

Case Report

Use of V-Y advancement flap in digital tip reconstruction after human bite: case report

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ABSTRACT

Described by Tranquilli-Leali in 1935, the V-Y advancement flap is a technique for reconstructing pulp defects. It involves the displacement of a neurovascular advancement flap. Objective were to demonstrate that the V-Y flap is a good treatment option even in complicated cases. We present the case of a 47-year-old man with diabetes who sustained a traumatic injury to the right thumb due to a human bite during a street fight. A V-Y advancement flap technique was performed for digital tip reconstruction. At 14 days postoperatively, complete flap integration was observed. This technique is ideal for addressing dorsal or transverse oblique amputations where digital tip coverage is required. The efficacy, ease, and good postoperative results make this type of surgical approach suitable for digital tip reconstruction, even in the presence of comorbidities and risk factors for infection.

Keywords: Plastic surgery procedures, Bites, Traumatic amputation

INTRODUCTION

Traumatic digital tip injuries represent a significant number of emergency department visits annually. Between 2010 and 2019, approximately 234,304 visits were recorded in the United States for this reason.¹ The highest incidence rates are observed in two age groups: children under five years old and adults over 65 years old.²

It is estimated that in the United States, 45,000 finger amputations are performed annually due to traumatic causes, with an incidence rate of 7.5 per 100,000 people.²

The fingertip includes the anatomical region between the pulp and the nail bed, extending distally to the insertion of the flexor and extensor tendons in the distal phalanx. It receives its blood supply through terminal branches of the digital arteries.³

The fingertip is crucial for sensory perception in daily activities, as it contains a high concentration of sensory receptors. One of the primary objectives in treating such injuries is the preservation of sensitivity.⁴

Traumatic digital injuries, especially those caused by human bites, present a significant challenge to surgeons due to extensive damage to soft tissue, tendons, and the risk of deep infections.⁵

The surgical management of digital tip injuries must prioritize both functional and aesthetic preservation of the affected segment.⁴ The V-Y advancement flap is a widely used technique for reconstructing digital tip defects due to its simple approach and satisfactory results.⁶ This technique allows for the approximation of well-vascularized tissue without requiring neurovascular dissection, as in a free flap.⁷

CASE REPORT

A 47-year-old man with a 9-year history of type 2 diabetes mellitus suffered a traumatic injury to the right thumb after a human bite during a street altercation. Five hours after the event, he presented to the emergency department, where a digital tip defect with exposed distal phalanx was identified, but no apparent bone loss was observed. X-rays of the affected hand (AP, lateral, and oblique views) confirmed the absence of bone injury. A V-Y advancement flap procedure was performed in the emergency department using the following surgical technique:

Wound cleansing with surgical soap and irrigation with sterile solution under aseptic and antiseptic conditions.

Demarcation of the surgical approach using a marking pen, following the Atasoy triangular flap design.

Infiltration of the palmar digital nerve of the thumb with 2% lidocaine.

Incision with a scalpel, followed by careful dissection while preserving neurovascular structures and releasing connective tissue septa.

Advancement of the flap distally to cover the defect, ensuring tension-free sliding to prevent flap necrosis.

Fixation with simple nylon 4-0 sutures, preserving the nail bed.

Wound coverage with sterile gauze and dressing.

Prophylactic antibiotic therapy was prescribed with amoxicillin/clavulanic acid (875 mg and 125 mg) orally every 12 hours for 5 days. Follow-ups were conducted at 5, 14, and 30 days postoperatively. The patient showed complete flap integration with preserved function and sensitivity, without signs of infection from the first follow-up visit.



Figure 1: Pre-procedure image showing the loss of the digital tip, nail, and exposure of the distal phalanx of the left-hand thumb.



Figure 2: Demarcation of the V-Y flap area with a surgical marking pen.



Figure 3: Immediate postoperative image demonstrating adequate defect coverage with the V-Y advancement flap.

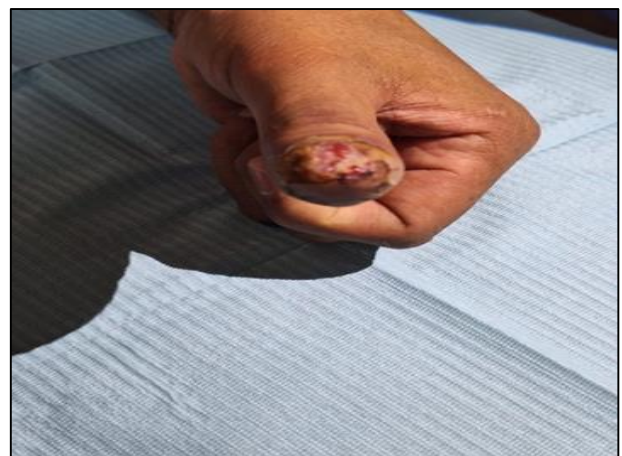


Figure 4: Image at 14 days post-surgery, showing complete integration of the digital flap, with appropriate coloration and no signs of necrosis or infection.



Figure 5: Image at 4 weeks post-surgery, showing proper healing in the flap area, with preserved sensitivity and no shortening of the affected thumb.

DISCUSSION

The primary objectives of pulp reconstruction using a neurovascular flap are: achieving adequate defect coverage, optimal subcutaneous tissue thickness, preserved sensitivity, and an aesthetic appearance.^{4,7,8}

The V-Y advancement flap is an ideal technique for treating dorsal oblique or transverse amputations where digital tip coverage is required. Additionally, it provides direct blood supply through the digital arteries.⁹

Possible complications of this technique include partial or total necrosis if closure is performed under tension.^{4,9} These adverse outcomes can be prevented by ensuring tension-free approximation and using loosely fixed sutures to facilitate better flap integration.⁹

Managing traumatic digital injuries, particularly those caused by human bites, carries a high risk of polymicrobial contamination.^{10,11}

Common pathogens include *Streptococcus anginosus*, *Staphylococcus*, *Eikenella*, and anaerobes.¹¹ Antibiotic treatment should be tailored to the clinical context. If the wound shows signs of infection, the recommended regimen includes metronidazole plus third-generation cephalosporins (cefotaxime or ceftriaxone). If no infection is present, prophylactic antibiotic therapy with amoxicillin/clavulanic acid or metronidazole plus doxycycline is recommended.¹¹

Administration of human tetanus immunoglobulin is indicated for any wound contaminated with saliva, soil, crush injuries, and penetrating wounds.^{10,11}

Diabetes mellitus affects wound healing through various mechanisms, including impaired angiogenesis, fibroblast proliferation, neuropathy, and hyperglycemia. Strict glycemic control mitigates these factors and improves wound healing outcomes.¹²

Literature reports good outcomes with the V-Y advancement flap technique. Eston and Wallace treated 31 patients with this method, 23 of whom achieved good functionality and sensitivity.¹³ Atasoy followed 56 patients who demonstrated favorable evolution with preserved sensitivity and mobility.¹⁴

CONCLUSION

The V-Y advancement flap is an effective and safe technique for reconstructing digital defects caused by human bites, even in patients with comorbidities such as diabetes mellitus. In this case, timely intervention and early antibiotic coverage led to a satisfactory outcome, preserving functionality, aesthetics, and sensitivity of the affected thumb. This approach highlights the importance of combining sound surgical principles with appropriate medical management to optimize results in complex traumatic injuries.

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