

Case Report: POSTERIOR INTEROSSEOUS NERVE COMPRESSION SYNDROME

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ABSTRAK

Kompresi saraf radial atau cedera dapat terjadi pada setiap titik sepanjang perjalanan saraf dalam ekstremitas atas. Penjeratan saraf radial atau cabang-cabangnya tersering pada lengan bawah proksimal dan pada siku. Variasi struktur anatomi di tingkat ini merupakan penyebab penting dari sindrom jeratan saraf radial. Kompresi saraf radial dan cabang-cabangnya di siku dapat mengakibatkan defisit motorik, sensorik, atau campuran. Cabang motorik sangat rentan terhadap cedera tekan, dan kompresi dari cabang ini dapat mengakibatkan berbagai presentasi klinis. Sindrom saraf interoseus posterior bisa dikira radikulopati C7 dan lateral epicondylitis yang memiliki sensasi terbakar sepanjang aspek lateral lengan bawah. Entitas klinis kadang-kadang sulit dibedakan pada pemeriksaan fisik. Pencitraan MR berperan penting untuk menggambarkan jeratan saraf dengan mengidentifikasi edema otot, atrofi, dan infiltrasi lemak serta mendeteksi penyebab jebakan. Artikel ini melaporkan kasus laki-laki berusia 25 tahun dengan nyeri persisten pada lengan bawah setelah jatuh 2 tahun sebelum MRS. Pada pemeriksaan fisik, terdeteksi melemahnya perpanjangan jari-jari dan pergelangan tangan. Tidak terdapat defisit sensorik dan tidak ada riwayat pengobatan yang tepat diambil sebelumnya. Pemeriksaan MRI dilakukan untuk mendeteksi kelainan pada lengan bawah dan siku. Kesimpulannya, kompresi saraf interoseus posterior dapat menyebabkan berbagai gejala klinis. Timbulnya rasa sakit atau kelemahan sering membahayakan, sehingga presentasi klinis membingungkan. MRI berguna dalam mengidentifikasi perubahan sinyal otot sesuai dengan denervasi, faktor anatomi yang berkontribusi, dan massa atau lesi lain yang dapat mengakibatkan jeratan saraf. (FMI 2012;48:37-42)

Kata kunci: sindrom kompresi saraf interoseus posterior, PIN, saraf radial

ABSTRACT

Radial nerve compression or injury can occur at any point along the course of the nerve within the upper extremity. Entrapment of the radial nerve or its branches is most common within the proximal forearm and at the elbow. Variations in anatomic structures at this level are an important cause of radial nerve entrapment syndromes. Compression of the radial nerve and its branches at the elbow can therefore result in motor, sensory, or mixed deficits. The motor branch is particularly vulnerable to compressive injury, and compression of this branch may result in a variety of clinical presentations. Posterior interosseous nerve syndrome can be mistaken for a C7 radiculopathy and lateral epicondylitis which has a burning sensation along the lateral aspect of the forearm. The clinical entities sometime are difficult to distinguish on physical examination. MR imaging plays an important role to depicting nerve entrapment by identifying muscle edema, atrophy, and fatty infiltration as well as detecting the cause of entrapment. This paper reported a case of male 25 year old with persistent pain at the forearm after a fall 2 years before admission. On physical examination, a weakening of the extension of the fingers and wrist was detected. There was no sensory deficit noted and no history of appropriate treatment taken previously. MRI examination was performed to detect the abnormality of the forearm and elbow. In conclusion, compression of the posterior interosseous nerve can result in a variety of clinical symptoms. The onset of pain or weakness is often insidious, resulting in a confusing clinical presentation. MRI is useful in identifying muscle signal changes in keeping with denervation, contributory anatomic factors, and masses or other lesions that may result in nerve entrapment. (FMI 2012;48:37-42)

Keywords: posterior interosseous nerve compression syndrome, PIN, radial nerve

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INTRODUCTION

Radial nerve compression or injury can occur at any point along the course of the nerve within the upper extremity. There are radial tunnel, posterior interosseous, and superficial radial nerve syndromes have been explained as the cause of radial neuropathy.

