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Radial Tunnel Trap: Synovial Ganglion Causing Posterior Interosseous Nerve Syndrome

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Abstract **Case Report**

Posterior interosseous nerve syndrome is an uncommon compressive neuropathy of the deep motor branch of the radial nerve, typically presenting with motor deficit without sensory impairment. Among its causes, synovial ganglion cysts arising from the proximal radioulnar joint represent a rare but important etiology. We report a case of progressive finger extension weakness related to posterior interosseous nerve compression by a synovial ganglion cyst. MRI demonstrated a well-defined cystic lesion arising from the proximal radioulnar joint extending into the radial tunnel and compressing the posterior interosseous nerve with associated denervation muscle edema. Early imaging diagnosis is essential for appropriate surgical management and favorable functional recovery [1].

Keywords: Posterior interosseous nerve syndrome, Radial tunnel, Synovial ganglion cyst, Compressive neuropathy, MRI, Arcade of Frohse.

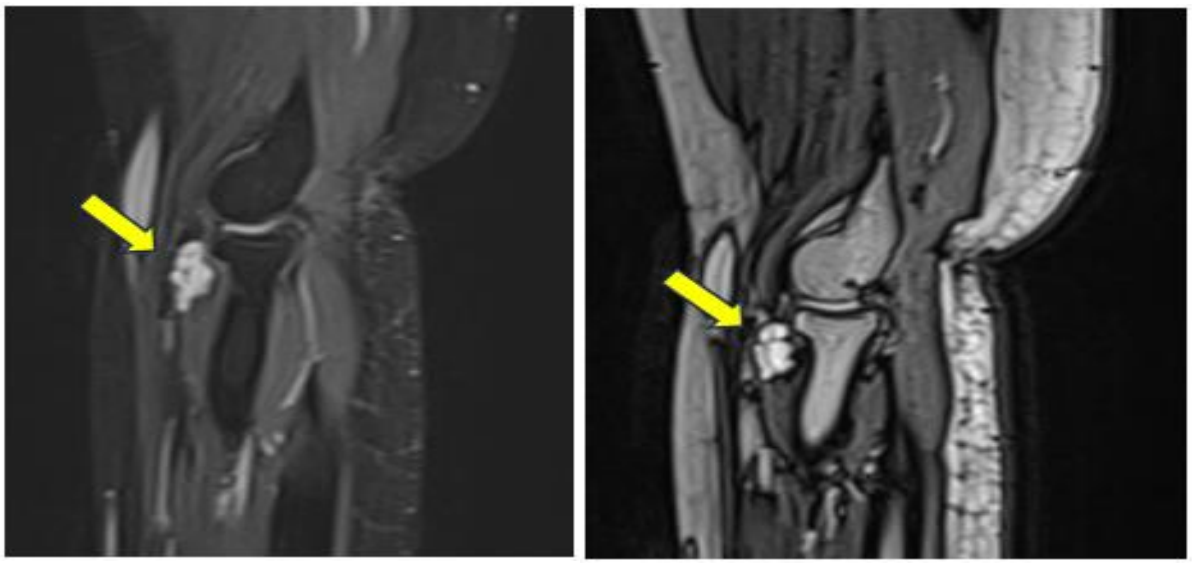
INTRODUCTION

Posterior interosseous nerve syndrome [PINS] results from compression of the deep motor branch of the radial nerve as it passes through the radial tunnel, most frequently at the level of the arcade of Frohse. Patients typically present with weakness of finger and thumb extension without sensory deficit. The causes of compression include fibrous bands, tumors, lipomas, vascular abnormalities, and synovial ganglion cysts originating from the proximal radioulnar joint. MRI plays a central role in identifying the compressive lesion and evaluating associated denervation muscle changes [2,3].

