back to work without any challenges.

DISCUSSIONS

For people who have had their thumbs amputated in an accident, it is a big loss both functionally and mentally. The thumb is very important for how the hand works. It helps with grip strength, fine motor skills, and a wide range of daily tasks, from personal care to work responsibilities. So, losing this finger can have a big effect on both physical and mental health. The Littler island flap reconstruction technique has become an important way to help with some of these problems by restoring dexterity and improving the quality of life for those who are affected.

There are many different kinds of functional problems that can happen after a thumb amputation. The thumb is very important for opposition. Bourke (6) says that losing a thumb can make it hard to do simple things, which means that people have to find new ways to do everyday tasks. People who have had an amputation may have weaker grips, less dexterity, and trouble with fine motor skills, which can make everyday life more difficult. It becomes hard to move tasks that require precise movements, and this often means relying on assistive devices or the non-injured fingers.

The psychological effects of a traumatic thumb amputation can be equally disastrous. The loss causes not only physical problems but also sadness because of the loss of function, identity, and independence. People who have changed abilities may feel inadequate, anxious, or depressed. Studies show that people who have had limbs amputated often have trouble with their body image and the way society views people with disabilities (7). The psychological distress resulting from these issues requires comprehensive rehabilitation programs that encompass both physical and emotional recovery.

The Littler neurovascular flap focuses on restoring functionality while keeping the body's natural beauty, which is important for both form and function. The island flap is made to get as much blood to the reconstructed thumb as possible, which helps it stay alive and lowers the chance of problems. This makes it possible to restore both sensory and

motor functions, which makes it easier to get back to a more normal life (8).

Surgeons can make a digit more stable and functional by moving healthy, working tissue from one digit to another. This is especially helpful for ring avulsion injuries, which cause a lot of tissue and function loss. Peraut et al. (2015) showed that Littler's flap worked well in two cases where fingertip sensation was restored, showing that the procedure can not only rebuild the finger's anatomy but also make it work better (9).

The Littler flap helps with digit rehabilitation in more ways than just function; it also helps with sensation recovery. Patients who lose their sense of touch after a traumatic injury may have a lot of trouble using their hands and living their lives. Zhao et al. (2016) looked at 151 cases and stressed how important it is to rebuild sensory function in different digital areas. The neurovascular island flap is especially helpful in this case because it keeps important blood vessels and sensory nerves intact, which helps with both short-term and long-term sensory recovery (10).

Moreover, improving skin coverage is a key job of the Littler neurovascular island flap. The flap covers the defect area with enough skin to look good and function well, which is important for both functional and cosmetic results. The study by Sumathi et al. (2024) highlighted this capability, detailing the reconstruction of volar thumb injuries with a heterodigital proximally based neurovascular island flap. Their findings highlighted the importance of obtaining sufficient coverage, which is essential for preventing complications like infection and facilitating improved healing outcomes (11).

The Littler neurovascular island flap procedure is a big step forward in hand surgery. It has many benefits for restoring finger function, improving sensation, and covering the skin defects better. This method is still an important part of treating many types of digital injuries, as more and more evidence shows that it works. It helps patients recover both functionally and aesthetically. As surgical techniques improve, the use and improvement of the Littler neurovascular flap will probably lead to better results in hand surgery.

Another reliable option for thumb reconstruction with very good results is the innervated dorsal metacarpal insular flap. In our practice this flap is a good option for thumb reconstruction with stable coverage and sensory reinnervation (12).

CONCLUSIONS

The Littler neurovascular insular flap is a reliable reconstructive option for thumb reconstruction after traumatic amputations. This flap provides satisfactory tissue coverage and optimal local sensitivity.

Restoring sensitivity to the reconstructed amputation stump using this innervated flap plays an essential role in the functional recovery of the thumb. The Littler flap allows for

Surgical Management of Thumb Amputation Using Littler Island Flap: Technique and Results

satisfactory sensory results, demonstrable by good two-point discrimination values.

The functional results obtained after the Littler neurovascular insular flap plasty allowed the patient to quickly return to daily and professional activities.

The aesthetic results obtained, associated with minimal donor site morbidity, support the use of the Littler flap as a balanced technique between function and cosmetic appearance in thumb reconstruction.