Entrapment of the radial nerve or its branches is most common within the proximal forearm and at the elbow. Variations in anatomic structures at this level, particularly the supinator muscle, are an important cause of radial nerve entrapment syndromes. The radial nerve bifurcates just above the level of the elbow, dividing into motor and sensory branches. Compression of the

radial nerve and its branches at the elbow can therefore result in motor, sensory, or mixed deficits. The motor branch (posterior interosseous nerve) is particularly vulnerable to compressive injury, and compression of this branch may result in a variety of clinical presentations. Posterior interosseous nerve syndrome can be mistaken for a C7 radiculopathy (distinguish by looking for weakness of triceps and wrist flexors in a C7 radiculopathy) and lateral epicondylitis which has a burning sensation along the lateral aspect of the forearm. Whereas patient with posterior interosseous nerve syndrome presents with weakness of the extensor muscles of the forearm. The clinical entities sometime are difficult to distinguish on physical examination. MR imaging plays an important role to depicting nerve

entrapment by identifying muscle edema, atrophy, and fatty infiltration as well as detecting the cause of entrapment.

CASE REPORT

We reported a case of male 25 year old with persistent pain at the forearm after a fall 2 years before admission. On physical examination, a weakening of the extension of the fingers and wrist was detected. There was no sensory deficit noted and no history of appropriate treatment taken previously. MRI examination was performed to detect the abnormality of the forearm and elbow. Marker was placed at the complained site.

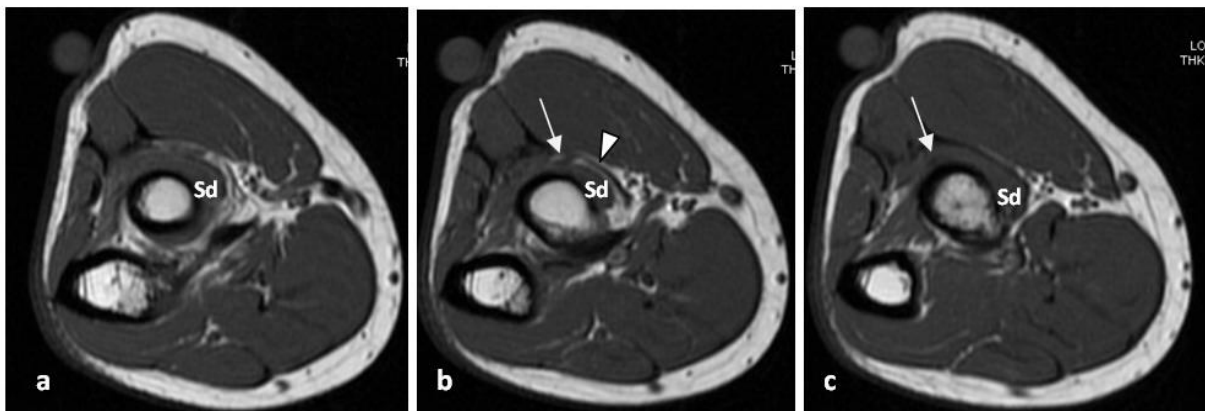


Figure 1a,b,c. Axial T1-weighted images in the proximal forearm showed the posterior interosseous nerve (white arrow) is identified between the deep head of the supinator (Sd) and the tendinous proximal edge of the superficial head of the supinator muscle (arcade of Frohse) (arrow head).

