Ulnar nerve entrapment

General information

Ulnar nerve has components of C7, C8, and T1 nerve roots. Even though this is the second most prevalent entrapment neuropathy after CTS, it is still relatively uncommon. Potential sites of compression:

1. above elbow: possibly by the arcade of Struthers

2. at the elbow: retroepicondylar groove ("ulnar groove"): between the medial epicondyle and the olecranon process. Compression by fascia or by dynamic compression or repetitive trauma. This is also the location of the "funny bone" where the nerve can be acutely impacted to produce transient numbness and tingling in the 2 little fingers

3. cubital tunnel: just distal to the ulnar groove, under the aponeurosis spanning the heads of the flexor carpi ulnaris (FCU) known as Osborne's ligament or cubital tunnel retinaculum

4. at the point of exit from the FCU

5. wrist: Guyon's canal.

Etiologies

Structural, mechanical or idiopathic.

Epidemiology

It is the second most common reason for peripheral nerve entrapment neuropathy in the upper limb. It is more common in certain occupations. Patients who have diabetes and those who have sustained injuries or degenerative changes around the elbow are also at increased risk.

Median or ulnar nerve dysfunction can occur from compression by a pseudoaneurysm of the proximal axillary artery.

Clinical features

Motor findings include:

1. wasting of the interossei may occur, and is most evident in the first dorsal interosseous (in the thumb web space)

2. Wartenberg's sign: one of the earliest findings of ulnar nerve entrapment (abducted little finger due to weakness of the third palmar interosseous muscle–patient may complain that the little finger

doesn’t make it in when they reach into their pocket)

3. Froment’s prehensile thumb sign: grasping a sheet of paper between thumb and the extended index finger results in extension of the proximal phalanx of the thumb and flexion of the distal phalanx as a result of substituting flexor pollicis longus (which is spared since it is innervated by anterior interosseous nerve) for the weak adductor pollicis

4. claw deformity of the hand (main en griffe): in severe ulnar nerve injuries on attempted finger extension (some have called this “benediction hand,” which differs from that with the same name in median nerve injury where the named sign occurs on trying to make a fist. Fingers 4 and 5 and to a lesser extent 3 are hyperextended at the MCP joints (extensor digitorum is unopposed by interossei and “ulnar” lumbricals III & IV) and flexed at the interphalangeal joints (due to pull of long flexor muscles). NB: C8 radiculopathy can also cause benediction sign)

Sensory findings: Disturbance of sensation involving:

1. The little finger and ulnar half of the ring finger

2. Sensory loss over the ulnar side of the dorsum of the hand. This will be spared in ulnar nerve entrapment at the wrist (dorsal ulnar cutaneous nerve branches proximal to the wrist)

Diagnosis

Diagnostic ultrasound

Localizing ulnar nerve lesions with electrodiagnostic studies can be difficult. There has been a recent renewed interest in diagnostic ultrasound using high frequency (18 MHz) probes to help with localization, and also for identification of pathology, including nerve swelling, transection, and neuroma, that exceeds MRI in some aspects and at a lower cost and with faster acquisition time.

Treatment

Ulnar nerve entrapment treatment.

Anatomical studies

Majid et al. from Pennsylvania State University College of Medicine, Hershey, performed a cadaveric dissection of 48 elbow specimens as if performing a cubital tunnel release. They assessed the presence of the crossing motor branch of the ulnar nerve and measured the distance from the medial epicondyle to the branch takeoff and its target of innervation.

Of 48 specimens, 34 (71%) were noted to have a crossing motor branch at the compression area by the deep flexor carpi ulnaris muscle fascia (common aponeurosis). On average, the distance from the medial epicondyle to the branch originating from the ulnar nerve was 18.2 mm, and to the target muscle innervation was 28.4 mm.

