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Seminars in
ROENTGENOLOGY

Case of the Season: Saturday Night Palsy

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A 39-year-old man presented to the emergency department with a 3-day history of left upper-extremity numbness over the dorsal surface of the forearm and wrist drop. There was no history of neck pain or trauma. He stated a similar episode had occurred a year ago, which spontaneously resolved in a few weeks. On physical examination, there was loss of wrist extension and supination as well as diminished sensation over the dorsal aspect of the forearm. There was normal strength in the triceps muscle. His medical history was significant for alcoholism and hypothyroidism.

Diagnosis

Electrodiagnostic (nerve conduction and electromyography) studies demonstrated evidence of radial neuropathy at the level of spiral groove. A noncontrast magnetic resonance (MR) scan was performed on the left upper-extremity from the upper arm to the distal forearm. Intramuscular edema was identified in the posterior aspect of the brachialis brachioradialis, supinator, and extensor muscles of the forearm (Figs. 1–3). No fatty atrophy was identified. The course and MR signal of the radial nerve appeared normal. No masses were identified along the expected course of the radial nerve or its branches. The appearance of the triceps and anconeus muscles was normal (Figs. 1 and 2). The distribution of muscle changes on the MR suggested radial nerve injury at the level of spiral groove of the humerus, concordant with the electrodiagnostic findings. "Saturday Night Palsy" or "Honeymooners Palsy" refers to an inadvertent prolonged pressure to the radial nerve in the spiral groove of the humerus or at the intermuscular septum. It can occur if an intoxicated person falls asleep with the underside of the arm compressed by a bar edge, bench back, or like object. This syndrome is also called honeymooners palsy, as it can be acquired when somebody sleeps with his/her head rested on another person's arm.

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Discussion

The radial nerve is composed of branches of the C5 to T1 nerve roots and arises from the posterior cord of the brachial plexus within the axilla. It travels over the dorsal surface of the humerus in the spiral groove supplying the extensor muscles of the upper arm. The extent of its innervations include the triceps, anconeus, brachialis (partial supply), brachioradialis, supinator, abductor pollicis longus, and forearm extensor muscles (extensor carpi radialis longus and brevis, extensor carpi ulnaris, extensor digitorum communis, extensor digiti minimi, extensor pollicis longus and brevis).[1] Distal to the spiral groove, it courses anterior to the intermuscular septum and passes anterior to the lateral epicondyle. At approximately the level of the elbow, the radial nerve bifurcates into the deep (posterior interosseous) and superficial branches. The deep branch supplies the forearm extensor muscles and does not pass into the hand. The superficial branch travels into the hand and gives off dorsal digital cutaneous nerves.[1,2]

In instances of trauma, the radial is the most commonly injured nerve of the upper extremity, but in cases of compressive neuropathy, ranks third after the median (carpal tunnel syndrome) and ulnar nerves (ulnar neuropathy of the elbow).[2-4] Compressive injuries to the radial nerve may arise from masses, iatrogenic causes such as injections, peripheral neuropathies, or from compressive forces external to the arm, such as in this case of Saturday Night or Honeymoon palsy.[1,2] This later form of nontraumatic compression receives its name from episodes of inadvertent radial nerve compression, classically by either an inebriated patient or an amorous partner while sleeping. Although functionally limiting in nature, these symptoms often resolve in 2-3 months.[2-5] The symptoms of Saturday Night Palsy may be controlled with the use of over-the-counter analgesics and steroids to minimize pain and swelling. Surgery is rarely required for cases of neglect.[2]

The expected clinical and imaging findings of injuries to the radial nerve are variable depending not only on the mode of the injury but also the level. Branches of the radial nerve that supply the triceps muscle originate before the spiral groove.[1] When injuries occur distal to the axilla, but proximal to the spiral groove, the triceps muscle will be affected, as will distal muscles (forearm extensors), with resultant wrist drop and numbness over the dorsum of the hand. The radial nerve is most vulnerable to injury in the spiral groove of the

