

CUBITAL TUNNEL SYNDROME IN CUBITUS RECURVATUS

By

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It is well known that several conditions around the elbow joint can cause irritation to the ulnar nerve. Traumatic ulnar neuritis is the term most often used. (*McCowan, Brooks*, etc.). Tardy ulnar palsy is another common term (*Knight, Feindel & Stratford, Gay & Love* etc.), *Osborne* is in favour of "compression neuritis of the ulnar nerve". It is understandable that several terms have been used for this condition because of the many causes that may be behind it. Even the symptoms and signs differ to some extent. *Osborne, Feindel & Stratford* described cases where nothing pathological could be found but a normal anatomy was responsible for the symptoms. The aponeuritic arch overlying the nerve between the bony attachments to the olecranon and medial epicondyle of the two heads of the flexor carpi ulnaris muscle caused compression to the ulnar nerve. They coined the term "cubital tunnel" and an analogy to the carpal tunnel syndrome comes to mind. The nerve palsy resulted from gradual compression especially when flexing the elbow. It was not due to traction or friction in the ulnar groove, which has been the common explanation for delayed ulnar paralysis.

Osborne classifies the causes of ulnar neuritis at the level of the elbow as follows: 1. Arthritis (osteoarthritis, osteochondritis dissecans with secondary arthritis, rheumatoid arthritis, tuberculous arthritis, neuropathic arthritis secondary to syringomyelia). 2. Old fracture (malunion of medial epicondylar fracture with deformity of groove, supracondylar fracture with malunion and late arthritis, cubitus valgus due to old separated capitellar epiphysis—the classical "tardy ulnar palsy"). 3. Ganglia (arising from medial capsule of elbow joint or deep in fibres of flexor carpi ulnaris). 4. Local injuries to the post-condylar

groove (causing scarring and constriction of nerve). 5. Idiopathic. (This group comprises more than 10 per cent of causes of ulnar neuritis and is due to simple compression by the fibrous bridge of flexor carpi ulnaris. Although the elbow joint is normal on physical and radiological examination, some swelling of the ulnar nerve in the post-condylar groove is present in most of the cases).

Apart from causes mentioned above, hypermobility of the nerve, recurrent ulnar nerve dislocation at the elbow, have also been shown to produce symptoms (*Childress, Osborne*). *Childress* reports observations and treatment of thirty-four patients with ulnar neuritis due directly or indirectly to excessive nerve mobility. Only seven of the patients required surgical transplantation. All these 34 patients had precipitating injury before they got ulnar neuritis. He also examined 2000 supposedly normal elbows with no signs of ulnar neuritis and found 121 cases with incomplete dislocation and 41 cases with complete dislocation of the nerve. Not one of these 162 persons with dislocating ulnar nerves knew that he had such an anomaly. It is stated that the hypermobile ulnar nerve is considerably more exposed to injury. *Pulkki & Vainio* described 18 cases of compression neuritis of the ulnar nerve where rheumatoid arthritis was responsible for the symptoms. Wasting of the intrinsic muscles was of no diagnostic value in those cases.

The present writer may add to the syndrome in question a case of bilateral tardy ulnar nerve palsy due to compression of the ulnar nerve in the cubital tunnel, where the patient had hypermobile elbow joints, cubitus recurvatus, which probably contributed to the development of symptoms.

A male orderly, twenty-five years old had since birth had hypermobile elbow joints. There is no history of injury to the upper limbs. The range of active movements in both elbow joints was normal in all other aspects than the (hyper-) extension-flexion range which was 205–30 degrees on the left side and 200–30 degrees on the right side (Fig. 1). There was no valgus or varus position and the carrying angle was 165 degrees on the right and 170 degrees on the left elbow. No abnormality could be detected on radiological examination. The patient complained of aching pain in the left hand for about three months duration. He also noted some tenderness around the ulnar side of the left elbow. There was clear hypaesthesia in the ulnar distribution of the left hand. Weakness in all the intrinsic muscles of the hand was present. Flexor carpi ulnaris worked well but flexor digitorum profundus to the little



Fig. 1.

Pre-operative appearance of one of the elbows.
(Both sides were similar in inspection).

and ring fingers showed some weakness. The typical clawed appearance was seen in the little and ring fingers and to some extent also in the middle finger (Fig. 2). There were similar symptoms and signs also in the right hand but they were much weaker and did not disturb him when he was first seen.

The left ulnar nerve was explored at the elbow. It was easy to see that the nerve was compressed against a band of fibrous tissue bridging

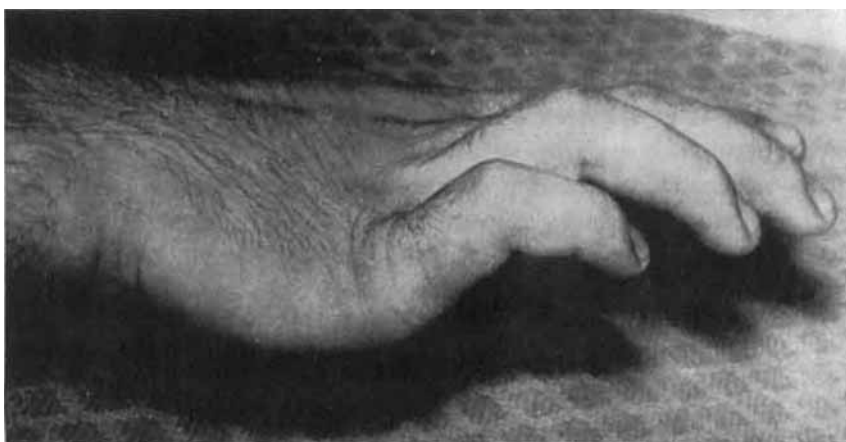


Fig. 2.

