Radial nerve palsy caused by spontaneously occurring nerve torsion

Case report

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An 18-year-old man presented with a spontaneously occurring radial nerve palsy that spared the triceps muscle. At surgery, the portion of the radial nerve located at the midarm level had an hourglass-like appearance. Under magnification, an external–internal neurolysis of the narrowed portion of the hourglass-shaped portion revealed nerve torsion. Straightening of the twisted nerve and fixation accomplished using epiperineurium–fascia stitches to avoid a new torsion resulted in complete functional recovery of the radial nerve.

KEY WORDS • radial nerve • nerve palsy • nerve torsion

Radial nerve palsy is the least frequently occurring group of peripheral nerve diseases of the upper extremities. Typically, the radial nerve is involved in fractures at the midhumeral level.14,16 Nerve entrapment may also occur, although rarely, at the lateral head of the triceps muscle,3,4,9,10,13 especially after strenuous muscular efforts,12,15 or at the level of the posterior interosseus nerve in the arcade of Frohse.11

Only a few cases of spontaneous, acute radial nerve palsy have been reported.1-3 In these cases, clinical presentation consists of acute pain followed shortly by palsy of the extensor muscles of the wrist and fingers. Surgical exploration almost always reveals a mid–upper level radial nerve lesion, which appears as an hourglass-shaped constricted segment that is totally unrelated to any compressive structure.

We describe a case of spontaneously occurring complete radial nerve palsy that spared the triceps muscle. In this case surgical exploration disclosed a constriction of the radial nerve at the midarm level. An external–internal neurolysis of the constricted segment revealed nerve torsion. Straightening of the nerve trunk, accomplished using fixation sutures, resulted in complete functional recovery by the 12-month follow-up examination. Similarities between this and other reported cases are discussed, with emphasis on etiopathogenetic factors and surgical options.

Case Report

History. This 18-year-old man was admitted to our insti-tution in May 1991. One month earlier, he had experienced an acute aching pain that involved his left arm on its anterolateral surface. In a short time, he was unable to extend his second finger and experienced paresthesias of his left hand. One week later, there was a complete palsy of wrist and finger extension. The acute pain lasted 10 days, after which it diminished to a dull sensation. The patient had no family history of metabolic, chronic inflammatory, or allergopathic disorders. Approximately 1 week before pain onset, the patient had been skiing without suffering any traumatic event.

Examination. Complete palsy of the extensor muscles of the left hand and fingers was found. Sensation was normal. Computerized tomography and magnetic resonance imaging revealed no abnormality. Electromyography revealed signs of advanced denervation when recordings were obtained from the extensor digiti minimi muscle (Fig. 1).

Operation. The patient underwent surgery 40 days after onset of symptoms. The radial nerve was exposed in the inferior half of the left arm, with the superior limit located approximately 15 cm above the elbow. An hourglass-shaped constriction involving a 3-mm-long segment of the nerve (Fig. 2A) was found 11 to 12 cm from the humeral troclea. With the aid of an operating microscope, an external–internal neurolysis of the constricted segment was performed and revealed that this nerve segment was the fulcrum of a nerve torsion. This torsion was formed by two interwoven fascicles, twisted one around the other along their major axes (Fig. 2B). The fascicles were realigned into the correct position by straightening the nerve trunk, and four epiperineurium–fascia stitches were made.
using No. 6-0 nylon in such a manner to avoid any new nerve-trunk torsion (Fig. 2C).

Postoperative Course. Postoperatively the patient’s pain completely disappeared. He began rehabilitation and regained 90% recovery of left hand function within a 5-month period. Six months after surgery, EMG revealed no sign of denervation (Fig. 3). Complete clinical recovery was observed 1 year postoperatively.

