CASE REPORT – OPEN ACCESS

International Journal of Surgery Case Reports 41 (2017) 511–515

Contents lists available at ScienceDirect

International Journal of Surgery Case Reports

journal homepage: www.casereports.com

Ulnar nerve entrapment complicating radial head excision

Kevin Parfait Bienvenu Bouhelo-Pam[a,*], Espoir Amour Mokoko Louckou[a], Saeed Abdulrazak[b], Badarou Chaibou[a], Hassan Boussakri[a], Mohamed Shimi[a], Mohamed El Idrissi[a], Abdelhalim El Ibrahimi[a], Abdelmajid El Mrini[a]

[a] Department of Osteoarticular Surgery B4, Hassan II University Hospital, Fès, Morocco
[b] Department of Trauma and Orthopedic Surgery B3, Hassan II University Hospital, Fès, Morocco

ARTICLE INFO

Article history:
Received 9 September 2017
Received in revised form 1 November 2017
Accepted 2 November 2017
Available online 14 November 2017

Keywords:
Cubital tunnel syndrome
Peripheral nerve palsy
Radial head excision
Elbow valgus

ABSTRACT

INTRODUCTION: Several mechanisms are involved in ischemia or mechanical compression of ulnar nerve at the elbow.
PRESENTATION OF CASE: We hereby present the case of a road accident victim, who received a radial head excision for an isolated fracture of the radial head and complicated by onset of cubital tunnel syndrome. This outcome could be the consequence of an iatrogenic valgus of the elbow due to excision of the radial head. Hitherto the surgical treatment of choice it is gradually been abandoned due to development of radial head implant arthroplasty. However, this management option is still being performed in some rural centers with low resources.
DISCUSSION: The radial head plays an important role in the stability of the elbow and his iatrogenic deformity can be complicated by cubital tunnel syndrome.
CONCLUSION: An ulnar nerve release was performed with favorable outcome.

1. Introduction

Cubital tunnel syndrome is the second most frequent compressive peripheral nerve palsy [1,2]. The particular relations of the ulnar nerve at the elbow, predisposes it to compression during injury. During active elbow motion, the ulnar nerve is exposed to varying forces of compression, traction and friction. Several mechanisms are involved resulting in either ischemia or a mechanical compression. We deem interesting to report a rare case of ulnar nerve entrapment due to an iatrogenic valgus deformity of the elbow in a patient with a history of radial head excision.

