



Ulnar Neuropathy at the Upper Arm after Parallel-Bars Swinging Exercise

Yong Kyun Kim
In-Woo Park
Suho Ro
Yun Hyeong Jeong
Bum Chun Suh

Department of Neurology,
Kangbuk Samsung Hospital,
Sungkyunkwan University
School of Medicine,
Seoul, Korea

Dear Editor,

Entrapment of the ulnar nerve at the elbow is the second most common type of compression neuropathy in the arm, but it is unusual at the upper arm. Here we report a rare case of isolated ulnar neuropathy at the upper arm caused by parallel-bars exercise.

A 62-year-old male patient was referred to our clinic due to 1-month history of weakness and tingling sensation in the left hand without trauma. Mild C5–C7 stenosis had previously been found in MRI, with surgery being recommended. The patient was left-handed and very thin, with a body mass index of 18.2 kg/m². A neurologic examination revealed weakness of the left ulnar innervated muscles (MRC grade II) and hypesthesia at the exact ulnar nerve dermatome without Tinel's sign at the elbow. No bony abnormality was seen on an X-ray. A nerve conduction study (NCS) revealed left ulnar neuropathy with conduction block at the midarm, and ultrasonography showed enlargement of the left ulnar and median nerves at the midarm (Fig. 1). An NCS of the median nerve produced normal findings. These findings together indicate that his symptoms resulted from ulnar neuropathy at the upper arm rather than cervical radiculopathy. We obtained additional history information that the patient had started performing a daily swinging exercise with an 'upper arm support' position on parallel bars (Fig. 1) at 1 month before the symptoms appeared. We advised the patient to stop the exercise and not to receive surgery. Two months later his hand weakness had improved to MRC grade III or IV. Follow-up NCS and ultrasonography showed recovery of the conduction block and nerve swelling (Fig. 1).

Physical and electrophysiologic examinations and the clinical course helped to localize the lesion at the ulnar nerve of the upper arm. The left-handedness of the patient combined with subsequent greater weight-bearing on his left side might have caused the unilateral involvement. The median nerve was enlarged without electrodiagnostic abnormality. Considering that ultrasonographic changes sometimes precede electrodiagnostic changes, nerve enlargement without NCS abnormality seems an acceptable conclusion. However, anatomical considerations were required to explain why the conduction block and impairment were only found in the ulnar nerve.

The ulnar nerve runs along the posteromedial aspects of the humerus. In the midarm, the medial intermuscular septum (MIS) divides the upper arm into anterior and posterior compartments, with the ulnar nerve crossing the septum to the posterior part. The ulnar nerve then passes through a fibrous canal called the arcade of Struthers (AS), which is a thin ligamentous structure involving either thickening of the brachial fascia or muscle fibers extending from the medial head of the triceps muscle to the MIS.¹

Cases of spontaneous ulnar entrapment neuropathy caused by the MIS or AS have been consistently reported.^{2,3} The tightest point is about 10 cm proximal to the medial epicondyle, which is the proximal end of the AS or where the nerve pierces the MIS.^{2,3} However, some anatomical studies have found that the point could be up to 15 cm from the medial

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Correspondence

Bum Chun Suh, MD, PhD
Department of Neurology,
Kangbuk Samsung Hospital,
Sungkyunkwan University
School of Medicine,
29 Saemunan-ro, Jongno-gu,
Seoul 03181, Korea
Tel +82-2-2001-2101
Fax +82-2-2001-1938
E-mail bcsuh@skku.edu

