Neuritis Ossificans of the Radial Nerve

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abstract

Neuritis ossificans is a rare reactive process affecting the peripheral nerves that is challenging to diagnose and treat. The usual presentation is mononeuropathy, pain, variable weakness, and a palpable mass along the nerve distribution. A paucity of literature exists on this disorder. It is often confused with myositis ossificans; many cases in the literature have reported myositic masses that have caused neuropathies. Diagnosing neuritis ossificans requires a high degree of clinical suspicion and excellent radiological and histopathological evaluation. The exact etiology of neuritis ossificans is unclear, but repeated localized trauma may be a factor. Treatment is mostly surgical, although conservative management with drugs has been reported to give good relief. The chance of iatrogenic nerve damage during microsurgical excision is high.

This article describes a case of neuritis ossificans of the radial nerve, which was treated by surgical excision of the lesion without nerve resection. No iatrogenic neurodeficit occurred, and the patient made a full recovery.

Neuritis ossificans should be considered in the differential diagnosis of painful mononeuropathies, particularly at atypical sites for compression neuropathy. Surgical resection of the mass may relieve pain and improve strength if the nerve can be sufficiently spared. Enucleation of this rare lesion is possible without neural compromise and should be considered as a treatment option for neuritis ossificans.

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Neuritis ossificans is a rare reactive lesion occurring mostly in the peripheral nerves. The architecture of this lesion is distinctly zonal. Histologically, the lesion consists of a central fibroblastic core, an intervening osteoid production zone, and a peripheral ossification layer, and it is similar to that of myositis ossificans. This similarity and the occurrence of the process in superficial nerves has led to speculation that trauma plays a role in its pathogenesis; however, this hypothesis remains unproved.

Clinically, neuritis ossificans resembles peripheral nerve mononeuropathy, causing pain and paresthesias along its distribution. Mononeuropathies can occur secondary to direct traumas, compression, stretch injuries, ischemia, infections, and inflammatory diseases. Nerve entrapments occur due to nerve compression by normal structures or external sources. The most common nerve entrapments occur at the median nerve of the wrist (carpal tunnel syndrome) and ulnar nerve of the elbow (cubital tunnel syndrome). In the lower extremity, peroneal neuropathy is the most common isolated mononeuropathy. Mononeuropathy is a rare cause of neuritis ossificans, and the management is mostly surgical, with common residual nerve injury. To our knowledge, this is the first case of neuritis ossificans of the radial nerve excised with no residual neurological deficits.

**Case Report**

A 35-year-old man presented with a 2-year history of pain and tingling in the right arm that was unresponsive to analgesics and neurotropics. He reported no motor or sensory deficits or antecedent trauma. Cervical spine radiographs were normal, and nerve conduction studies revealed no sensorimotor abnormality. However, a small, firm mass was localized to the posterior middle one-third of the humerus near the deltoid insertion. The mass was tender to light touch, whereas deep palpation elicited pain and paresthesias along the radial nerve distribution. Plain radiographs revealed a well-circumscribed, radiopaque lesion suggestive of a calcific mass, which correlated with clinical findings (Figure 1). Fine-needle aspiration cytology was inconclusive, and economic constraints precluded magnetic resonance imaging (MRI). The patient gave informed consent to undergo surgery and was aware of potential nerve injury. Surgical exploration revealed discreet, bulbous, noncompressible swelling of the radial nerve corresponding with the mass found on examination (Figure 2). The lesion was incised along its length and enucleated without sacrificing the nerve (Figure 3). No attempt was made to repair the incision in the nerve epineurium. The mass was sent for histopathological examination, and the wound was closed after adequate hemostasis was attained.

Postoperatively, the patient demonstrated no neurodeficit and made an uneventful recovery. He was advised early range of motion (ROM) exercises, and his symptoms resolved immediately postoperatively. Histopathology of the calcific mass suggested neuritis ossificans, with a central area of bony tissue surrounded by infiltrating neutrophils, eosinophils, and lymphocytes. The mass was not detectable on subsequent radiographs. At 1-year follow-up, he reported no symptoms and had returned to work as a carpenter.