Identifying this branch is important for performing a cubital tunnel release, and awareness of this anatomy during ulnar nerve decompression procedures may help avoid injury to this motor branch [1)]

Case series

2017

Between January 2010 and March 2015, 42 consecutive cases of CuTS with atrophy of the intrinsic hand muscles were surgically treated in the Department of Neurosurgery, Goethe University, Frankfurt, Germany.

Clinical data of the treatment course and postoperative results were collected. Follow-up was prospectively assessed according to McGowen grading and Bishop outcome score. Mean follow-up time was 39.8 (±17.0) months.

All patients were treated with in situ decompression; in 33%, submuscular transposition was performed. Forty-five percent showed improvement of sensory deficits and 57% showed improvement of motor deficits 6 months after the operation. Atrophy improved in 76%. At the time of follow-up, 79% were satisfied with the postoperative result and 77% of patients reached good or excellent outcome according to modified Bishop rating scale. Patients with improvement of atrophy had significantly shorter symptom duration period (7 ± 10 months vs 26 ± 33 months; $p < 0.05$). In the case of intraoperative pseudoneuroma observation, atrophy improvement was less likely ($p < 0.05$).

In severe cases of CuTS with atrophy of the intrinsic hand muscles, surgical treatment enables improvement of sensory function, motor function and atrophy even in cases with muscular atrophy. Atrophy improvement was more likely in cases of short symptom duration and less likely in cases with pseudoneuroma [2)].

2015

54 patients underwent ulnar nerve decompression for 56 cubital tunnel syndromes from October 2008 to April 2011. All patients presented with typical clinical and neurophysiological findings and underwent preoperative nerve ultrasonography. They were randomized for either endoscopic (n = 29) or open (n = 27) surgery. Both patients and the physician performing the follow-up examinations were blinded. The follow-up took place 3, 6, 12, and 24 months postoperatively. The severity of symptoms was measured by McGowan classification and Dellon Score, and the clinical outcome by modified Bishop Score. Additionally, the neurophysiological data were evaluated.

No differences were found regarding clinical or neurophysiological outcome in both early and late follow-up between both groups. Hematomas were more frequent after endoscopic decompression (P = .05). The most frequent constrictions were found at the flexor carpi ulnaris (FCU) arch and the retrocondylar retinaculum. We found no compressing structures more than 4 cm distal from the sulcus in the endoscopic group. The outcome was classified as “good” or “excellent” in 46 out of 56 patients (82.1%). Eight patients did not improve sufficiently or had a relapse and underwent a second surgery.

The endoscopic technique showed no additional benefits to open surgery. We could not detect relevant compressions distal to the FCU arch. Therefore, an extensive far distal endoscopic

decompression is not routinely required. The open decompression remains the procedure of choice at our institution [3].

Case reports

A case of a 33-year-old female with a chronic loss of the ulnar nerve function for 8 years after traumatic laceration. After that, she regained the functions of ulnar nerve after nerve stimulation by peri-ulnar nerve injection of methylprednisolone and lidocaine. The theory behind using steroids is related to the fact that the immune system could induce a secondary injury that interferes with the recovery. Many studies have shown effectiveness in using steroids alone or when combined with other substances on nerve regeneration in animal models. Bani Hani et al. believed that this is the first report of nerve recovery using local steroidal injections after a traumatic injury [4].

In cases of ulnar nerve compression at the cubital tunnel, both neurolysis and transposition are effective in improving clinical outcome. The only statistically significant advantage of neurolysis over transposition seems to be relief of localized elbow pain. Kamat et al,recommend neurolysis as the preferred procedure [5].

There are correlation between 3-Tesla magnetic resonance neurography (MRN) and surgical findings in two patients who underwent multiple previous failed ulnar nerve surgeries. MRN correctly localized the site of the abnormality. Prospectively observed MRN findings of perineural fibrosis, ulnar nerve re-entrapment abnormalities, medial antebrachial cutaneous neuroma and additional median nerve entrapment were confirmed surgically [6].

1)
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5)
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6)

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