Compression Neuropathy of the Radial Nerve Due to Ganglion Cysts

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Received: 20 December 2007 / Accepted: 20 December 2007 / Published online: 25 January 2008
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Abstract Ganglions of the upper extremity are common. Radial nerve dysfunction, particularly radial sensory dysfunction, is a rare finding in association with a ganglion. We present our experience with two such ganglia and a review of the literature.

Keywords Ganglion · Nerve compression · Compression neuropathy · Radial nerve · Sensory dysfunction

Introduction

Ganglions are a frequent source of upper extremity masses. Although they can be present anywhere from the scapula down to the fingertips, they are the most common cause of focal masses in the hand and wrist [1].

A ganglion can cause focal neurologic symptoms when the cyst wall compresses a nerve. Compression of the posterior interosseous nerve by a ganglion was first reported in 1966 [2]. Although compression of the motor branch of the radial nerve has been reported in many patients [2–8], sensory neuropathy is rarer. A total of two purely sensory [6, 9] and three mixed motor and sensory [6] neuropathies have been reported in the English language literature.

We present two cases of radial nerve compression, one purely sensory and one mixed.

Case Reports

Patient 1 is a 56-year-old, right-hand-dominant man with a 9-month history of an enlarging mass located on the radial aspect of the left proximal forearm. For the first 6 months, the patient had no neurologic symptoms related to this mass. Three months before presentation, the patient noticed loss of sensation over his dorsal hand, including the first dorsal web space and the thumb, index, and middle fingers. He had no motor deficits.

The exam revealed a smooth, firm 4-cm diameter mass located deep to the brachioradialis muscle just distal to the elbow. Magnetic resonance imaging (MRI) revealed a fluid-filled lesion with one major cyst and several minor cysts at its periphery at the level of the mass (Fig. 1). The origin of the cystic lesion could not be determined from the MRI. Electromyography (EMG) and nerve conduction studies demonstrated a purely sensory neuropathy of the radial nerve at this level with no evidence of motor neuropathy by EMG.

The patient underwent excision of this lesion. The radial nerve was identified proximal to the mass. It was noted to divide proximal to the lesion with the superficial radial nerve traveling over the superficial surface of the ganglion (Fig. 2). The posterior interosseous nerve traveled along the radial aspect of this mass and was mildly distorted. The cyst was dissected down to its stalk originating from the proximal radio-ulnar joint. The cyst and stalk were removed.

Postoperatively, the patient had rapid recovery of radial nerve sensation. Tinel's sign was present at the wrist by

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Figure 1 Preoperative T2-weighted MRI of Patient 1 shows a well-demarcated lesion with fluid signal density consistent with a ganglion overlying the proximal radius.

3 weeks postoperatively. The patient reported normal sensation over his dorsal hand by 2 months postoperatively.

Patient 2 is a 73-year-old, right-hand-dominant man with a left lateral forearm/elbow mass present for 9 months. As with Patient 1, the mass was initially asymptomatic. About 3 months before presentation, this patient also began experiencing numbness and paresthesias in the distribution of the superficial radial nerve. He was initially worked up for a sarcoma at this location, but MRI and x-ray imaging revealed a fluid-signal mass consistent with a ganglion cyst emanating from his elbow joint (Fig. 3). Examination revealed decreased wrist extension (4/5) and absent extensor pollicis longus, extensor indicis proprius, and extensor digitorum communis function. EMG/nerve conduction studies confirmed delayed conduction across this

Figure 2 Intraoperative photograph of Patient 1 demonstrates the superficial radial nerve (over the Ragnell retractor) compressed against the ganglion's superficial surface. Posterior interosseous nerve is seen along the radial aspect of the mass. No motor deficits were present in this patient.

Figure 3 Preoperative T2-weighted MRI of Patient 2 demonstrates a well-demarcated lesion with fluid signal density overlying the proximal radius.

forearm mass and fibrillation potentials in the extensor musculature of his forearm (Fig. 4).

The patient was scheduled for removal of the ganglion cyst and tendon transfers to restore finger extension. Unfortunately, the patient's preoperative chest x-ray revealed a metastatic lesion from a previous hypopharyngeal carcinoma. The patient underwent therapy for this lesion and ultimately succumbed to his cancer before any operative intervention on his forearm ganglion.

Discussion

The patient with a rapidly growing mass in the upper extremity in the absence of a history of trauma can cause concern. Although a ganglion cyst represents the most

Figure 4 Preoperative photograph of Patient 2 demonstrates the mass in the proximal forearm and the patient's inability to maximally extend his wrist and fingers concurrently due to the compression of the posterior interosseous nerve by the mass.

common tumor of the hand [1], there is a larger differential diagnosis for masses more proximal in the upper extremity. Benign lesions such as lipoma or Schwannoma could produce similar symptoms and findings. The rate of growth also raises concern for a sarcoma or other malignancy [10]. Neurologic symptoms could represent direct invasion of a nerve by tumor or compression of the nerve by a mass.

Precise location of the mass affects the surrounding soft tissue, upon which it can exert a compressive force. The mass in Patient 1 was slightly more anterior and distal than the mass in Patient 2. This may in part explain the absence of motor findings in the first patient, as the posterior interosseous nerve had already branched off from the main trunk of the radial nerve. In Patient 2, a more proximal lesion applied pressure to the radial nerve approximately at the level of bifurcation. Thus, weakness was to be expected both in the extensor carpi radialis brevis from the superficial radial nerve [11] and in the ECU from the posterior interosseous nerve. Having only the extensor carpi radialis longus to extend the wrist, decreased wrist extensile force was expected and was observed clinically in our patient.

In Patient 1, however, operative exploration did reveal pressure on the posterior interosseous nerve from the lateral aspect of the mass. The fact that this compression was not sufficient to cause motor symptoms can be explained by the paucity of nerve fascicles in the posterior interosseous nerve relative to total nerve trunk cross-sectional area distal to the lateral epicondyle as described by Sunderland [12].

A number of imaging modalities are available for these lesions. Ultrasound has been advocated by some [3, 6, 13] as being rapid and eliminating radiation exposure; however, ultrasound is highly operator-dependent and may not delineate the extent of a mass. Computed tomography [5–6] provides excellent definition of bony structures but may not distinguish soft tissues of similar x-ray opacity. Magnetic resonance imaging provides excellent differentiation of soft tissue densities [3, 6] but is contraindicated for patients with retained metal or claustrophobia.

In both cases, MRI clearly demonstrated a fluid-filled, well-demarcated lesion consistent with a ganglion cyst. Thus, the patients' concern for malignancy could be allayed even before their referral for surgical treatment. Unfortunately for Patient 2, preoperative work-up revealed a

different, metastatic cancer to which the patient rapidly succumbed. For a patient with a rapidly growing upper extremity mass in the absence of a history of trauma, MRI remains an excellent diagnostic modality to evaluate the lesion and distinguish ganglions and other benign masses from more sinister malignant processes.

Acknowledgment The authors wish to thank Beth Kaczmarek, Editorial Consultant for the Department of Plastic Surgery, Medical College of Wisconsin, for her assistance in the preparation of this manuscript.

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