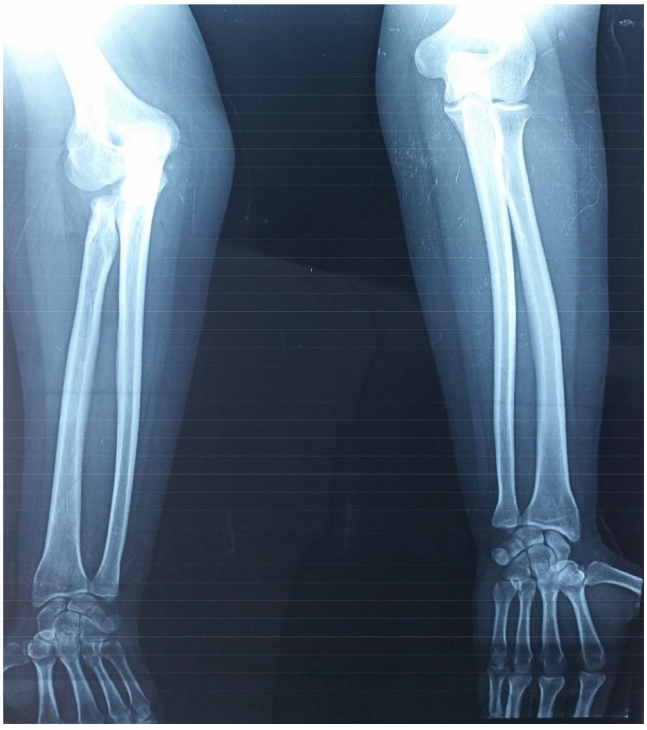
2. Case report

Patient, 42-year-old female, without any history of disease presented at our department for right hand tingling and gradual worsening weakness in the hand limiting basic daily activities. Anamnesis and clinical history revealed that patient had been a victim of an accident a year prior to her admission with right elbow impact on fall. The diagnosis of an isolated radial head fracture Mason type 3 [3] had been made on plain X ray in a rural center. Patient underwent radial head excision with consent. Physical examination during her consultation at our department, 12 months after surgery, found a marked right elbow valgus deformity, 30° more than the contralateral limb (Picture 1). We also noted ulnar clawing of fingers with Grade 3 muscle force in the right upper extremity. There was marked hypoesthesia in the ulnar territory and a Tinel sign in the forearm and hand. Range of motion at the elbow, muscle tone as well as cubito-pronator reflex was normal. Electromyography of the right elbow came back for an abolition of motor response and a decreased sensory amplitude of 8 μV. Radiography of both forearms up to the elbows (Picture 2) revealed an absence of radial head with a marked valgus deformity in the right elbow compared with the opposite limb. Ultrasound (Picture 3) centered on the olecranon groove with special emphasis on the ulnar nerve course during right elbow motion found a considerable compression on flexion with signs of nerve distress. Patient was admitted for surgery after consent block after favorable opinion with peroperative discovery of a pale ulnar nerve in considerable distress (Picture 4). Neurolysis with anterior intramuscular transposition of the ulnar nerve was performed using a 5-mm trench in the flexor- pronator group according to Adson's technique [4] (Picture 5). Postoperative recovery was uneventful with ulnar nerve clinical and electrical functional recovery obtained from the third post-operative week (Picture 6). A floating radial head prosthesis [5] was proposed secondarily to patient. Our work has been reported in line with the SCARE criteria [6].

* Corresponding author.
E-mail address: bopakev@yahoo.fr (K.P.B. Bouhelo-Pam).

https://doi.org/10.1016/j.ijscr.2017.11.012

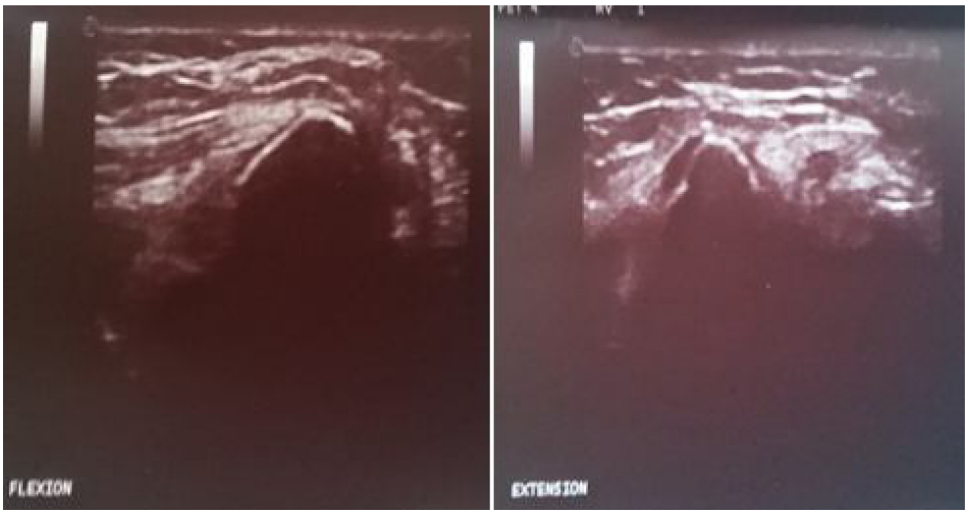
Picture 1. Physical examination showing a marked valgus deformity of the right elbow and ulnar clawing of fingers.