Discussion

The radial nerve may be damaged at several sites along its course.7 Most frequently, damage occurs in the arm at the midhumeral level and in the forearm at the arcade of Frohse, the site at which the radial nerve’s terminal branch, the posterior interosseous nerve, may become entrapped. Sleep palsy or Saturday-night palsy may affect the radial nerve at the axillary outlet, the brachioaxillary angle, and the site at which the nerve turns around the lateral margin of the humerus, immediately below the deltoid muscle’s insertion.6 As a consequence of the very proximal origin of the triceps branches, only a few radial nerve injuries cause palsy of the triceps. One exception is nerve injury caused by a distal cord–nerve level stretch and gunshot injuries. Humerus fractures14,16 or operative manipulation to repair such fractures6 may result in an isolated injury to the triceps branches. A few cases have been described in which spontaneously occurring—neither traumatic nor properly compressive—midarm radial nerve palsy has been observed. Such patients exhibit wrist and finger drop as a result of a loss of function of the extensor muscles in the forearm.

There have been only a few reports of spontaneously occurring radial nerve palsy.1,2 In a 26-year-old man at surgery, the portion of the radial nerve located at the spiral groove was observed to have an inexplicable hourglass-shaped constriction that did not correspond to any extrinsic compressing structure. Epineurotomy revealed fascicular bulging adjacent to the constricted area, but not torsion. Biopsies obtained from muscle and skin were positive for acute arteritis. Two months later, a right anterior interosseus nerve syndrome developed. At surgery, the median nerve exhibited similar findings to those seen in the radial nerve. Postoperatively, EMG demonstrated incomplete right radial nerve recovery. In a 32-year-old man, a spontaneously occurring radial nerve palsy developed 3 weeks after an axillary anesthetic block had been performed to repair a traumatic laceration of the small left finger. Surgical exploration of the radial nerve performed 40 days after the axillary block disclosed an hourglass-shaped constriction approximately 5 cm distal from the lateral intermuscular septum. Neurolysis performed with the aid of a microscope was unremarkable. Postoperatively, follow-up EMG revealed complete recovery. In a 33-year-old man who sustained a bite on the dorsum of his right wrist from a brown recluse spider, a posterior interosseous nerve palsy developed 4 days later. At surgery performed three months after symptom onset, two hourglass-shaped constrictions of the posterior interosseous nerve were found above the elbow in areas devoid of obvious extrinsic compressive structures. Postoperatively, follow-up EMG demonstrated full functional recovery. In these three cases, the etiopathogenesis of the hourglass-shaped constricted nerve segment lesions was relegated to medical disorders: polyarteritis in the first case and allergic angioneuropathy in the other two cases. Vascular mechanisms should be responsible for changes in nerve caliber away from structures known to be potential sites of injury.
nerve compression. In patients affected by vasculitis, intrafascicular edema due to chronic hypoperfusion is considered a possible cause of isolated nerve constriction and intraneural scarring. In the present case, this mechanism cannot be advocated because there was no history of chronic inflammation, allergic diathesis, or vasculitis. Although a true trauma did not occur, a certain amount of muscular effort was recorded in the patient’s recent history. In fact, 1 week before pain onset, the patient had been skiing. Thus, we may speculate that the priming noxious stimulus was an unnatural movement of the upper arm caused by an unbalanced muscular effort, resulting in mechanical stress along the radial nerve—somewhat like a sliding effect that is not counterbalanced at the site where the nerve runs free. In this hypothesis, compression of the nerve segment due to unnatural bending would imply ischemia, fibrotic reaction, and appearance of an hourglass-shaped constriction. In our case, the hourglass-shaped constricted nerve segment was different from those observed in other cases reported in the literature, because the normal fascicular pattern was substituted by the torsion of one fascicle around the other. External and internal microneurolysis, correction of fascicular torsion, and fixation to maintain nerve straightness resulted in complete functional recovery. Epiperineurium–fascia stitches have been shown to be well tolerated in several different pathological conditions, with no side effects related to nerve fixation. In our opinion, these procedures should be the first surgical option. The second option might be the excision of the constricted segment, with direct nerve suture repair after release of the torsion in such a manner to allow proper coaptation of the nerve stumps.

In conclusion, patients suffering from spontaneously occurring radial nerve palsy should undergo surgical exploration as soon as possible. In cases in which an hourglass-shaped constriction and torsion of a nerve segment are found, we recommend microsurgical neurolysis, release of nerve torsion, and fixation of the nerve by using epiperineurium–fascia sutures.

References

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