Pre-operative clawing of the fingers in the right hand.
(The left hand was similar).

the two heads of flexor carpi ulnaris. The band was slack in extension. It tightened in flexion and compressed the nerve when the amount of flexion increased to right angle or more. Simultaneously the medial ligament of the elbow joint bulged outwards during flexion and reduced the size of the opening of the cubital tunnel. This bulging of the floor of the cubital tunnel also increased the angle of dip to which the nerve was subjected as it entered the tunnel from its superficial course in the ulnar groove. When this compressing band was divided a shallow transverse groove in the nerve trunk was found and some amount of oedema proximal to compression could be detected in the nerve. Slight thickening in the nerve could be palpated in the same area. The nerve appeared normal distal to the lesion. Because of the fact that the nerve seemed to twist over flexor carpi ulnaris muscle when flexing the elbow it was decided to transpose the nerve anteriorly and laterally by dividing the epicondylar portion of the flexor carpi ulnaris muscle. The nerve obtained space enough between flexor carpi ulnaris and the other flexors when mobilised some centimetres proximally and distally. No branches of the nerve needed to be cut. The humeral end of flexor carpi ulnaris was sutured back. When testing the mobility of the ulnar nerve before closing the wound it was found free without any tendency to twisting or kinking. The wound was closed and the elbow immobilised for three weeks in ninety degrees of flexion.

Right after the patient had recovered from the general anaesthesia the clawing of fingers, pain and hypaesthesia had disappeared and the patient stated that his hand was fully normal again. When last seen 18 months after the operation the situation had remained normal except for the hypermobility of the elbow joint of course.

4 months after the operation the patient wanted to have the right elbow operated as well because of increasing weakness in the ulnar intrinsic muscles of this non operated side. Some wasting was noted in all the ulnar intrinsic muscles of the right hand and the typical clawing of the little and ring fingers was apparent. There was also weakness in flexor digitorum profundus to fourth and fifth fingers and slight weakness in flexor carpi ulnaris too. No sensory changes could be detected on this side, and the patient did not complain of pain in the hand. Some aching was felt in the ulnar side of the elbow and this area was tender to palpation. When the right ulnar nerve was explored findings could be detected similar to those on the opposite side operated previously (Fig. 3). This time the ulnar nerve was transferred to the plane of cleavage between brachialis and the common

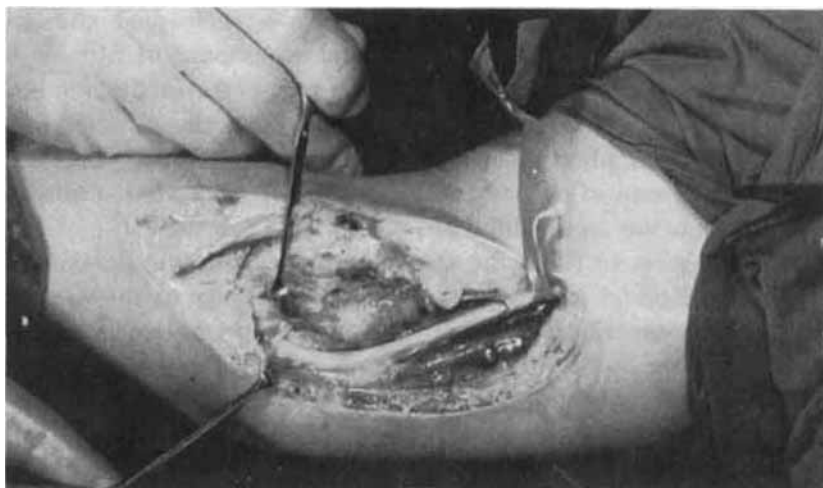


Fig. 3.

The right ulnar nerve explored at the elbow. The fibrous bridge responsible for compressing the nerve can be seen between the two hooks.

flexor origin. The immediate postoperative result was good. The patient could actively extend all the fingers (Fig. 4). There was no pain and no sensory disturbance. Six weeks later the patient gradually incurred pain in the elbow area and some clawing of the fingers seemed to recur. The nerve was re-explored and found twisted distally over the fibrous edge of flexor carpi ulnaris. The fibrous edge was divided. The postoperative result was satisfactory for some weeks but then gradually deteriorated again. Weakness in the ulnar intrinsic muscles increased and hypaesthesia developed in the ulnar sensory distribution



Fig. 4.