Picture 2. Comparative plain radiographs of both elbows with absence of right radial head and right elbow valgus.

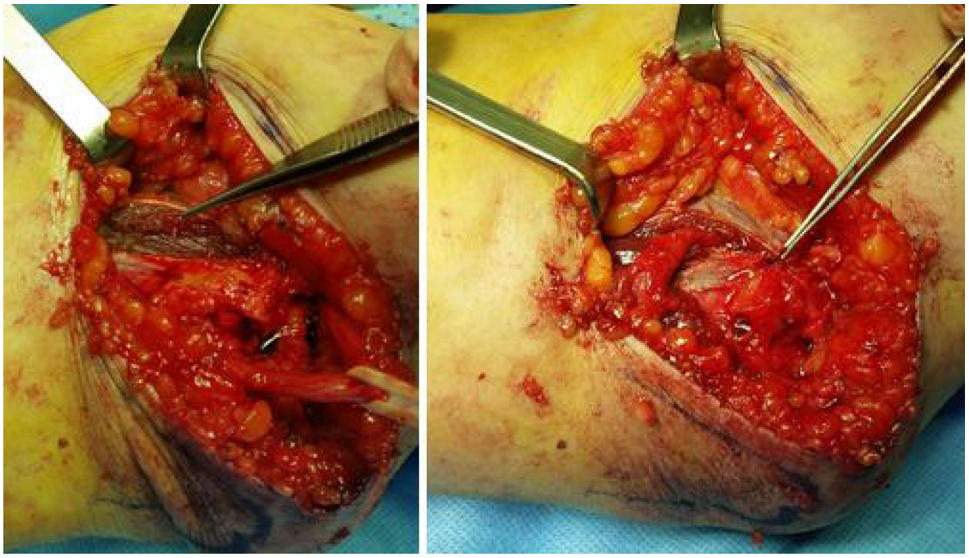
3. Discussion

The radial head plays an important role in the stability of the elbow [7]. Not only does it serve as a lateral bumper but it is also an insertion zone for the lateral collateral, annular and the square Denuce ligaments. When elbow is flexed, the posterior epitrochleo-olecranon ligament stretches resulting in a 55% reduction in the volume of the cubital tunnel [1,8]. Intraneural and extraneural pressures rises and could reach up to 200 mmHg with elbow flexion and contraction of the flexor carpi ulnaris. Since the ulnar nerve is located behind the elbow axis during rotation, elbow flexion produces a proximal and distal displacement of the nerve towards



Picture 3. Ultrasound image of the ulnar nerve in its groove on elbow flexion and extension.

Picture 4. Peroperative image showing signs ulnar nerve distress.



Picture 5. The anterior intramuscular transposition of the ulnar nerve.

the medial epicondyle. The ulnar nerve also stretches from 4, 7 to 8 mm on elbow flexion [1]. Our case report demonstrates that an absence of radial head could potentially lead to instability with elbow valgus. The ulnar nerve in this peculiar anatomical situation could be stretched in the olecranon groove. Abe et al. [9] reported a series of patients presenting a varus deformity of the ulna with secondary ulnar entrapment neuropathy. Contrary to this series, our patient did not present ulnar deformity. Typically, clinical presentation of ulnar nerve distress or compression in its groove [10] is one of paresthesia with tingling of fingers and muscle weakness in relation to nerve entrapment in a fibro-musculoskeletal compartment. These signs worsen on elbow flexion and a Tinel

Picture 6. Functional recovery after the third postoperative week.