**Discussion**

Neuritis ossificans is among the least-encountered reactive lesions in the peripheral nerves. The classical pathology is fibrovascular tissue with osteoid and bone deposition arranged in a zonal pattern. It is similar to myositis ossificans, which is also defined pathologically by zonal proliferation of fibroblasts and osteoblasts, with subsequent bone and cartilage ossification. Heterotopic ossification has not been associated with underlying connective tissue or metabolic disorders. Local trauma is a documented risk factor; however, evidence of such is often absent. The current case emphasizes neuritis ossificans as a rare but potentially underacknowledged cause of mononeuropathy in the literature. Reported sites included the saphenous and tibial nerves, median nerve ossification in a tennis player, and the sciatic nerve. Additional idiopathic cases include ulnar neuropathy at the elbow, cranial nerve neuritis ossificans, and common peroneal nerve involvement. Other reported sites...
of neuropathy due to heterotrophic ossification and the potential predisposing factors include sciatic neuropathy after hip fracture and fixation, biceps femoris muscle strain from weight lifting, and ulnar neuropathy after elbow burns. Additional cases due to myositis ossificans include ulnar neuropathy at the elbow and wrist. Reavey-Cantwell et al reported a case of brachial plexopathy associated with a tender supraclavicular mass. Druce et al reported femoral neuropathies. Wolffman et al reported a case of myositis ossificans with osteogenic sarcoma in brachial plexus following trauma, and Katz et al reported neuritis ossificans of the tibial, common peroneal, and lateral sural cutaneous nerves. No etiology of neuritis existed in our patient. However, we postulate that his profession as a carpenter and subsequent repetitive trauma was a potential cause of the lesion because constant hammering causes repetitive triceps abutment on the nerve in the radial groove.

Imaging studies and biopsies are essential to confirming the diagnosis. Plain radiographs, ultrasonography, MRI, computed tomography (CT) of the involved region, and bone scan may be used. Economic constraints limited our radiological evaluation. However, if the plain radiographs had been inconclusive, MRI or CT would have been imperative to delineate the lesion. Radiographs revealed the circumscribed lesion, which made deciding to operate easier. The risk of iatrogenic nerve damage in the absence of a well-defined lesion on radiographs and unavailability of MRI or CT is high.

The differential diagnosis of such a lesion includes myositis ossificans, soft tissue sarcoma, calcific lymph nodes, and organized hematomas. When a calcified soft tissue mass is identified, biopsy is usually needed to rule out sarcoma and confirm neuritis ossificans. High-resolution echography and fine-needle aspiration cytology rarely aid diagnosis, and open biopsy, even with the inherent risk of nerve injury, is usually needed for the final diagnosis. Surgical excision of the ossifying mass may relieve pain and prevent the progression of mononeuropathy. Meticulous microsurgical dissection should be attempted but is not always possible, and residual sensorimotor neurological deficits are common. However, we achieved excision of the mass with no neurodeficit. Radiation therapy may be an effective alternative for pain but not neuropathy. Recurrence is uncommon. Surgeons should consider enucleation in such conditions to provide significant symptom relief while preserving neural function. More recently, conservative management of neuritis ossificans with oxycodone and gabapentin has been reported, with the resolution of 2 of 3 masses in a patient.

**CONCLUSION**

Neuritis ossificans should be considered in the differential diagnosis of painful mononeuropathies, particularly at atypical sites for compression neuropathy. Physical examination must include palpation along the course of the nerve to assess for focal tenderness and masses. Imaging aids in identifying calcified masses, which would likely require biopsies for definitive diagnosis. Surgical resection of the mass may relieve pain and improve strength if the nerve can be sufficiently spared. Enucleation of this rare lesion is possible without neural compromise and should be considered as a treatment option for neuritis ossificans.

**REFERENCES**