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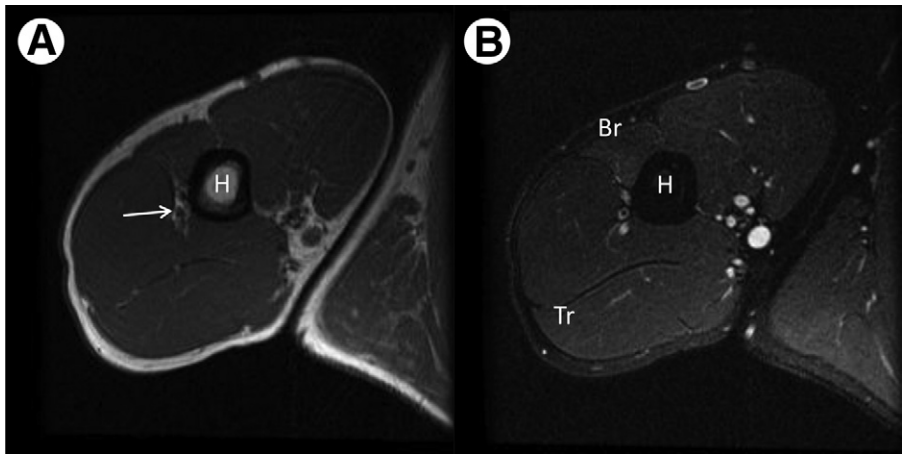

Figure 1 At the level of mid-brachium. (A) Axial T1-weighted image demonstrates the radial nerve (arrow) in the spiral groove. There is no fatty atrophy of the muscles. (B) Axial T2-weighted fat-saturated image demonstrates high signal in the brachialis muscle and no signal abnormality in the triceps musculature. H, humerus; Br, brachialis; Tr, triceps.

humerus, occurring after fracture of the humerus or from prolonged compression.[1-3] This results in wrist drop with associated sensory abnormalities overlying the dorsum of the hand, but with sparing of the triceps musculature. The brachioradialis is spared if injuries occur distal to the spiral groove, but superior to the elbow. Distal radial neuropathies include radial tunnel/posterior interosseous nerve syndrome resulting from compression of the deep (motor) branch of the radial nerve.[6] Wartenberg syndrome results from selective compression of the superficial (sensory) branch of the radial nerve in the distal forearm. Neurogenic muscle edema occurs in acute and subacute stages of denervation and results in prolongation of T2 relaxation time on T2-weighted or inversion recovery sequences as early as 24-48 hours after denervation. In contrast, the signs of muscle denervation are not apparent at electromyography until 2-3 weeks after the onset of a nerve lesion. Fatty muscle atrophy occurs when there is chronic muscle denervation. Fatty muscle atrophy evolves after several months of denervation and is visible on standard T1-weighted spin-echo images as reduced muscle volume and higher signal intensity compared with those of normal muscle tissue.[7,8] MR imaging in our patient demonstrated high signal on T2-weighted fat-saturated images involving the brachioradialis, part of the brachialis, as well as the forearm extensors, but sparing the triceps and anconeus muscles (Figs. 1–3). T1-weighted images were unremarkable confirming no fatty atrophy. These findings suggested a subacute denervation injury in the distribution of the radial nerve at approximately the level of the spiral groove. Standard MR imaging alone provides excellent anatomic detail and may demonstrate skeletal muscles changes that correlated to a specific level of nerve injury. The nerve injury itself however is rarely directly visualized and nerve size and signal are usually unaltered. Peripheral nerve injuries may also be investigated with ultrasonography and magnetic resonance neurography (MRN). Newer techniques such as MRN further the ability to detect and describe patterns of peripheral nerve injury occurring from entrapment, mass lesion, or injury.

