# V-Y flap as a therapeutic option for fingertip reconstruction. A case report

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#### Background

Fingertip injuries are the most frequent hand trauma and constitute the main cause of care in the emergency department of medical units. These injuries can influence a person's daily activities and affect their quality of life if they're not properly treated. It is necessary to have extensive knowledge of the anatomy of this region, as it is essential to implement an appropriate and individualized therapeutic management for each type of wound. Undoubtedly, due to its multiple advantages, the V-Y advancement flap continues to be the most widely used treatment for fingertip injuries. This surgical technique is very successful, it reduces functional and esthetic complications, as well as morbidity in the donor area. Therefore, this flap preserves the sensitivity, length and function of the finger, avoiding remodeling of the stump. In addition, is very efficient in any of the fingers of the hand, providing skin with the same characteristics to those of the pulp. We present the case of a male patient who suffers an amputation of his right third finger, exposing our therapeutic management, as well as the demonstration of its evolution through the days.

**Keywords:** hand trauma; fingertip injury; reconstruction; flap; V-Y advancement flap.

and injuries are events that occur very commonly, they are included in the first places of occupational accidents and are the main reason for consultation in emergency medical services. It is estimated that worldwide 1,080,000 workers suffer at least one injury every year<sup>1</sup> and in our country more than 110,000 cases per year have been reported<sup>2</sup>. On the other hand, fingertip injuries are those that occur between the pulp and the nail bed distal to the insertion of the flexor and extensor tendons of the distal phalanx. It has been reported that these types of lesions are the most frequent, with the first and second fingers being the most affected. Due to their anatomical location, fingertip injuries are a frequent cause of morbidity in our environment, since they lead to a degree of disability that limits the individual to perform daily activities<sup>3</sup>. Several factors influence this type of trauma, such as gender, occupation, age, among others. It is important to establish individualized therapeutic management for each patient. The main objective of the treatment is to restore the function of the fingertip, creating a painless area with a durable and sensitive skin, thus improving the patient's quality of life<sup>4</sup>. In this paper we present the case of a fingertip trauma to expose our management and demonstrate the consistent results of the same.

## Case report

A 60-years-old male, resident of Magdalena, Jalisco, with occupation of butcher and pathological history of type 2 diabetes of 10 years of evolution in treatment with Metformin and Insulin. He started his current condition 7 hours ago while working in a butcher shop and referred to our emergency department with a cutting wound on the digital tip of the third finger of his right hand. Physical examination showed loss of skin integrity at the level of the pulp and nail due to an oblique cut in the right third finger (Figure 1); flexion and extension movements were preserved. Anteroposterior and oblique X-ray of the right hand showed an oblique fracture at the level of the distal phalanx of the same finger (Figure 2). Laboratory studies with normal parameters.

After asepsis and antisepsis, a ring block is performed on the third finger of the right hand with simple Lidocaine. Sterile fields and digital ischemia were placed. Exploration of the lesion area was performed, without evidence of tendon, nerve or vascular lesions. A V-Y advancement flap is marked in a lateralized way to provide oblique coverage. The edges of the flap are incised with a scalpel until the flap is released to proceed with the advancement. Once completed, fixation stitches are made in the

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Figure 1. Fingertip amputation of the right third finger.

different vertexes with 4-0 Nylon. Subsequently, the irregular edges are remodeled with iris scissors and the flap edges are then confronted with simple stitches separated with 4-0 Nylon (Figure 3). Ischemia is removed. Capillary filling is verified, which is immediately present. Finally, the area is cleaned, and the finger is bandaged. The procedure was finished without accidents or incidents.

Three (Figure 4) and seven days (Figure 5) after the event, the patient went to a revision visit where V-Y flap was observed with adequate integrity without changes in color and temperature, with capillary filling present, as well as preserved movements and sensibility. It was decided to perform asepsis of the region and cover the surgical wound.

### Discussion

A detailed understanding of the anatomy of the fingertip is essential to establish optimal initial management in each patient. The fingertip is made up of a combination of bone, being the diaphyseal segment of the distal phalanx, and a soft tissue convexity<sup>5</sup>. The nail unit and pulp form a functional anatomical complex<sup>6</sup>. The pulp consists of fibroadipose tissue that extends from the dermis to the periosteum of the distal phalanx. However, the nail unit is formed by the nail plate, the nail bed and the adjacent skin<sup>7</sup>. The vascularity of this area is provided by the palmar collateral digital arteries that run



Figure 2. Anteroposterior and oblique X-ray of the right hand.



Figure 3. V-Y advancement flap in right third finger.

hrough the lateral digital canal accompanied by the digital collateral nerves<sup>8</sup>. All these structures act together to provide adequate stability, strength, sensitivity and blood supply to this area.

A complete physical examination of the hand includes evaluation of the skin, vascularization, neurological function and tendon motor capacity. Also, X-rays of the hand are necessary to rule out bone involvement and to assess the extent of the injury. After a complete evaluation has been performed, an individualized treatment plan is established. Treatment spontaneous modalities vary from healing, debridement of the injury, bone shortening and wound closure to surgical procedures such as grafting, local flaps and microsurgical reimplantation<sup>9</sup>. Distal tip trauma of less than 1 cm2 without bone or nail bed involvement can be treated conservatively by allowing the wound to heal by secondary intention<sup>10</sup>. Primary closure of the wound is considered when there is no tension between the tissues and the location allows the wound edges to be properly addressed. If the lesion presents involvement of the pulp and nail bed without bone exposure, management depends on the shape of the defect; for transverse wounds, local and regional flaps are recommended, such as the V-Y advancement flap, the thenar flap, the Moberg flap and the crossed finger flap. Although, if the defect is oblique, a free flap is recommended<sup>11</sup>. Nowadays, it has been described that the V-Y advancement flap can be used for both types of defects and is still the treatment of choice for fingertip lesions<sup>12,13</sup>. It is important to



Figure 4. V-Y advancement flap three days after the surgical procedure.



**Figure 5.** V-Y advancement flap seven days after the surgical procedure.

mention that this flap is used as the first line of treatment in amputations caused by guillotine mechanism. For this type of flap, a triangular design is drawn with its base in the distal region and its apex in the proximal region, which should not exceed the fold of the interphalangeal joint. Dissection is performed through the skin and subcutaneous tissue over the flexor tendon sheath, avoiding severing nerves and terminal digital arteries, which allows us to guarantee the viability and sensitivity of the flap<sup>14</sup>. This flap allows an advancement of 0.5 to 1 cm without generating tension, with good functional and aesthetic results.

### Conclusion

The V-Y flap technique is a valuable method for the reconstruction of selected distal fingertip amputations, particularly for cases involving pulp level injuries. It has minimal donor site morbidity and is easy to perform under optimal conditions. Allowing preservation of sensory function in the reconstructed fingertip, it minimizes tension on wound closure, resulting in a more aesthetic appearance and maintaining a vascular connection, promoting good results in terms of healing, improving wound healing and tissue survival. Nevertheless, it is important to keep in mind that the success of the V-Y flap technique depends on several factors, including the size and location of the lesion, and in the skill of the surgeon. In some cases, other reconstructive methods may be more appropriate. A consultation with a hand surgeon is essential to determine the best approach for each specific fingertip injury.

### Conflicts of interests

The authors have no conflicts of interest to declare.

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