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Case Report

Littler Flap for Distal Thumb Reconstruction: A Case Report and Literature Review

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Abstract: Successful thumb reconstruction necessitates specific conditions. Factors include sense, stability, length, mobility, posture, and pain-free function. Strength, attractiveness, and durability are also significant. Trauma is the primary cause of thumb reconstruction. The Littler flap, comprising neurovascular tissue, is a crucial procedure in thumb reconstruction, primarily employed to restore sensation to the thumb pulp post-repair, taken from the ulnar neurovascular bundle of the middle or ring finger.

Keywords: Thumb, Reconstruction, Hand, Amputation, Finger tip, Hand Trauma.

INTRODUCTION

Hand anatomy provides multiple local pedicle and island flaps to address localized skin problems. A significant issue for patients and a challenge for hand surgery involves the loss a lot of thumb pulp, with or without bone exposure. Deep skin defects frequently impact the ways the skin appear and performs. There are three types of surgical flaps: regional, distant, and local. There are many surgical ways of dealing with serious injuries, but they can be hard and not consistently provide good functional or cosmetic results. There are many good things about using the ipsilateral upper limb as a donor site. The donor and recipient sites are in the same operating field, so a single regional block anesthetic can be used and both sites can be prepared at the same time without blood. Also, the donor site only affects one limb. The Moberg advancement flap and cross-finger flap are two-stage surgical methods that can cause problems like stiff joints, poor recovery of sensation, or bad cosmetic results. The Littler flap is a good way to repair an injured thumb. It not only covers the skin, but it provides as well with sensation and length.

CASE REPORT

A 53-year-old male patient, a farmer with no significant medical history, arrives at our unit one hour after sustaining an accidental injury during agricultural work, resulting in distal amputation of the right thumb. We did a Littler flap repair to cover the area and restore feeling in the distal area.

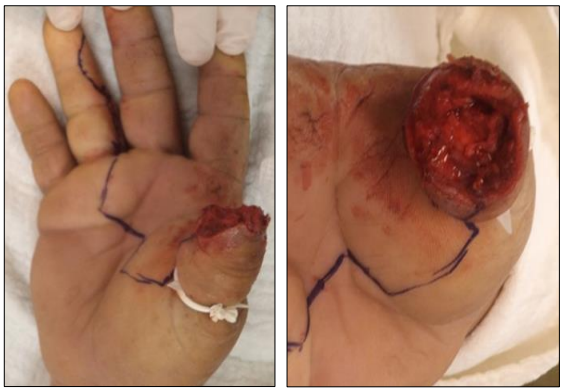

Figure 1: Right hand distal thumb amputation

Thumb Reconstruction

The thumbs of the majority of trauma patients should be replaced. Thumb reconstruction is required when replantation is not an option. The degree of thumb amputation is determined by physical examinations and X-rays, which then determine the reconstruction method.

The patient's needs, both personal and professional, should guide the reconstruction. Given the potential for significant recovery, the patient must agree to reconstruction and rehabilitation. We prioritize thumb length restoration for losses in the middle third.

The best treatment for a thumb that has lost its proximal third is microsurgical reconstruction. Reconstructions involving microsurgery are not always possible. Trauma is the main reason for thumb reconstruction. In the broad spectrum of trauma, thumb injuries can result from various mechanisms, including laceration, avulsion, and compression. Some mechanisms show signs of more than one sort of damage. Injuries from saws and lawn mowers are a good example of this. They use both cutting and crushing processes, which makes the harm area bigger. Infections and tumors are other types of injuries that can cause thumb loss and require reconstruction.

Patients should be made aware of the many techniques available for thumb fracture treatment, allowing them to make an educated choice about the most appropriate solution for their individual and professional situations.

Restoration of length is occasionally required with thumb distal third amputations, as a thumb amputated at the IP joint retains functionality. As a result, the main goals of thumb tip reconstruction are to keep the length and cover the bone with soft tissue. When there is no bone exposed at the tip of the thumb, closure can be done by either secondary intention healing or skin grafting. Research has shown that secondary healing of tip amputations, which have a diameter of up to 1.5 cm and no visible bone, can produce acceptable 2-point discrimination. Therefore, getting coverage this way is really easy. Skin grafts may not be able to feel anything, but secondary healing through wound contraction has the benefit of bringing stable, sensate skin together to seal the gap. The main reason people choose full-thickness grafts is that they last longer and are more stable, especially in the places where pressure and shear are applied. Small full-thickness skin grafts can be taken from the hypothenar eminence or the volar wrist crease. Larger grafts can be taken easily from the groin crease. The main things to consider when choosing a flap are how big the defect is and where the soft tissue loss is, such as at the tip, dorsal, or volar.