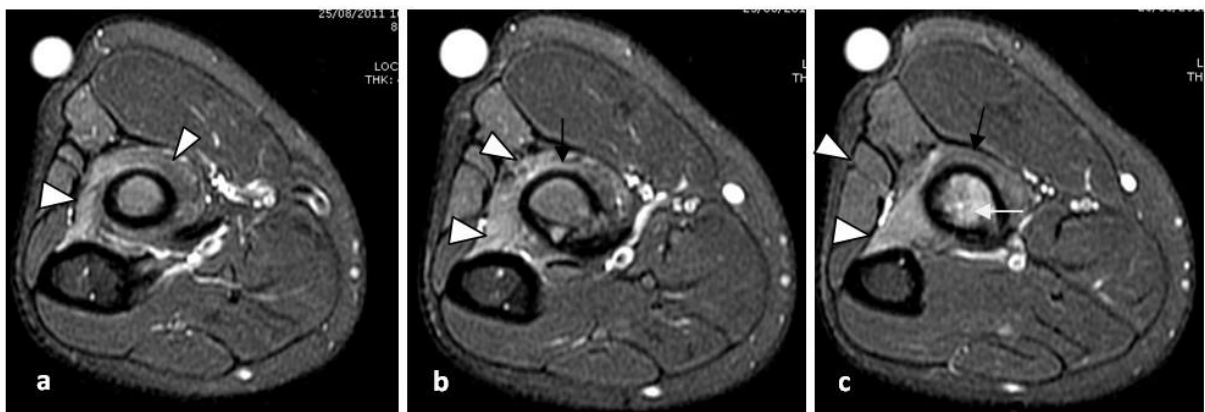


Figure 2a,b,c. Axial fat-suppressed T2-weighted images in the proximal forearm demonstrated atrophy and edema of the supinator and extensor carpi ulnaris (arrow head) in this patient with proximal posterior interosseous nerve entrapment (black arrow). Bone marrow edema was also detected at proximal radius (white arrow).



Figure 3 a,b,c,d. Sagittal, coronal fat-suppressed T2-weighted images in the forearm demonstrated atrophy and edema of the supinator (black arrow) . Bone marrow edema was also detected at proximal radius (white arrow).



Figure 4 a,b. Sagittal T1-weighted and sagittal fat-suppressed T2-weighted images in the forearm demonstrated mild periosteal thickening with sclerotic signal with hypointense – both sequences at anterior site of proximal radius, in keeping with healed fracture (white arrow).

DISCUSSION

Posterior interosseous nerve syndrome also known as supinator entrapment syndrome is an entrapment of the deep branch of the radial nerve just distal to the elbow joint. The posterior interosseous nerve passes deep in relation to the arcade of Frohse (the proximal aspect of the supinator muscle, superficial head) (Hill & Hall 1999, Lubahn & Cermak 1998, Chien et al 2003) and subsequently branches to supply the finger and thumb extensors, extensor carpi ulnaris, and the abductor pollicis longus (Lubahn & Cermak 1998, Chien et al 2003) (Figure 5,6). Normal anatomy of radial nerve and its branches on MR images shown at Figure 7,8,9,10.

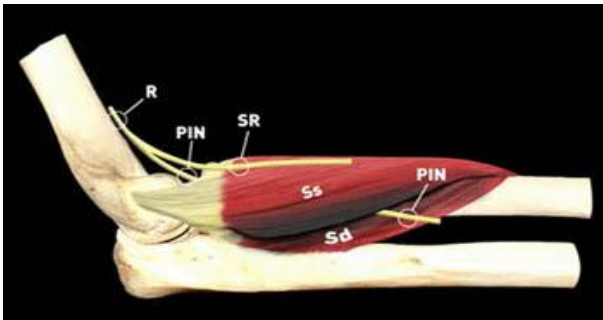


Figure 5. A lateral rendering of the elbow demonstrates the bifurcation of the radial nerve (R) into the posterior interosseous nerve (PIN) and superficial radial nerve (SR). The posterior interosseous nerve (PIN) passes between the superficial (Ss) and deep (Sd) heads of the supinator muscle before exiting into the posterior compartment of the forearm.