Careful case selection, accuracy of surgical technique, and adequate postoperative rehabilitation are important factors for the success of the reconstruction. The Littler flap, which includes neurovascular components, remains a reliable option in the arsenal of hand reconstructive surgery.

The Littler island flap provides reliable, sensate, and aesthetically favorable coverage for distal thumb amputations (F1). Functional recovery, preserved sensibility, and minimal donor-site morbidity make it a preferred technique in selected patients.

REFERENCES

- I. XarchasABCDEF KC, TilkeridisABE KE, PelekasEF SI, KazakosDF KJ, KakagiaDF DD, VerettasDF DA. Littler's flap revisited: an anatomic study, literature review, and clinical experience in the reconstruction of large thumb-pulp defects. *Med Sci Monit*. 2008;14(11):573. https://www.researchgate.net/profile/Konstantinos-Tilkeridis/publication/23439497_Littler's_flap_revisited_An_anatomic_study_literature_review_and_clinical_experience_in_the_reconstruction_of_large_thumb-pulp_defects/links/0fcfd5041b5a69763e000000/Littler's-flap-revisited-An-anatomic-study-literature-review-and-clinical-experience-in-the-reconstruction-of-large-thumb-pulp-defects.pdf
- II. Sinaga BD, Budi DP, Sadabaskara M. Heterodigital flap as a solution for a thumb defect: a case report. *Journal of Trauma and Injury*. 2024 Nov 18;38(1):56. <https://pmc.ncbi.nlm.nih.gov/articles/PMC11968311/>
- III. Sposato L, Yancosek K, Cancio J. Psychosocial reactions to upper extremity limb salvage: A case series. *Journal of Hand Therapy*. 2019 Jan 1;32(1):48-56. <https://www.sciencedirect.com/science/article/pii/S0894113017300194>
- IV. Peraut E, Mirous MP, Chammas M. Secondary restoration of fingertip sensation with Littler's heterodigital neurovascular island flap after ring avulsion injury: report of two cases. *Chirurgie de la Main*. 2015 Feb 1;34(1):49-54. <https://www.sciencedirect.com/science/article/pii/S1297320314003497>
- V. Graham D, Bhardwaj P, Sabapathy SR. Secondary thumb reconstruction in a mutilated hand. *Hand Clinics*. 2016 Nov 1;32(4):533-47. [https://www.hand.theclinics.com/article/S0749-0712\(16\)30065-8/abstract](https://www.hand.theclinics.com/article/S0749-0712(16)30065-8/abstract)
- VI. Bourke G. Amputations, replantation and thumb reconstruction. *Plastic and reconstructive surgery: Approaches and techniques*. 2015 Apr 21:752-68. <https://onlinelibrary.wiley.com/doi/abs/10.1002/9781118655412.ch54>
- VII. Pet MA, Ko JH, Vedder NB. Reconstruction of the traumatized thumb. *Plastic and reconstructive surgery*. 2014 Dec 1;134(6):1235-45. https://journals.lww.com/plasreconsurg/FullText/2014/12000/Reconstruction_of_the_Traumatized_Thumb.21.aspx
- VIII. Peraut E, Mirous MP, Chammas M. Secondary restoration of fingertip sensation with Littler's heterodigital neurovascular island flap after ring avulsion injury: report of two cases. *Chirurgie de la Main*. 2015 Feb 1;34(1):49-54.
- IX. Zhao G, Wang B, Zhang W, Tang P, Chen C. Sensory reconstruction in different regions of the digits: A review of 151 cases. *Injury*. 2016 Oct 1;47(10):2269-75. <https://www.sciencedirect.com/science/article/pii/S002013831630331X>
- X. Sumathi S, Karthick P, Sushmita V, Yuvaraj V. RECONSTRUCTION OF VOLAR THUMB INJURIES USING HETERODIGITAL PROXIMALLY BASED NEUROVASCULAR ISLAND FLAP. *Int J Acad Med Pharm*. 2024;6(1):1421-5.
- XI. Turcu, E. G. (2025). Functional Reconstruction of the Thumb with an Innervated Dorsal Metacarpal Island Flap (FDMA) Case Report. *International Journal of Medical Sciences and Academic Research*,6(06) p.n.01-06, <https://doi.org/10.5281/zenodo.17959966>