

clinical case

Traumatic section of the deep branch of the ulnar nerve: clinical case.

Jose Poveda Mira^{1*}, Fernando Bonilla Enseñat¹, Cesar Poveda Cerrillo¹, Carmen Garcia Espert¹, Emilio Baixauli Pellsó¹.

¹University Hospital and Polytechnic La Fe Valencia. Avenida Fernando Abril Martorell 106, Valencia, Spain. 46026.

*Correspondence: poveda_josmir@gva.es.



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Abstract: Traumatic injuries to the ulnar nerve are very rare and can go unnoticed, making it necessary to perform a complete examination of the hand for diagnosis. We present the case of a 23-year-old man who presented with a 10mm wound on the ulnar edge of the hand over Guyon's canal with impossibility for abduction and adduction of the fingers, positive Watterberg and Froment signs. A surgical exploration is performed where a section of the deep motor branch of the ulnar nerve is appreciated. The diagnosis of the lesion of the deep branch of the ulnar nerve is fundamentally clinical and surgical. Reparation is performed by primary tension-free end-to-end epineurial suture. The prognosis will depend on patient factors, the quality of the surgery and the magnitude of the lesion.

Keywords: ulnar nerve, nerve section, Froment sign, Guyon canal, Watterberg sign.

1. Introduction

Ulnar nerve injuries in the hand are usually caused by compression at the level of Guyon's canal. However, traumatic injury to the ulnar nerve is rare, and even more so exclusive involvement of its deep motor branch. These injuries often occur in the context of large wounds and catastrophic hands [1]. A regulated exploration of the hand will allow us to suspect the existence of the lesion and the area in which it has occurred for its subsequent repair if necessary.

2. Clinical case

We present the case of a 23-year-old man who attended the hospital emergency room referred to the primary care center due to functional impotence in the fourth and fifth fingers of the right hand after a puncture wound with a glass on the proximal ulnar edge of the hand.

The patient presented a 10mm wound at the level of the hypothenar eminence in the region between the pisiform bone and the hamate hook. His hand is in 90 degree flexion at the proximal interphalangeal joint of the fourth and fifth fingers with a position of

semiflexion of the distal interphalangeal joint thereof. Physical inspection shows no muscle atrophy or trophic changes [Image 1].



(to)



(b)

Image 1. (a) A 1cm wound is observed on the palmar side of the hand over the pisiform area. **(b)** Ulnar claw position of the hand and positive Watenberg sign.

Our patient presented pain in the fifth finger with a sensation of cramps in the ulnar edge of the hand on passive movement. The exploration of active mobility shows: impossibility for the adduction and abduction of the second to fifth fingers; inability to adduct the thumb (positive Froment's sign); weakness for metacarpophalangeal flexion of the fingers and for interphalangeal extension with flexion of the fingers; and position of the fifth finger in abduction (positive Watenberg sign) [Images 1 and 2]. The extension of the interphalangeal joint of the thumb and of the metacarpophalangeal and interphalangeal joints of the lesser fingers remains preserved. No affection of the mobility of the wrist was observed, nor were there alterations in tactile or thermoalgesic sensitivity in any part of the hand or wrist. Vascular examination is correct at the time of examination.



Image 2. Positive Froment's sign due to inability to adduct the thumb

X-rays are taken in anteroposterior and oblique projections of the hand where no findings of interest are appreciated and a blood test with biochemical parameters, complete blood count and hemostasis within normal limits.

Through physical examination, the probable diagnosis of a wound with section of the deep branch of the ulnar nerve at the level of zone II of Guyon's canal is established, for which a first aid is carried out in the emergency room with washing of the wound with abundant serum, cleaning of the hand with a sponge with chlorhexidine and administration of prophylactic antibiotic therapy with intravenous amoxicillin 1g/clavulanic acid 125mg and approximation of the edges of the wound.

