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Case Report Open Access

Isolated Compression of Deep Palmar Branch of Ulnar Nerve by a Midpalmar Ganglion: A Rare Case Report

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Abstract

Isolated compression of deep palmar branch of Ulnar Nerve (UN) by a midpalmar ganglion is very rare but treatable cause of ulnar neuropathy. We present such a case in a 24-year-old man with progressive hand weakness but no sensory loss had a clinical diagnosis of deep palmar branch lesion of the UN. MRI clearly showed a ganglion arising from the volar and ulnar aspect of base of 4th carpometacarpal joint causing compression of the deep motor branch of the UN with secondary denervation changes of dorsal interosseous muscle and nerve edema distal to the site of compression. We also discuss the anatomy of the region and a review of the reported cases of deep branch of UN compression.

Keywords: Compressive neuropathy; Deep branch of ulnar nerve; Ganglion; Magnetic Resonance Imaging (MRI)

Introduction

UN lesions in the wrist and hand can cause a variety of different clinical findings, depending on precise location. Findings might range from a pure sensory deficit to pure motor syndromes with weakness that may or may not involve the hypothenar muscles. This depends on whether the lesion involves the main trunk, the sensory branch only, or the deep palmar branch at different sites from just at the hypothenar muscles to the lateral palm. UN compression at the wrist can be caused by a variety of intrinsic and extrinsic factors [1]. Isolated compression of only the deep branch of UN by a ganglion is very rare [1,2]. We describe the clinical, neurophysiological and MRI findings in a patient with a clinical diagnosis of deep palmar branch lesion of UN. The purpose of this case report is to describe the MR imaging characteristics, presenting symptoms and electrophysiological findings with emphasis on the MR imaging anatomy of UN at wrist and palm.

Case Report

A 24-year-old gentleman presented to neurology outpatient department with a gradually worsening weakness and paraesthesia in the fourth and fifth digits of the right hand. On examination, light-touch sensation and two-point discrimination were intact throughout the hand, including UN distribution. The Froment's sign was positive. The hypothenar musculature was intact. A clinical diagnosis of deep branch of UN palsy was made, and Electromyography (EMG) was done. EMG study showed severe denervation of the deep branch of the UN. Further MRI of the wrist was acquired to look for space occupying lesion impinging upon the UN. The MRI of the wrist showed a multiloculated cystic lesion at proximal 4th and 5th metacarpal levels with proximal elongated neck like extension into the volar and ulnar aspect of 4th carpometacarpal joint (Figures 1A-1C). This cystic lesion was compressing the deep branch of UN distal to the hypothenar muscle innervation. Mild T2 STIR (short tau inversion recovery) hyperintensity in the deep branch of UN just distal to the site of compression likely to be nerve edema was noted. Mild atrophy with hyperintensity in the 4th dorsal interosseous muscle suggestive of denervation hyperintensity (Figure 2). Final diagnosis of ganglion cyst of the palm arising from volar and ulnar aspect of base of 4th carpometacarpal joint compressing the deep palmar branch of UN distal to the hypothenar muscle innervation was made.

Discussion

Compression of the deep motor branch of the UN was first described by Bowers and Hurst in 1979 [3]. In 1952, Seddon presented a case in which a ganglion arising from the pisohamate joint caused compression of the deep branch of UN distal to the hypothenar muscle innervations [2].

Guyon's canal is located at the proximal part of the hand radial to the pisiform bone contains the UN and artery [4]. Distal UN bifurcates an average distance of 10 to 12 mm distal to the proximal margin of the pisiform bone [4]. The distal Guyon's canal is divided into three zones (Figures 3A-3D) [5]. Zone 1 is that portion of the tunnel proximal to the bifurcation of the UN where the nerve carries both motor and sensory fibres and thus compression in this zone leads to combined motor and sensory deficits. Zone 2 encompasses the deep motor branch of the nerve distal to bifurcation where the nerve carries only motor fibres and leads to a pure motor neuropathy [5]. Further location of the lesions within Zone 2, in which lesion just distal to bifurcation but proximal to the branch to the hypothenar results in paralysis of the intrinsic muscles, distal to the hypothenar innervation where sparing of hypothenar occur and further distally where the lesion occurs just proximal to the branches going to the first dorsal interosseous and adductor pollicis muscles. Zone 3 surrounds the superficial branch where neuropathy leads to only sensory deficits [5]. MRI is the imaging modality for the evaluation of ulnar neuropathy.