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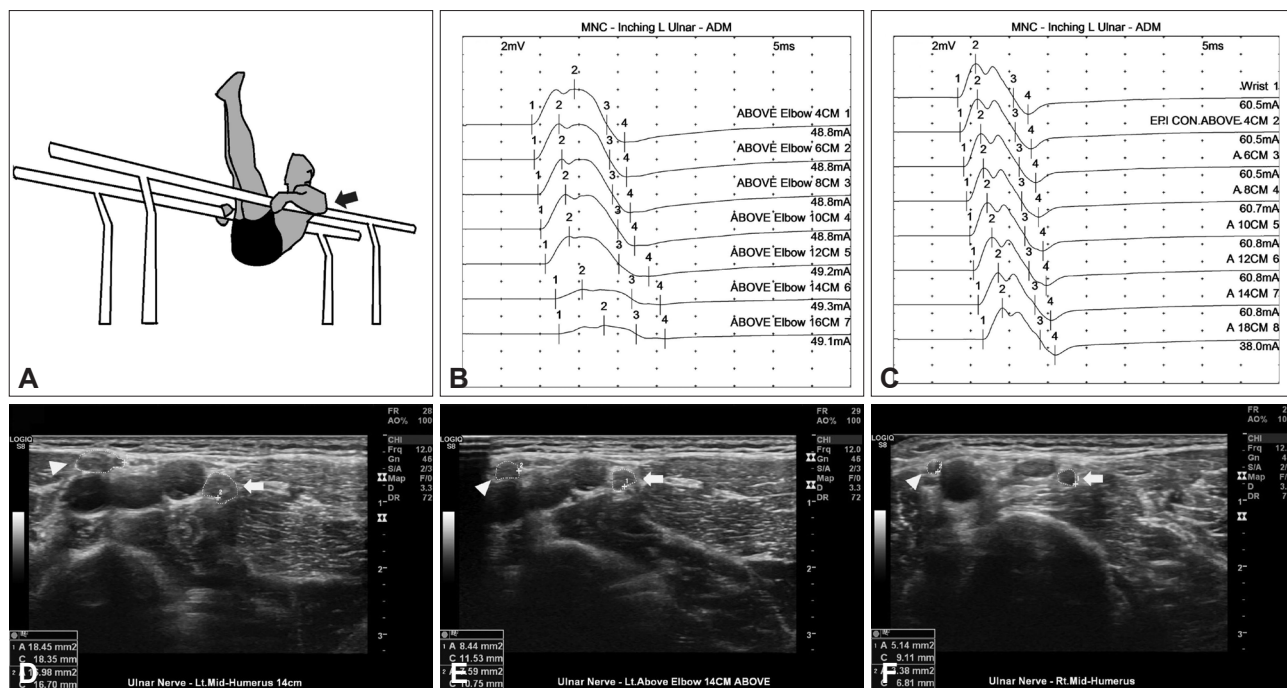


Fig. 1. Ulnar neuropathy at the midarm after exercising on parallel bars. A: The midarm support position on parallel bars (arrow). B: A conduction block was found between 12 and 14 cm above the elbow in the left ulnar nerve in the initial NCS. C: This conduction block had recovered in a follow-up NCS. D: Enlarged cross-sectional area of the left ulnar (arrow) and median (arrowhead) nerves in initial ultrasonography. E: Decreased cross-sectional area of the left ulnar (arrow) and median (arrowhead) nerves in follow-up ultrasonography. F: Cross-sectional area of the unaffected right ulnar (arrow) and median (arrowhead) nerves for control. NCS: nerve conduction study.

epicondyle.^{4,5} This anatomical course may have resulted in the electrophysiologic findings differing between the ulnar and median nerves under the same compression force. Although there is no previous report of ulnar neuropathy at the upper arm caused by extrinsic compression published in the English literature, we posit that it is likely to occur at the same point as primary entrapment.

To our knowledge, this is the first reported case of ulnar neuropathy at the upper arm caused by an external compressive force without trauma or a space-occupying lesion. Not only could the MIS or AS provoke primary entrapment, but it could also be a point that is vulnerable to compressive forces on the medial aspect of the upper arm.

Author Contributions

Conceptualization: Bum Chun Suh, Yong Kyun Kim. Investigation: Bum Chun Suh, Yong Kyun Kim. Supervision: Bum Chun Suh. Visualization: Yong Kyun Kim. Writing—original draft: Yong Kyun Kim. Writing—review & editing: In-Woo Park, Suho Ro, Yun Hyeong Jeong.

ORCID iDs

Yong Kyun Kim

<https://orcid.org/0000-0002-8666-2405>

In-Woo Park
Suho Ro
Yun Hyeong Jeong
Bum Chun Suh

<https://orcid.org/0000-0002-5628-5274>
<https://orcid.org/0000-0003-3378-561X>
<https://orcid.org/0000-0001-5277-3978>
<https://orcid.org/0000-0002-3947-5615>

Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

REFERENCES

- Bingol UA, Cinar C, Arslan H, Oksuz S, Cetinkale O. Origin, reality, and clinical importance of the arcade of Struthers: an anatomic study. *Ann Plast Surg* 2015;75:430-434.
- Nakajima M, Ono N, Kojima T, Kusunose K. Ulnar entrapment neuropathy along the medial intermuscular septum in the midarm. *Muscle Nerve* 2009;39:707-710.
- Sivak WN, Hagerty SE, Huyhn L, Jordan AC, Munin MC, Spiess AM. Diagnosis of ulnar nerve entrapment at the arcade of Struthers with electromyography and ultrasound. *Plast Reconstr Surg Glob Open* 2016;4:e648.
- Tubbs RS, Deep A, Shoja MM, Mortazavi MM, Loukas M, Cohen-Gadol AA. The arcade of Struthers: an anatomical study with potential neurosurgical significance. *Surg Neurol Int* 2011;2:184.
- Won HS, Han SH, Oh CS, Chung IH, Kim SM, Lim SY. Topographic relationship between the medial intermuscular septum and the ulnar nerve in the upper arm. *J Neurosurg* 2011;114:1534-1537.