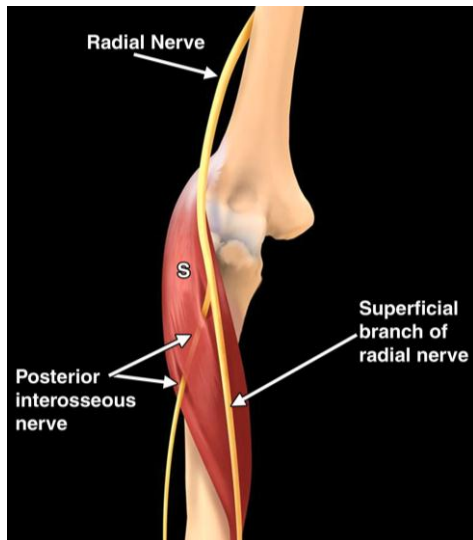


Figure 6. Anterior rendering of the elbow demonstrates the bifurcation of the radial nerve into the

posterior interosseous nerve and superficial branch of radial nerve. The posterior interosseous nerve (PIN) passes between the superficial and deep heads of the supinator muscle before exiting into the posterior compartment of the forearm.

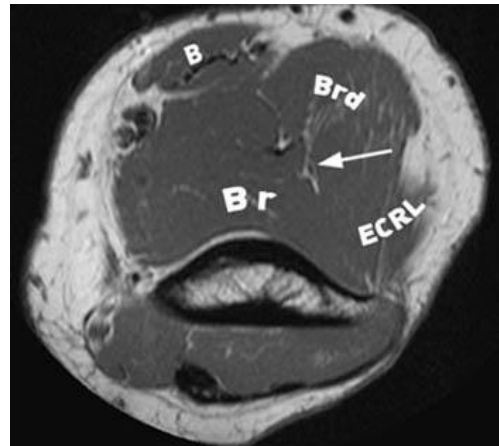


Figure 7. Normal anatomy of radial nerve. Axial T1-weighted images above the elbow; the radial nerve (arrow) lies between the brachioradialis (Brd) and brachialis muscles (Br) and is typically outlined by a small layer of fat on axial T1-weighted images. The biceps (B) and extensor carpi radialis longus (ECRL) muscles are also indicated

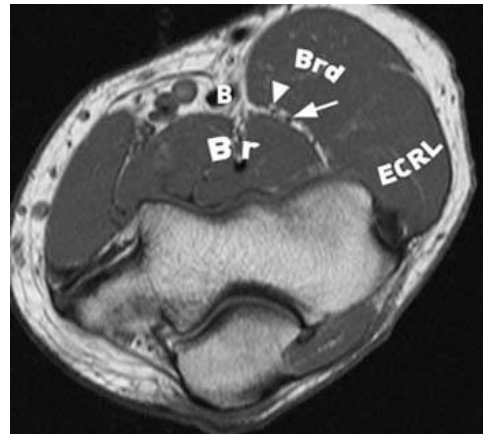


Figure 8. An axial T1-weighted image just above the elbow joint demonstrates that the radial nerve has bifurcated into the superficial radial nerve (arrowhead) and posterior interosseous nerve (arrow). The brachioradialis (Brd), brachialis (Br), the extensor carpi radialis longus (ECRL) muscles and the biceps tendon (B) are indicated.

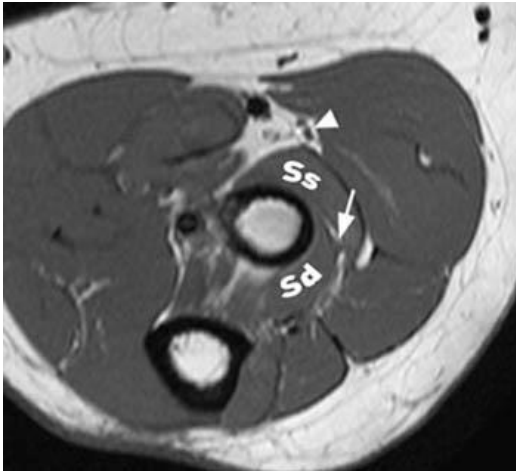


Figure 9. An axial T1-weighted image distal to the radiocapitellar joint demonstrates the posterior interosseous nerve (arrow) between the superficial (Ss) and deep (Sd) heads of the supinator muscle. The superficial radial nerve (arrowhead) courses between the supinator and brachioradialis muscles into the distal forearm.



Figure 10. The posterior interosseous nerve (arrowhead) is identified between the deep head of the supinator (Sd) and the tendinous proximal edge of the superficial head of the supinator muscle (arcade of Frohse) (arrow).

