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Case Report

Primary reconstructive and functional management of severe spaghetti wrist injury due to forearm laceration: a case report

Sergio E. Vázquez-Lara*, José L. Villarreal-Salgado, Víctor H. Grano-González, Gustavo Emmanuel García-Marin, Gerardo Salvador Rea-Martínez, Giancarlo Talleri-Ornelas, Luis E. Ocampo Guzmán, Miguel Jimenez-Yarza

Department of Plastic and Reconstructive Surgery, Hospital Regional Valentín Gómez Farías ISSSTE, Zapopan, Jalisco, México

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***Correspondence:**
Dr. Sergio E. Vázquez-Lara,
E-mail: sergioeduardovazquez@gmail.com

ABSTRACT

Upper extremity trauma is very common in emergency services. These are complex injuries that represent a challenge for the surgeon and require management by a multidisciplinary team. We report a case of a 48-year-old male who suffered a fall from his own height causing a laceration in the distal region of the forearm. Physical examination revealed active bleeding through the wound, and absence of strength and sensation. Applying standardized management for trauma patients is essential, ensuring that first aid is administered according to established protocols. Hemostasis could be achieved with different procedures; however, surgical hemostasis can provide immediate control of bleeding. It is vital to establish a protocol that effectively identifies patients who will benefit from a recovery process. Providing an effective strategy for managing upper extremity trauma is crucial. Early detection and treatment are important in preventing the condition from worsening, while ensuring the extremity functions as effectively as possible.

Keywords: Forearm trauma, Spaghetti wrist, Arterial injury, Nerve injury, Flexor tendon injury

INTRODUCTION

The upper extremity is one of the areas of the body with most involvement in a person's interaction with his or her environment performing essential functions in daily life. Injuries to the upper limb represent a common reason for consultation in the emergency department, presenting in 20 to 40% of patients.[1] These can range from fingertip trauma to more complex injuries involving various tissue structures. Likewise, vascular, tendinous, and nerve injuries in this region have an incidence of 30 to 40%, 29%, and 1.3 to 2.8%, respectively.[2-4] These types of injuries are not usually life-threatening, but they should be treated immediately since their delayed management can lead to severe and permanent hand dysfunction. In this paper, we present the case of an upper extremity trauma with the aim of highlighting the severity, the complexity of the surgical management, and updating information in the literature.

CASE REPORT

A 48-year-old male with no pathological history, began his current condition four hours prior to his admission when he was working with an electric saw, suffering a fall from his own height, causing a cutting wound in the right forearm region. Physical examination revealed a laceration of approximately 10 cm in the V flexor area with soft tissue avulsion (Figure 1), adequate capillary filling with active bleeding through the wound, and absence of strength and sensation. Emergency surgical management was performed. During the surgical procedure, the patient was cleaned with saline solution and iodopovidone. Exploration of the flexor compartment of the forearm was achieved, revealing a complete section

of the four superficial digital flexor tendons, the four deep digital flexor tendons, the palmaris longus tendon, and the flexor pollicis longus tendon. Additionally, a complete section of the radial artery, ulnar artery, median nerve, and ulnar nerve was identified. In coordination with the angiology department, the greater saphenous vein from the right thigh was harvested. Anastomosis of the proximal and distal end of both arteries was made using 7-0 prolene suture (Figure 2). Vascular permeability was verified. Subsequently, neurorrhaphy of the median and ulnar nerves was executed with 7-0 nylon suture (Figure 3). Finally, tenorrhaphy was performed with modified Kessler technique for the four superficial digital flexor tendons, the four deep digital flexor tendons, the palmaris longus tendon, and the flexor pollicis longus tendon with 3-0 nylon suture (Figure 4). Adequate movement of these tendons was established. Procedure was finished leaving a Blake type drainage in surgical site (Figure 5). During postoperative period, the patient had a satisfactory evolution, reporting clinical improvement denying any symptomatology. We decided to discharge him on his second day of hospital stay. Afterwards, the condition is followed up in outpatient clinic in conjunction with the physical medicine and rehabilitation department. Initiating passive physical therapy progressing to active, gradually recovering strength, movement, and sensitivity (Figure 6).