sign is often present at the level of the medial epicondyle. Electromyography (EMG) is a key diagnostic tool. It shows a decrease in ulnar conduction speed at the elbow on a 10-cm segment along the epitrochlea [11]. There is no standard for ulnar nerve conduction blocks. The most commonly used diagnostic criteria are: at least 50% of reduction of the amplitude of the motor response on proximal stimulation, a fall of 10 m/s nerve conduction speed along the elbow. The ulnar nervous compression in our patient was confirmed on EMG and on ultrasound of the olecranon groove on elbow flexion and extension. Iatrogenic valgus deformity of the right elbow was observed on physical examination and on radiography. Magnetic Resonance Imaging (MRI) could have been performed but we did not deem it necessary in our case. MRI remains of exceptional use because of its cost, only for second intention in case of doubt on a tumor localization [12] and for visualizing an anconeal epitrochlean muscle [13]. Anterior transposition of the ulnar nerve [14] consists of placing the ulnar nerve in front of the medial epicondyle using the shortest route possible, thereby decreasing ulnar nerve tension and stretching during elbow flexion, or better still avoid contusions or repeated bruising. Three types of transpositions [15,16] have been previously described: submuscularis, intramuscularis and subcutis. In every chosen approach, ulnar dissection is more extensive than previous surgery dissection so as not to impose on the nerve a zigzag route [17]. This anterior transpositioning of the nerve requires that the nerve branches are not an obstacle, with an inherent risk of sacrificing the transverse branches destined to the joint [18] and a transposition of the posterior motor branches destined for the flexor carpi ulnaris and the flexor digitorum pro-

fondus. Hence, the transposition of the ulnar nerve separates it more or less from its vascular bed thus causing a partial devascularization that adds up in the extrinsic and intrinsic ischemia noticed during the chronic nervous compression that could potentially limit nerve recovery [19]. The combined transposition of the vascular bed certainly reduces this devascularization [19], at the expense of a longer and more delicate dissection. Ideally, it is advisable to respect at least the lower collateral ulnar artery which insures the only direct vascular contribution to the ulnar nerve at its emergence in the proximal part of the cubital tunnel [20]. The intramuscular transposition practiced in our patient led to favorable outcome as it is often the case in most series [17,21] with 92%–94% of patient satisfaction and 70–87% of good outcomes for intramuscular transpositions. Radial head prosthesis being preferred to radial head excision in the management of complex fractures with the latter is prone to many complications [22]. Radial head excision in association with a medial ligamentous injury may lead to cubitus valgus and tardy ulnar palsy. This may be prevented by primary radial head replacement. Since radial head excision is not an emergency procedure this, when required, may be safely deferred until the patient can be treated in a center where this procedure is available.

4. Conclusion

Our study seeks to demonstrate the role of radial head excision, still practiced in certain health centers with low level of equipment, in the occurrence of cubital tunnel syndrome because of iatrogenic elbow valgus. This rare entity, in our humble opinion should be considered among probable causes of ulna nerve entrapment at the elbow. The favorable outcome reported in our case could be attributed to the special consideration given to management of this particular anatomical situation.

Conflicts of interest

The authors declare no conflicts of interest.

Funding

This study has no sponsor.

Ethical approval

This is not research study.

Consent

The informed consent of the patient was obtained.

Author contribution

All the authors contributed to the writing of this report.

Registration of research studies

Research registry.

Guarantor

Espoir Amour MOKOKO LOUCKOU.