It might be caused by entrapment of the nerve within supinator muscle including fractures or dislocation of the radial head, tumors, ganglia, radiocapitellar synovitis, bicipital bursitis, and iatrogenic causes resulting from open reduction/internal fixation (Lubahn & Cermak 1998).

Entrapment of the radial nerve proximal to its bifurcation produces both motor and sensory deficits resulting in pain in the forearm, weakness of finger and wrist extension, and eventual muscle atrophy. Entrapment distal to the radial nerve bifurcation results in distinct clinical presentations depending on the branch affected (Lubahn & Cermak 1998, Spinner 1968, Barnum et al 1996). Patients with compression of the superficial branch of the radial nerve may complain of pain in the distal forearm and hand paresthesias, the clinical entity known as Wartenberg syndrome. In contrast, posterior interosseous nerve syndrome manifests with the gradual onset of weakness of muscles supplied by the posterior interosseous nerve. Pain may be present but is often not a primary feature, and there is no sensory deficit. On physical exam, the patient has weakness of extension of the digits and wrist. There are 5 potential sites of posterior interosseous nerve entrapment. They are: the arcade of Frohse (1), the radiocapitellar capsule (2), small recurrent vessels that cross the posterior interosseous nerve (leash of Henry) (3), the fibrous edge of the extensor carpi radialis brevis (4), and the distal margin of the supinator muscle (5). Of these, the proximal tendinous edge of the supinator muscle (arcade of Frohse) is the most frequent site of posterior interosseous nerve entrapment (Spinner 1968) (Figure 11).

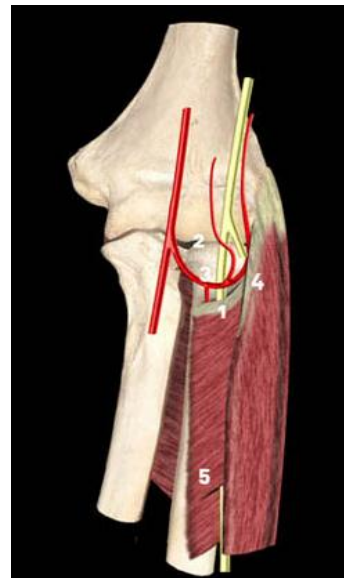


Figure 11. The anterior rendering of the elbow demonstrates the potential sites of posterior interosseous nerve entrapment. They are: the arcade of Frohse (1), the radiocapitellar capsule (2), small recurrent vessels that cross the posterior interosseous nerve (leash of Henry) (3), the fibrous edge of the extensor carpi

radialis brevis (4), and the distal margin of the supinator muscle (5).

In patients with posterior interosseous nerve syndrome or radial tunnel syndrome, the anatomic variants that cause entrapment are often difficult to visualize with MRI. However, MRI is a modality of choice to visualize edema, atrophy, and fatty infiltration which accompany nerve entrapment and easily depicts the distribution the muscle of muscle involvement, thus assisting in localizing the level of entrapment (Chien et al 2003, Lubahn & Cermak 1998). In this case healed fracture at anterior site of proximal radius and post traumatic injury were considered as the cause of the posterior interosseous nerve entrapment, visualized on axial, sagittal T1-weighted, fat-suppressed T2-weighted images as sclerotic and periosteal thickening at anterior site of proximal radius, in keeping with previous trauma, associated with the presence of atrophy and edema of the supinator and extensor carpi ulnaris. Initial treatment of radial nerve entrapment is conservative, consisting of activity modification, anti-inflammatory medication and functional splinting . Decompression surgery is reserved if progression or no improvement within 6-12 weeks or for individuals with an underlying compressive lesion (Barnum et al 1996).

CONCLUSION

Compression of the posterior interosseous nerve can result in a variety of clinical symptoms. The onset of pain or weakness is often insidious, resulting in a confusing clinical presentation. MRI is useful in identifying muscle signal changes in keeping with denervation, contributory anatomic factors, and masses or other lesions that may result in nerve entrapment.

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