Figure 1: Laceration in the V flexor area with active bleeding through the wound.

Figure 2: Arterial anastomosis of the proximal and distal end.

Figure 3: Neurorrhaphy of median and ulnar nerves.

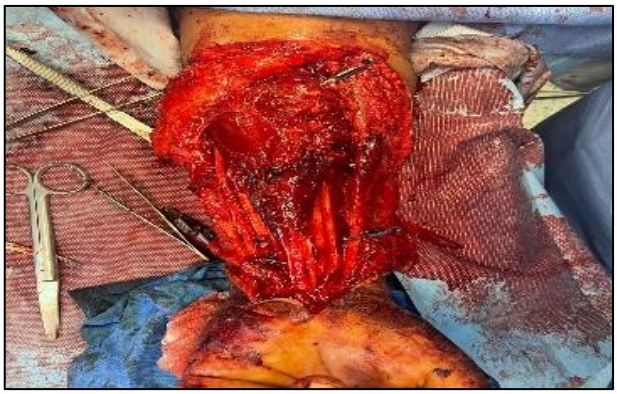

Figure 4: Tenorrhaphies using modified Kessler technique for multiple sectioned tendons.

Figure 5: Closed surgical wound with presence of Blake type drainage.

Figure 6: Post-surgical follow-up after three weeks with adequate evolution.

DISCUSSION

It is important to apply standardized management for trauma patients by providing first aid according to established protocols. However, the priorities in managing patients with these types of injuries are to control bleeding, restore blood circulation, and prevent tissue damage. The most effective methods for achieving hemostasis include a combined approach that employs direct digital pressure, a temporary tourniquet, compressive dressings, and wound closure. Additionally, surgical hemostasis can provide rapid control of bleeding; however, this aggressive approach is generally not necessary for most forearm lacerations.[5] In 2019, the Mangled upper extremity score (MUES) introduced a new scale designed to assess upper extremity injuries. This scale shows a significant correlation with the number of complications and the length of hospital stay.[6] On the other hand, peripheral nerve injuries have a strong correlation with occupation and lifestyle. People who work in basic and support roles, or in sectors such as agriculture, livestock, and forestry are more susceptible to these types of injuries. Regarding lifestyle, minors and unemployed individuals are the most affected groups. In these cases, they may be associated with contexts of violence and exposure to risky activities.[7] Primary exploration and repair of distal nerve injuries, especially in association with vascular injury, is effective because there is no retraction or need for graft interposition, improving the outcome. The main goal is to properly approximate the nerve segments to achieve complete and functional reinnervation of the tissues.[8] Additionally, tendon injury patterns are classified as open or closed, sharp or blunt, traumatic or degenerative, and can be differentiated based on their location as volar or dorsal. Open tendon injuries are common in trauma patients and often require primary surgical treatment.[3] Repair of the flexor tendons involves not only restoring their continuity, but also preserving their ability to glide through the surrounding structures. Early mobilization after surgery is crucial to reduce peritendinous adhesions and facilitate the remodeling of the repaired tendon.[9] It is essential to provide an early and optimal approach to the management of upper extremity trauma. Nowadays, due to lack of information, establishing a precise algorithm for treatment of these injuries is challenging. Therefore, it is essential to develop a methodology that accurately identifies patients who will truly benefit from a recovery process, which is often complex and prolonged.

CONCLUSION

The optimal management of a forearm laceration is based on fundamental principles to achieve proper hemostasis. Surgical treatment protocols are widely used and remain the standard in specialized trauma centers. Open injuries of the upper extremity are serious and should be treated by a specialized surgeon. Early recognition and management help prevent the progression of the condition, focusing on preserving the patient's life and, subsequently, maintaining the function of the extremity as effectively as possible. The personal, psychological, social and economic impact is highly significant in the patients' lives, so the management of these complex cases should be carried out by a multidisciplinary team.

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