After 24 hours, the team of specialists in hand surgery proceeds to the surgical intervention: in the supine position, using an ischemia cuff for the limb and general anesthesia, the wound is enlarged on the tendon of the flexor carpi muscle. ulnaris, the fatty plane is dissected and we locate the ulnar nervous vascular bundle that we follow to Guyon's canal. Guyon's canal is sectioned and we observe the complete section, 5mm from its origin, of the deep motor branch of the ulnar nerve and the integrity of the sensory superficial branch and ulnar blood vessels.

The nerve ends are prepared, their edges are cleaned and end-to-end epineural neurorrhaphy is performed with 8/0 nylon monofilament using simple tension-free sutures and fibrin adhesive [Image 3]. The skin is sutured with 4/0 nylon monofilament and a brachial splint is placed with slight wrist flexion.

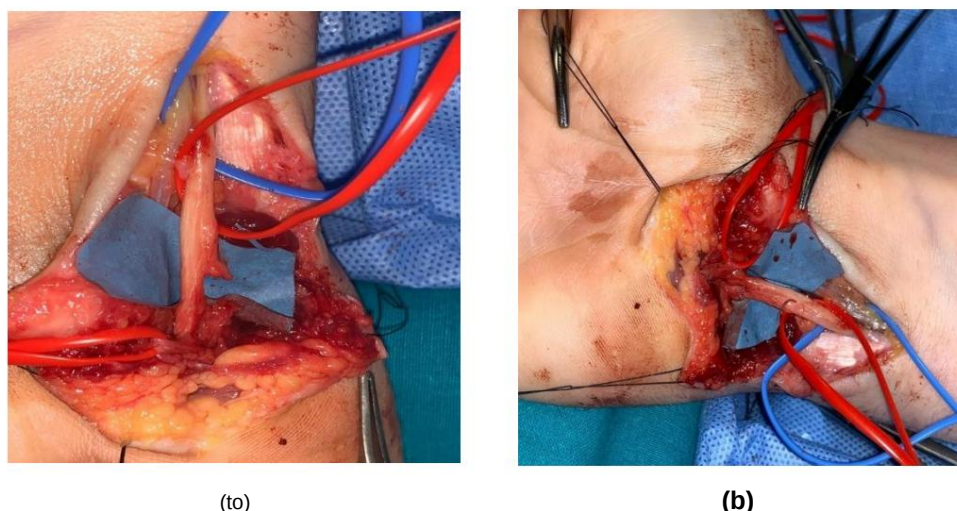


Image 3. (a) Enlarged wound with presence of section of the deep motor branch of the ulnar nerve at the level of its bifurcation. **(b)** Nerve once the injury has been repaired.

The patient presented a good clinical evolution during admission and as he did not present complications, he was discharged 24 hours after surgery. The patient is scheduled for outpatient consultation 3 weeks after surgery. After removing the splint, it is observed that the

The wound shows no signs of complications, so the stitches are removed and a wrist orthosis is prescribed to limit extension.

One month after the last assessment, the wound is fully closed with no signs of dehiscence and with good healing. The patient continues with a slight attitude in flexion of the fourth and fifth fingers, but presents a strength of 2/5 on the MRC scale for abduction and adduction of the fingers, centrifugal Tinel's sign on percussion of Guyon's canal and strength 1/5. on the MRC scale for thumb adduction. From this moment on, he began rehabilitation and night splint and in clinical control a year after evolution, clinical improvement was observed with complete mobility and strength 3/5 on the MRC scale for abduction and adduction of the fingers and thumb.

4. Discussion

The interest of this case lies in the importance of a correct exploration in the diagnosis of peripheral nerve lesions. In this way, we can suspect the involvement of a nervous structure and its location based on a regulated exploration and knowledge of anatomy without the need for imaging tests, to later carry out a more oriented surgical exploration.