Figure 2: Surgical defect, during reconstruction with little flap

Littler Flap

The Littler flap, which includes neurovascular tissue, is an essential technique in thumb reconstruction. This flap is often not employed as a primary covering flap, although applying it in that role is viable. The flap is predominantly utilized for restoring sensation to the thumb pulp following repair. The flap is derived from the ulnar neurovascular bundle of the middle or ring finger. The ulnar aspect of the digit is selected because of its negligible impact on grip and pinch functions. The required measurements of the flap are indicated on the ulnar pulp of the selected donor finger. The flap frequently necessitates the excision of skin from the distal and middle phalanges of the donor finger. The flap is incised, and a midlateral or Bruner incision is executed from the proximal aspect of the flap. The flap is raised from distal to proximal, and the complete ulnar neurovascular bundle is lifted in conjunction with it. It is essential to excise the neurovascular bundle with a substantial sheath of adjacent adipose tissue containing the vasa vasorum of the artery, as this constitutes the sole source of venous drainage for the flap. The skeletonization of the artery leads to venous congestion. The dissection should be performed sufficiently proximally in the palm to facilitate proper transposition to the thumb, and the other branch of the common digital artery (the radial digital artery to the ring or small finger) must be severed. The common digital nerve may experience intrafascicular splitting to facilitate sufficient flap motion. The flap is transferred to the thumb using a subcutaneous tunnel, or a connecting incision may be created from the donor site to the thumb. The flap is subsequently inserted into the volar defect of the thumb. The donor site is augmented with full-thickness skin grafts. Alongside postoperative rehabilitation of movement, patients are required to collaborate with a hand therapist for sensory re-education of the thumb.

DISCUSSION

Thumb reconstruction requires certain conditions to succeed. Sense, stability, length, mobility, posture, and pain-free function are factors. Also important are strength, beauty, and durability. An immobile thumb can be compensated for by the other digits, but an unstable thumb cannot. Individualized treatment plans are essential while evaluating thumb repair candidates. Considerations include the patient's occupation and thumb aesthetics. The length needed for proper function varies by patient. Some individuals need a longer thumb for fine motor or precise handling, while others might do well with a shorter one.

Figure 3: Thumb Reconstruction using a little flap

The surgeon must evaluate the patient's use pattern and functional needs before reconstructing. Finally, wherever possible, thumb replantation or revascularization yields better results than secondary reconstruction. The thumb distal third is called the “compensated amputation zone.” This amount of injury rarely requires length replacement. Naturally, the patient's occupation (fine motor abilities) and thumb aesthetic concern must be considered while planning treatment. The thumb ray's middle third, from the interphalangeal joint to the metacarpophalangeal joint, is separated into distal and proximal halves for rebuilding. Middle-third proximal defects may require more sophisticated reconstruction. The reconstruction of defects in the distal middle third of the thumb necessitates a relative lengthening of the thumb metacarpal and residual proximal phalanx from a conceptual standpoint. Phalangization is the term used to describe this relative elongation. In addition to fingertip loss, the other factor that necessitates consideration is these methods consist of Z-plasties (simple, four-flap, or five-flap), dorsal rotation flaps, remote pedicle flaps, regional flaps, and free flaps. The residual thumb length, the extent of the first webspace contracture, the mobility of the first metacarpal, and the condition of the skin and muscles of the thumb are the four primary factors that determine the most appropriate technique for each individual case.

Neurovascular flaps can resurface distant digital pulp lesions, where feeling is crucial. Although groundbreaking in finger reconstruction, these flaps have significant drawbacks. In the heterodigital reverse-flow neurovascular island flap (midpalmar or dorsolateral from the middle phalanx), the second space's common digital artery is sacrificed, decreasing arterial flow. The Littler neurovascular island is suitable for major finger abnormalities where sensation is crucial, such as thumb pulp injuries, despite its many issues. Neurovascular island flap sensory reconstruction has been imperfect. Most neurovascular island flap issues are digital nerve-related. Many research papers have reported issues such as progressing sensibility loss, "double-sensibility," cold intolerance, hyperesthesia, and other complications specifically associated with the typical island flap. This may be due to poor cortical reorientation after flap translocation.

CONCLUSION

The value of a functioning thumb is immense, and its reconstruction is worthy of considerable effort. Reconstruction of the thumb's distal fingertip may need multiple procedures depending on injuries and bone exposure. Many types of distal fingertip reconstruction exist. The plastic surgeon's challenge is to choose the right flaps from the many options and adapt them to each patient's needs.

Conflicts of Interests

The authors disclose no conflicts of interest. The patient has approved the use and publication of confidential information and images for scientific and non-profit purposes by signing the informed consent form. The submitted paper has received review and approval from all authors.

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