Immediate postoperative result. The clawing of fingers has disappeared.

of the right hand. Another re-exploration was performed and gross scarring of the muscular bed was seen and an amount of fibrosis was noted in the ulnar nerve trunk. Neurolysis was performed along a distance of about 8 centimetres. After this operation the muscles innervated by the right ulnar nerve have gradually developed some more power and the area of sensory disturbance has somewhat diminished. The patient has not complained of pain.

This case seems to fit to the cubital tunnel syndrome described by *Osborne* and *Feindel & Stratford*. The hypermobility in the extension range probably contributed to the development of symptoms by causing secondary hypermobility to the ulnar nerve especially in heavy manual work. The intramuscular placement operation to the left ulnar nerve, which caused more symptoms was very successful. It was interesting to note that the symptoms, even the clawing of fingers, disappeared immediately. The deep intramuscular placement operation on the right side did not succeed so well. There could have been some technical faults. Although the nerve became free in the first instance it had some secondary kinking later. The question arises whether it would not have been better to perform only the decompression operation described by *Osborne*. Considering the anterior transposition of ulnar nerve *Osborne* writes: "Even with a correct surgical technic, however, the results of transposition are sometimes unpredictable. Residual tenderness and causalgic pain may occur and gross scarring of the muscular bed may cause further damage to the nerve. The operation is not a small procedure, and in the past surgeons have hesitated to explore and transpose the nerve until clinical signs were present and a definite diagnosis possible." He also states that the results of the minor decompression procedure appear to be as satisfactory as the results after the more elaborate operation of anterior transposition. It might have been sufficient to do just the decompression operation in the present case too.

There are different opinions in the transposition technic. *Knight* and *Lange* advocate a subcutaneous placement of the nerve. *Brooks*, *Childress*, *McGowan* and *Osborne* are in favour of the deep intramuscular placement where the nerve will lie between the common flexor origin and brachialis muscle next to the median nerve on the brachialis. Although *Childress* and *Osborne* recommend the deep intramuscular placement they do not point out that the nerve should be deep to the common flexor origin. In the present case the successful transposition was performed to a intramuscular channel prepared between flexor carpi ulnaris and the other flexors. On the other elbow of the present

case, the nerve was transferred deep to the common flexor origin with less success.

The question of traumatic ulnar neuritis is not a simple one. The lesion can be due to compression, friction or traction. It can be caused in the ulnar groove of the medial humeral epicondyle or anterior or distal to the groove. If flexor carpi ulnaris and flexor digitorum profundus to the little and ring fingers are not affected or there are no sensory disturbances it may be difficult to find out where the lesion is. The pathology can of course be in the wrist or hand or even in the neck region. Careful clinical examination should in most cases show the site of the lesion.

It is interesting that even in the absence of any gross pathology around the elbow traumatic neuritis of the ulnar nerve can exist at that area. The disappearance of the clawing of the fingers immediately after the operation was surprising.

SUMMARY

The author describes a case of bilateral traumatic ulnar neuritis due to repeated gradual compression to the nerve trunk in the cubital tunnel. By the term cubital tunnel is meant the structure distal to the ulnar groove where the nerve emerges to the submuscular channel formed by flexor carpi ulnaris aponeurosis and the medial ligament of the elbow joint. Hypermobility of the elbow in the extension-flexion range in this case probably contributed to the development of symptoms. The symptoms totally disappeared on one side and diminished on the other side after deep intramuscular placement of the ulnar nerve. It was surprising that the clawing of fingers disappeared immediately after operation.

RESUME

L'auteur décrit un cas de neurite ulnaire traumatique bilatérale due à une compression répétée sur le tronc du nerf du tunnel cubital. Par « tunnel cubital », on pense à la structure distale du sillon ulnaire où le nerf émerge pour passer au canal submusculaire formé par l'aponévrose du fléchisseur carpien ulnaire et le ligament médial de l'articulation du coude. L'hypermobilité du coude par rapport à l'extension et à la flexion contribue probablement dans ces cas à l'accroissement des symptômes. Les symptômes disparaissent entièrement d'un côté et diminuent de l'autre après le placement intramusculaire profond du

nerf ulnaire. Il a été surprenant de constater que la position crochue des doigts a disparu immédiatement après l'opération.

ZUSAMMENFASSUNG

Der Verfasser beschreibt einen Fall von doppelseitiger traumatischer Neuritis des N. ulnaris, die durch wiederholte, allmähliche Kompression des Nerven im Ellbogenkanal hervorgerufen wurde. Unter dem Ausdruck Ellbogenkanal versteht man die Struktur distal vom sulcus ulnaris wo der Nerv in den submuskulären Kanal eintritt, der von der Aponeurose des Flexor carpi ulnaris und dem medialen ligament des Ellbogengelenkes gebildet wird. Überbeweglichkeit des Ellbogens im Streck- und Beugungsbereich haben in diesem Falle wahrscheinlich zur Entwicklung der Symptome beigetragen. Die Symptome verschwanden vollständig auf einer und verringerten sich auf der anderen Seite nach tiefer intramuskulärer Verlegung des N. ulnaris. Es war überraschend, dass die Klauenstellung der Finger unmittelbar nach der Operation verschwand.

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