References

[1] D.J. Bozentka, Cubital tunnel syndrome pathophysiology, Clin. Orthop. Relat. Res. 351 (1998) 90–94.
[2] P. Caliandro, G. La Torre, R. Padua, F. Giannini, L. Padua, Treatment for ulnar neuropathy at the elbow, Cochrane Database Syst. Rev. 15 (11) (2016) CD006839.
[3] M.L. Mason, Some observations on fractures of the head of the radius with a review of one hundred cases, Br. J. Surg. 41 (1954) 123–132.
[4] A.W. Adson, The surgical treatment of progressive ulnar paralysis, Minn. Med. 1 (1918) 455–460.
[5] D. Arbter, S. Piatek, A. Probst, F. Holmenschlager, S. Winckler, Results after Judet radial head prosthesis for non-reconstructable radial head fractures, Unfallchirurg 115 (November (11)) (2012) 1000–1008.
[6] R.A. Agha, A.J. Fowler, A. Saeta, I. Barai, S. Rajmohan, D.P. Orgill, SCARE Group, The SCARE Statement: Consensus-based surgical case report guidelines, Int. J. Surg. 34 (2016) 180–186.
[7] F. Duparc, Stabilité du coude et articulation condyloradiale, Cahiers d'enseignement de la SOFCOT 77 (2001) 30–37.
[8] Bartels RHMA, J.A. Grotenhuis, J.M.G. Kauer, The arcade of Struthers: an anatomical study, Acta Neurochir. (Wien) 145 (4) (2003) 295–300, discussion 300, avr.
[9] M. Abe, T. Ishizu, H. Shirai, M. Okamoto, T. Onomura, Tardy ulnar nerve palsy caused by cubitus varus deformity, J. Hand Surg. Am. 20 (1) (1995) 5–9.
[10] A.L. Dellon, Clinical use of vibratory stimuli to evaluate peripheral nerve injury and compression neuropathy, Plast. Reconstr. Surg. 65 (4) (1980) 466–476.
[11] S.-D. Byun, C.-H. Kim, I.-H. Jeon, Ulnar neuropathy caused by an anconeus epitrochlearis: clinical and electrophysiological findings, J. Hand Surg. Eur. 36 (7) (2011) 607–608.
[12] G.W. Britz, D.R. Haynor, C. Kuntz, R. Goodkin, A. Gitter, K. Maravilla, et al., Ulnar nerve entrapment at the elbow: correlation of magnetic resonance imaging, clinical, electrodiagnostic, and intraoperative findings, Neurosurgery 38 (3) (1996) 458–465.
[13] D.Y. Bradshaw, J.M. Shefner, Ulnar neuropathy at the elbow, Neurol. Clin. 17 (3) (1999) 447–461.
[14] Y.P. Charles, B. Coulet, J.-C. Rouzaud, J.-P. Daures, M. Chammas, Comparative clinical outcomes of submuscular and subcutaneous transposition of the ulnar nerve for cubital tunnel syndrome, J. Hand Surg. Am. 34 (5) (2009) 866–874.
[15] J.B. Lowe, C.B. Novak, S.E. Mackinnon, Current approach to cubital tunnel syndrome, Neurosurg. Clin. N. Am. 12 (2) (2001) 267–284.
[16] S. Asamoto, D.-K. Böker, A. Jödicke, Surgical treatment for ulnar nerve entrapment at the elbow, Neurol. Med. Chir. (Tokyo) 45 (5) (2005) 240–244, discussion 244–245.
[17] A.L. Osterman, C.A. Davis, Subcutaneous transposition of the ulnar nerve for treatment of cubital tunnel syndrome, Hand Clin. 12 (2) (1996) 421–433.
[18] D.B. Siegel, Submuscular transposition of the ulnar nerve, Hand Clin. 12 (2) (1996) 445–448.
[19] A. Messina, J.C. Messina, Transposition of the ulnar nerve and its vascular bundle for the entrapment syndrome at the elbow, J. Hand Surg. Br. 20 (5) (1995) 638–648.
[20] W.B. Kleinman, Cubital tunnel syndrome: anterior transposition as a logical approach to complete nerve decompression, J. Hand Surg. Am. 24 (5) (1999) 886–897.
[21] K.D. Plancher, J.O. McGillicuddy, W.B. Kleinman, Anterior intramuscular transposition of the ulnar nerve, Hand Clin. 12 (2) (1996) 435–444.
[22] L. Obert, D. Lepage, D. Huot, F. Givry, P. Clappaz, P. Garbuio, et al., Fracture de tête radiale non synthésable: résection, implant de Swanson ou prothèse? Étude rétrospective comparative, Chirurgie de la Main 24 (1) (2005) 17–23.