Posterior interosseous nerve palsy after intravenous cannulation of forearm

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The extensor aspect of the forearm is a common site for intravenous cannulation, being well tolerated by patients, and avoiding flexural difficulties of the antecubital fossa. Iatrogenic neuropraxia is rare after intravenous cannulation.

CASE HISTORY

A woman aged 45 was admitted for intravenous insulin therapy of uncontrolled diabetes mellitus. A 16-gauge cannula was inserted into the middle third of the extensor aspect of her right forearm and a sliding-scale regimen of insulin (50 units Actrapid in 48 mL physiological saline) was delivered through a Graseby pump. After two hours, when 10 mL of the insulin mixture had been administered, she complained of intense pain and inability to extend her right index finger. A large swelling was found at the cannula insertion site and she had a 30° extensor lag of the right index finger. Extensor function of the thumb and middle, ring and little fingers was normal. There was no sensory deficit. The cannula was removed and the right arm was elevated.

Nerve conduction studies the following day revealed delayed action potentials between a stimulation electrode placed at the level of the spiral groove in the upper arm and a receiving electrode on the wrist dorsum. Electromyography of extensor indicis, performed at its musculotendinous junction in the distal forearm, showed a low-amplitude motor interference pattern. Both the above tests were within normal limits on the left arm. Partial posterior interosseous nerve palsy, secondary to the pressure effects of an intramuscular haematoma, was diagnosed. In view of the isolated nature of the injury, with normal function of the extensor muscles to the other digits, the injury was treated conservatively with splints and hand physiotherapy. Neurological and functional recovery was complete within three months.

COMMENT

On entering the anterior compartment of the forearm the radial nerve divides into superficial and deep terminal branches. The deep branch, known as the posterior interosseous nerve (PIN), enters the arcade of Frohse and passes between the two heads of the supinator muscle to which it lends several branches. On emerging from the supinator muscle, it bifurcates into two major branches. A recurrent branch supplies extensor carpi ulnaris, extensor digitorum communis and extensor digiti minimi. The remaining branch, known as the descending branch, innervates abductor pollicis longus, extensor pollicis longus, extensor pollicis brevis and extensor indicis and provides sensation to the dorsal wrist joint. Proximally the nerve travels between the superficial and deep extensor muscles where it is susceptible to injury, but at the distal border of extensor pollicis brevis it lies deep to extensor pollicis longus and descends on the interosseous membrane to the dorsum of the carpus.

With intravenous cannulation peripheral nerves on the extensor aspect of the forearm may be damaged directly by cutting or indirectly by pressure from haematoma formation, usually as a result of intramuscular bleeding. The most frequent concomitant of injury to the PIN or its branches in the forearm is muscle-tendon laceration. A combination of these injuries together with anatomical variation results in palsy of the PIN with variable sensory and motor deficit[1]. After closed injury, treatment of the damaged nerve is controversial. Some authors advocate immediate exploration, stating that early nerve repair is preferable to delayed tendon transfer in the treatment of permanent paralysis[2]. Others recommend surgical exploration three months after injury if there is no evidence of nerve recovery on both clinical testing and electromyography[3]. If the injury has been complicated by infusion of hyperosmotic fluids or there is evidence of compartment syndrome, decompressive fasciotomy and early neurolysis is indicated to preserve neural function. For cases diagnosed early, referral to a hand surgery unit is recommended.

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