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TEST YOURSELF: ANSWER

Test yourself: weakness and wasting of forearm

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Discussion

Posterior interosseous nerve (PIN) syndrome is an uncommon neuropathic condition that occurs because of compression of the deep branch of the radial nerve within the radial tunnel. It is also referred to as supinator syndrome or deep radial nerve syndrome.

At the level of the elbow joint, the radial nerve divides into the superficial sensory branch and deep motor branch. The deep branch runs distally along the radial tunnel and then enters the supinator muscle. At the point where the nerve exits from the posterior aspect of the supinator muscle, it is referred to as the posterior interosseous nerve (PIN), which then courses distally along the dorsal aspect of interosseous membrane. However, some authors use the term PIN interchangeably with the deep branch of the radial nerve at the point of bifurcation. The PIN supplies most of the extensor muscles in the forearm, with the most common branching pattern to the extensor digitorum, extensor carpi ulnaris, extensor digiti minimi, abductor pollicis longus, extensor pollicis brevis, extensor pollicis longus and the extensor indicis muscles [1–3].

The most common site of compression is at the most distal point of the radial tunnel along the proximal margin of the supinator muscle, which is a either a membranous or tendinous band called the arcade of Frohse, the latter believed to form a fibrous arcade in response to repeated rotary movement of the forearm [1–3].

Radial nerve compression can result in either PIN syndrome or radial tunnel syndrome. It is not known why some patients develop one syndrome over the other. PIN syndrome describes clinical features of wasting and weakness of the extensor forearm, whereas radial tunnel syndrome is associated with a burning sensation along the lateral aspect of the elbow [2, 4].

This is a case of PIN syndrome, which was correlated with clinical and intra-operative findings. On clinical examination the patient had significant visible wasting of her forearm muscles in addition to the clinical history provided.

The MRI scan showed denervation oedema within the forearm extensor compartment on fluid sensitive sequence (SPAIR) and fatty atrophy of the extensor muscles on the T1 W sequence. A small rounded soft tissue abnormality was seen just proximal to the supinator origin, which demonstrated low T1 W and high T2 W signal characteristics (Figs. 1, 2, 3, 4). Dilatation of a nerve was suspected based on the MRI findings but no extrinsic cause for compression was identified. The literature suggests that a structural cause for PIN syndrome can be difficult to demonstrate on MRI. If the abnormal segment of radial nerve can be depicted, it may show high signal intensity on fluid-sensitive sequences; however the actual compressive structure may not be visualised [3].

An ultrasound scan was subsequently organised that demonstrated a significantly dilated deep branch of the radial nerve just proximal to the origin of the supinator with marked reduction in calibre as the nerve passed into the supinator muscle belly (Figs. 5, 6, 7). Appearances thus suggested pre-stenotic dilatation of the nerve due to entrapment in the region of the Arcade of Frohse. This segment of the nerve was very dilated in comparison with the normal nerve calibre more proximally at the level of the lateral intermuscular septum of the antecubital fossa (Figs. 6 and 7). Case reports of visualised abnormalities of PIN compression on ultrasound have been previously described [5, 6].

The US and MRI findings were confirmed intra-operatively where a very tight arcade of Frohse was found with dilatation of the deep branch of the radial nerve proximal to this. The arcade was surgically released together with other potential constricting structures such as the leash of Henry and extensor carpi radialis brevis (ECRB) fascia. Three months following the operation, the patient has regained some degree of finger extension; however residual weakness unfortunately still remains, which is unsurprising given the extent of muscle atrophy at presentation.

The case presentation can be found at https://doi.org/10.1007/s00256-017-2862-8

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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