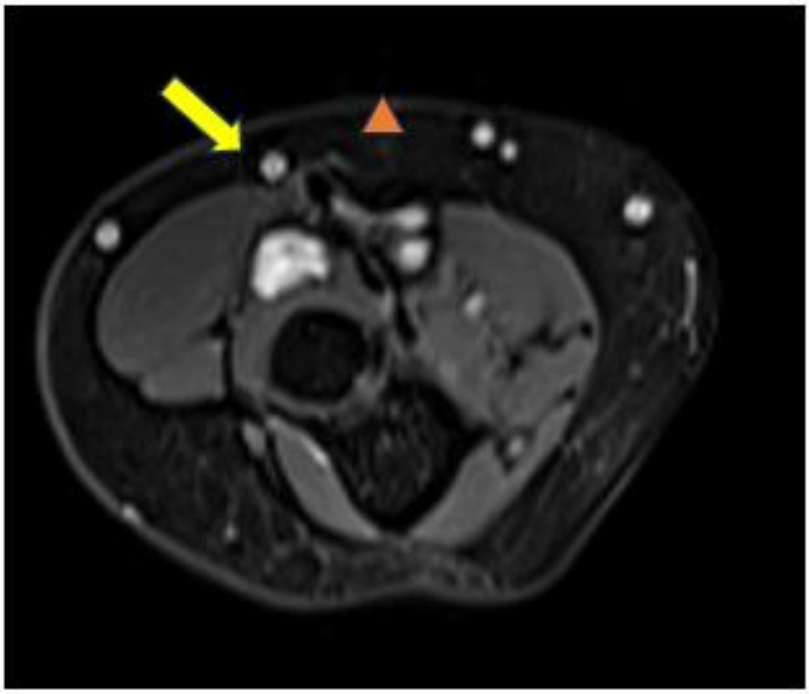
CASE PRESENTATION

A patient presented with progressive weakness of finger extension without sensory disturbance. MRI of the elbow demonstrated a well-defined multiloculated cystic lesion adjacent to the proximal radioulnar joint, hypointense on T1-weighted images and hyperintense on T2-weighted images, with thin peripheral enhancement after contrast administration. The lesion extended into the radial tunnel and compressed the posterior interosseous nerve at the level of the arcade of Frohse. Associated denervation edema was

observed in the extensor compartment muscles. These imaging findings were consistent with posterior interosseous nerve compression secondary to a synovial ganglion cyst [4].



Sagittal MRI images of the elbow demonstrate a well-defined cystic lesion adjacent to the proximal radioulnar joint extending into the radial tunnel along the expected course of the posterior interosseous nerve.
The lesion appears hyperintense on T2-weighted images and markedly hyperintense on T2-weighted fat-suppressed sequences, consistent with a synovial ganglion cyst.



Axial T2-weighted fat-suppressed MRI of the elbow demonstrates a well-defined hyperintense cystic lesion arising from the proximal radioulnar joint and extending into the radial tunnel, producing compression along the expected course of the posterior interosseous nerve, consistent with a synovial ganglion cyst.
This lesion produces compression at the level of the arcade of Frohse, supporting the diagnosis of posterior interosseous nerve syndrome[triangle]

DISCUSSION

Posterior interosseous nerve syndrome is an uncommon compressive neuropathy affecting the deep motor branch of the radial nerve, most frequently at the level of the arcade of Frohse [1]. It typically presents with isolated motor weakness of finger and thumb extension without sensory deficit due to the purely motor function of the posterior interosseous nerve distal to its branching point [2]. Among its etiologies, synovial ganglion cysts arising from the proximal radioulnar joint represent a rare but well-recognized and surgically treatable cause of nerve compression [3]. MRI is the imaging modality of choice because it accurately demonstrates the cystic nature of the lesion and its relationship to the radial tunnel [4]. It also allows identification of the exact site of nerve compression and associated denervation muscle edema within the

supinator and extensor compartment muscles [5]. Early recognition of these characteristic imaging findings is essential for treatment planning and prevention of irreversible motor deficit related to chronic nerve compression [6,7].

CONCLUSION

Synovial ganglion cysts should be considered in patients presenting with posterior interosseous nerve syndrome. MRI plays a key role in identifying the compressive lesion and associated muscle denervation, allowing early surgical planning and improved functional outcome.

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