

Management of Thumb Tip Injuries

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Planners

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Learning Objectives

- Discuss the treatment principles of thumb tip injuries.
- Describe the role of the Moberg flap in the management of thumb tip injuries.
- Review the role of the first dorsal metacarpal artery island flap in the management of thumb tip injuries.
- Highlight the role of reverse flow homodigital flaps in the management of thumb tip injuries.
- Assess the literature regarding the treatment outcome of thumb tip injuries.

Deadline: Each examination purchased in 2015 must be completed by January 31, 2016, to be eligible for CME. A certificate will be issued upon completion of the activity. Estimated time to complete each JHS CME activity is up to 1 hour.

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The management of thumb tip injuries has undergone great changes in recent years. The traditional armamentarium of flaps has been expanded and replaced by a wide variety of flaps with more versatility and less donor side morbidity. Parallel to the development of new flaps, the conservative treatment of thumb tip injuries with semi-occlusive dressing has gained ground in the treatment of these injuries. Although tedious and time-consuming, and requiring intensive communication with the patient to explain the look and occasionally fetid smell of the wound, this technique yields excellent results with respect to restoring contour and sensibility in pulp injuries. The article gives an update on the current options for treating thumb tip injuries including the most commonly applied flaps. (*J Hand Surg Am.* 2015;40(3):614–622. Copyright © 2015 by the American Society for Surgery of the Hand. All rights reserved.)

Key words Thumb, tip injuries, treatment concepts.

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FINGERTIP INJURIES ARE THE most frequently encountered injuries in the upper limb, because it is the main autologous tool used by primates and humans. The fingertips are the most important organs of tactile sensibility. Two-point discrimination usually is below 5 mm owing to the density of Vater–Pacini bodies and the branches of the palmar digital nerves responding to tactile stimuli and providing skin sensibility. The anatomic structures of the pulp with its subcutaneous architecture are laid out to withstand substantial pressure and shear force. Rich arterial blood is supplied to the fingertip by terminal branches of the main palmar digital arteries. Venous blood drainage on the palmar side is provided by the superficial palmar veins and oblique communicating veins.

Classification of thumb tip defects is not clearly defined in the literature. Usually defects are defined arbitrarily as small or large.¹ Other definitions use the structures involved such as the pulp, nail, and bone, which also define the location of the injury.^{2,3} Using both criteria definitions most likely gives the best basis for selecting the appropriate reconstructive method.

The selected technique of defect reconstruction depends on many factors such as the nature of the injury; the size, location, and condition of the defect; the patient's age, gender, and general health condition; and the patient's professional profile.

The goals in fingertip amputation reconstruction are to cover the defect with a satisfactory cosmetic appearance, establish maximum tactile gnosis, preserve the length of the thumb, obtain a well-padded pulp tissue, preserve an intact nail bed, and minimize time off work.

Numerous methods for reconstructing fingertips are described in the literature, which correlate to the principle of the reconstructive ladder. These range from healing by secondary intention and skin grafting to simple palmar V–Y plasty and bilateral V–Y plasty,^{4–6} various island flaps, and even free toe pulp transfer for large defects. Skin grafting of the defect is an easy method but usually results in poor sensory function; therefore, it should be considered only if other options are not feasible. Healing by secondary intention (eg, under a semi-occlusive dressing) has been established as a good method for small to medium defects without exposure of bone or tendons. If successful, it results in an excellent contour and consistency of the pulp with satisfactory return of sensory function.

Flaps used for thumb tip reconstruction are classified as homodigital flaps,^{4–15} heterodigital

(cross-finger),^{16,17} distant island flaps (homodigital),^{18–22} and heterodigital,²³ metacarpal perforator,²⁴ and microsurgical free.^{25–32}

Among these numerous options, the reconstructive surgeon's duty is to choose the best method that meets the patient's needs. Because of the specific anatomical characteristics and highly sophisticated function of the fingertips, it has long been believed that palmar defects of the fingertip should be reconstructed using palmar skin that has characteristics similar to those of the fingertip. However, because there is a possibility of postoperative scar contracture at the flap donor site, other flaps have also been commonly used.

THUMB TIP FLAP RECONSTRUCTION

Extensive thumb defects with exposure of tendons, bone, or joints present a challenging reconstructive problem. Immediate coverage of the wound has the highest priority to preserve aesthetic and function. A variety of flaps is routinely used for reconstruction of the thumb.

Moberg flap

In the thumb, the palmar advancement flap first described by Moberg¹³ in 1964 has special importance. The flap is an advancement flap based on proper neurovascular bundles for coverage of palmar defects of the pulp. It is considered a standard flap for reconstruction of medium defects 2 cm or smaller.³³ In 1968, O'Brien³⁴ was the first to describe a modification of this technique by converting this advancement flap into an island flap to cover larger defects. Performing bilateral Z-plasties at the base of the flap as well as dividing the subcutaneous septa avoids flexion contracture of the interphalangeal joint as described by Germann.³⁵ Distal procedures such as V–Y extensions,³⁶ Burrow triangles,³⁷ or full-thickness skin grafts after division of the proximal skin bridge³⁴ have been described to increase flap mobility. In large defects with bone exposure, shortening of the bone may be considered but it may result in reduced strength in pinch grip. The Moberg flap remains the reference standard for covering complex distal thumb pulp defects (Fig. 1).

First dorsal metacarpal artery flap

One of the most frequently employed procedures is the first dorsal metacarpal artery (DMCA) flap, also known as the Kite flap, described by Foucher et al^{38,39} in 1978. This flap is based on the work of Holevich⁴⁰ (1963) and Hilgenfeldt⁴¹ (1950). It is based on the first dorso-metacarpal artery and usually

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