Entrapment syndrome is neuropathy due to a structural abnormality, such as compression, displacement, or traction of the nerve, or by an intrinsic abnormality of the nerve, such as a nerve cell tumor. The diagnosis is suspected clinically, and the role of imaging is to identify the abnormality causing the entrapment or to show secondary findings such as nerve flattening or swelling or muscle edema or atrophy that

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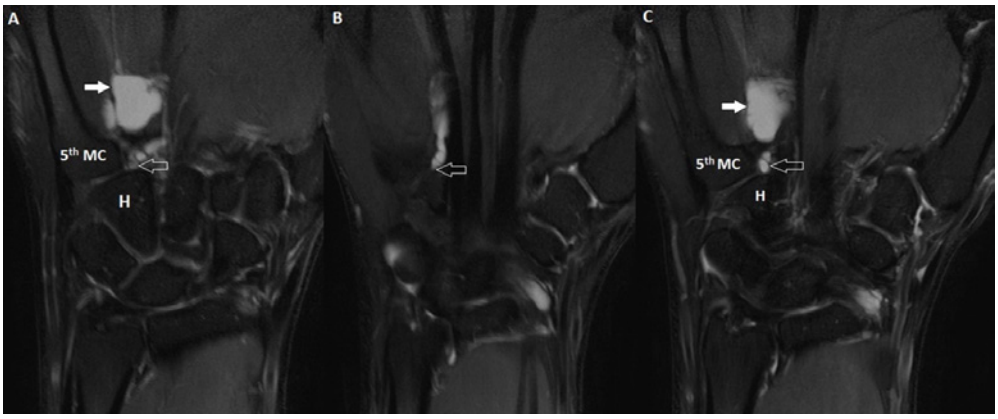

MC=Metacarpal; H=Hamate

Figure 1 A-C: Coronal T2 STIR (short tau inversion recovery) MR images demonstrate a multilobulated cystic structure (white arrows) at the level of proximal half of metacarpals originating from the volar and ulnar aspect of the fourth carpometacarpal joint (open arrows).

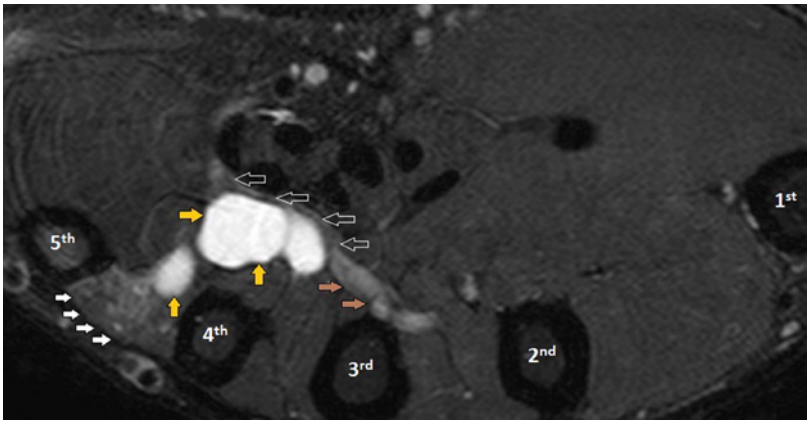

Figure 2: Axial T2 STIR (short tau inversion recovery). MR image depicts a multilobulated cystic structure (yellow arrows) at the volar aspect of the diaphysis of the fourth metacarpal and fourth intermetacarpal space and deep to the flexor tendons impinging upon the deep palmar branch of ulnar nerve (open arrows) distal to hypothenar innervation. Mild hyperintensity and swelling of the nerve (brown arrows) just distal to compression. Note the mild atrophy and denervation hyperintensity of fourth dorsal interosseous muscle (white arrows).