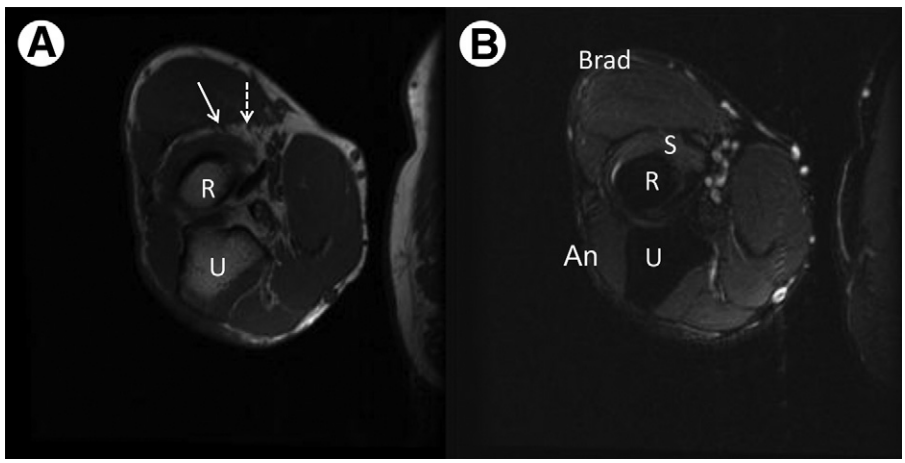

Figure 2 At the level of proximal forearm. (A) Axial T1-weighted image demonstrates the deep (arrow) and superficial branch (broken arrow) of the radial nerve along the volar aspect of supinator. There is no fatty atrophy of the muscles. (B) Axial T2-weighted fat-saturated image demonstrates high signal in the brachioradialis and supinator muscles. R, radius; U, ulna; S, supinator; Brad, brachioradialis; An,= anconeus.

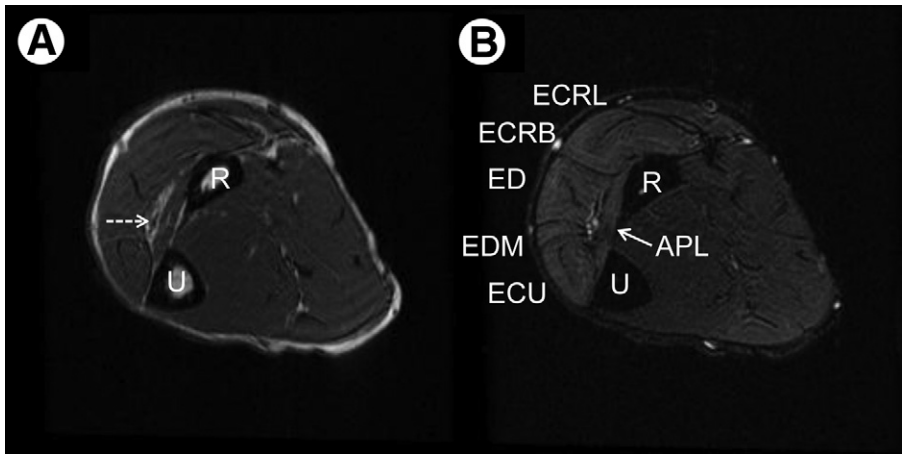

Figure 3 At the level of distal forearm. (A) Axial T1-weighted image demonstrates the posterior interosseous nerve (broken arrow) deep to the forearm extensors. There is no fatty atrophy of the muscles. (B) Axial T2-weighted fat-saturated image demonstrates high signal in the forearm extensors (ECU, EDM, ED, ECRB, ECRL) and APL muscles. ECU, extensor carpi ulnaris; EDM, extensor digiti minimi; ED, extensor digitorum; extensor carpi radialis brevis; ECRL, extensor carpi radialis longus; APL, abductor pollicis longus; R, radius; U, ulna.

Among the changes detectable by MRN are alterations in nerve size, signal intensity, course, and enhancement pattern.[8,9] In cases of nerve-compression syndromes, such as aforementioned, changes in nerve size and signal due to swelling are detectable to the extent that the sensitivity and specificity of this modality approaches that of needle electromyography.[9] MRN has great potential in settings such as the pediatric population, where electrodiagnostic testing can be difficult to perform, or in thoracic outlet syndrome, where electrophysiologic studies are of limited value.[9]

In summary, Saturday Night Palsy is a form of radial neuropathy that occurs from inadvertent compression of the nerve at the spiral groove of the humerus. MR imaging aids in excluding other potential causes of nerve damage and suggests the diagnosis through the distribution of the muscle involvement. The signs and symptoms of this compressive neuropathy are typically self-limited.

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