The ulnar nerve originates mainly from the C8 and T1 spinal roots forming the anteromedial secondary trunk of the brachial plexus or medial cord. It then proceeds to the medial biceps groove to traverse the medial intermuscular septum in the middle of the arm and pass to the extensor side. Between the septum and the medial head of the triceps it reaches the elbow through the olecranon groove. The nerve runs between the two heads of the flexor carpi ulnaris muscle to the flexor side of the forearm and courses below this muscle to the wrist. It continues its course through the flexor retinaculum radially to the pisiform bone passing through Guyon's canal [2][3][4]. Within the canal, it runs medial to and deeper than the ulnar artery.

The proximal limit of Guyon's canal is formed by the pisiform bone and the distal limit by the hook of the hamate. The roof of the canal is formed by the palmaris brevis muscle and the floor by the combination of the transverse carpal ligament, the hamate, and the triquetrum [3][4].

Guyon's canal is divided into 3 zones: zone I, which begins at the proximal edge of the palmar carpal ligament and ends distal to the bifurcation of the ulnar nerve in its deep and superficial branches; zone II, which begins distal to the bifurcation of the ulnar nerve to the fibrous arch of the hypothenar muscles and contains the deep motor branch of the ulnar nerve; and zone 3, which begins distal to the nerve bifurcation and contains the superficial branch of the ulnar nerve [5]. In zone II, the deep motor branch gives off a branch to innervate the abductor digiti minimi, surrounds the hamate on its medial side and passes under the fibrous arch of the hypothenar muscles to give off branches to innervate: the

flexor digiti minimi brevis, the opponens digiti minimi, the adductor pollicis, the deep fascicle of the flexor pollicis brevis, the lumbrical muscles of the 4th and 5th fingers, and the dorsal and palmar interosseous muscles [3]. In zone III, the superficial branch supplies sensation to the palmar aspect of half of the fourth finger and all of the fifth finger and gives motor branches to the palmaris brevis muscle.

The diagnosis of this lesion is based on the clinical examination of the motor and sensory function of the hand. Given the innervation of the deep branch of the ulnar nerve at the wrist level, the patient will present: fifth finger abduction deficit, lesser finger abduction and adduction, fifth finger metacarpophalangeal flexion, thumb-clamp little finger, the approximation of the thumb and weakness for metacarpophalangeal flexion of the first finger. Characteristic of this lesion is the appearance of Watemberg's sign (fifth finger remains abducted) and Froment's sign (inability to perform digital clamping without flexing the thumb interphalangeal). Also, the appearance of the ulnar claw hand is typical and, over time, the appearance of atrophy of the hypothenar eminence and interdigital atrophy [1][4].

Diagnosis using imaging tests (magnetic resonance or ultrasound) is complicated given the inflammatory changes that occur in the area. The use of other tests such as electromyography will not be useful until 3 weeks after the injury because nerve stimuli remain during this time. Therefore, we will base the diagnosis on physical and surgical examination [7].

The most indicated technique within the first 5 days of a traumatic injury to the ulnar nerve is the primary suture. It is advisable to perform the resection of the contused ends of the nerve and, subsequently, perform an end-to-end suture or by means of a graft in the case of not being able to suture both ends without tension. Simple epineural sutures should be used with 8/0-9/0 nylon monofilament and the use of fibrin glue. Immobilization in a splint should be maintained to maintain the elbow at 90 degrees of flexion and the wrist between 30 and 40 degrees of flexion for 3 weeks, followed by removal of the elbow immobilization and progressively increasing wrist mobilization for at least 6 weeks. [5][6][7].

The prognosis will depend on: the age of the patient; the type, location and length of the lesion; the delay in repair; the quality of the nerve endings and; the correct surgical suture. The rate of regeneration is estimated at 1mm per day in adults, the presence of positive centrifugal Tinnel being a sign of good prognosis. Despite performing a good surgical technique, it is estimated that the results in peripheral nerve sections in adults are good in only 46.4% of cases [6][7].

5. Conclusions

Traumatic injury to the deep motor branch of the ulnar nerve is very rare, but it can occur in the context of apparently simple injuries to the ulnar region of the base of the hand. It is essential to perform a complete physical examination in all hand injuries to diagnose these injuries and guide their location, knowing the anatomy of Guyon's canal will allow us to repair it.

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