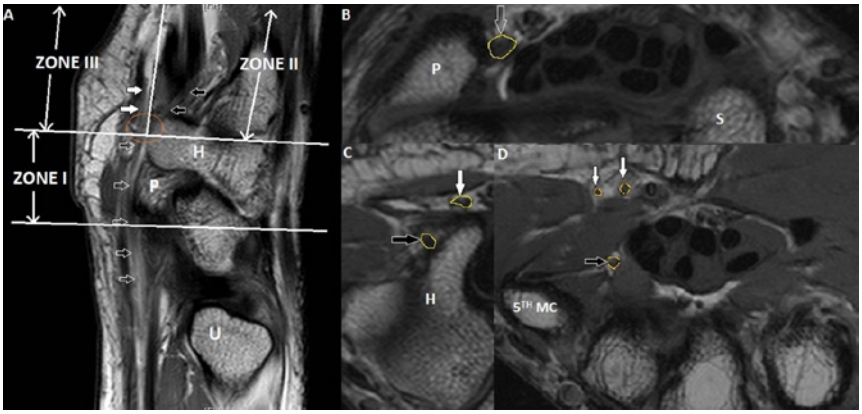

Figure 3 A-D: A: Sagittal T1-weighted MR image divides the sites of ulnar nerve compression in Guyon's canal into 3 zones. Distal ulnar nerve bifurcates (brown circle) an average distance of 10 to 12 mm distal to the proximal margin of the pisiform (P) bone. In zone 1, nerve (open arrows) compression proximal to bifurcation leads to mixed motor and sensory symptoms. In zone II symptoms are purely motor and restricted to muscles innervated by the deep ulnar motor branch (black arrows) and in zone III symptoms are purely sensory due to involvement of superficial sensory branch (white arrows).
B-D: Axial T1-weighted MR images show ulnar nerve (open arrow) in proximal Guyon's canal, radial to pisiform (P) and ulnar to ulnar artery in B; Nerve divides into the superficial sensory (white arrow) and deep motor (black arrow) branches at the level of hamate (H) or distal part of canal in C; further distally, distal to hypothenar innervation the deep palmar branch (black arrow) and of superficial sensory branches (white arrows) of ulnar nerve in D.

confirm or support the diagnosis [6]. Compressive neuropathies of the UN occur mostly at elbow and less commonly at wrist. Various causes of UN compression at wrist include ganglion, trauma, giant cell tumors, neurofibromas, intraneural cysts, anomalous muscles, thrombosis, bursitis, thickened pisohamate ligament and rarely by Guyon's canal lipoma [7,8]. In most cases, a ganglion compressing the UN arises from the level of the pisiform–hamate–triquetral complex or slightly distal to it [9]. Midpalmar ganglion originating from the carpometacarpal joint is a rare cause of isolated compression of deep branch of UN distal to Guyon's canal [2,10]. To the best of our knowledge, only few such cases of ulnar neuropathy have been reported to date [2,10]. This is another such rare case with compression of the deep motor branch of the UN distal to Guyon's canal and hypothenar innervation (zone 2) [10] by a ganglion originating from volar and ulnar aspect of base of 4^{th} carpometacarpal joint. MRI is extremely helpful in identifying the origin of ganglion cyst and its relationship to the deep branch of the UN as seen in our case and thus aids in surgical planning and excision.

Conclusion

Midpalmar ganglion arising from the carpometacarpal joint is an uncommon cause of isolated compression of deep branch of UN. MRI is a choice of modality for complete delineation including origin and extension of ganglion cyst thus aids in early treatment.

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