An uncommon peripheral nerve injury after penetrating injury of the forearm: the importance of clinical examination

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A 22 year old woman presented to the accident and emergency department with a self inflicted stab wound to the radial side of the volar aspect of the left forearm caused by a pen knife. Her wounds were sutured on the day of injury. Over the course of next three weeks her wounds healed well but she noticed difficulty in using the hand. She therefore attended her general practitioner who suspected a possible nerve injury and referred the patient back to the A&E department. On follow up examination, she was noticed to have a loss of finger and thumb extension and weakness of thumb abduction. Active extension of the wrist (with radial deviation) was intact. There was no sensory deficit. PIN palsy was diagnosed and the patient was referred to the regional hand surgery unit where she underwent exploration of the wound. A complete transection of the PIN in the supinator canal was found and repaired with good functional outcome. This case reflects the importance of clinical examination in uncommon peripheral nerve injuries and appropriate referral to a specialist department in case of doubtful penetrating wound that pose a threat to an underlying important structure.

DISCUSSION

Penetrating injuries to the forearm are common and they are frequently associated with peripheral nerve injuries. The type of nerve involved depends on the level of the penetrating injury in the forearm. The median and the ulnar nerve are commonly injured than the posterior interosseous nerve.

The deep branch of the radial nerve is often referred to as the PIN. The PIN has some unique anatomical features. The radial nerve divides into the superficial and deep branches at the level of the lateral epicondyle. The PIN is a pure motor nerve with the exception of several sensory branches to the wrist joint at its most terminal extent. The PIN enters the arcade of Frohse between the two heads of supinator muscle. At the distal end of the supinator, it divides into multiple branches. Spinner observed that the branches are arranged in two major groups. The first group (recurrent branch) supplies the superficial layer of extensor muscles (extensor digitorum communis, extensor digiti minimi, extensor carpi ulnaris) and the second group (descending branch) supplies the deep muscle layer (abductor pollicis longus, extensor pollicis longus and brevis, extensor indicis proprius). Injuries to the PIN are uncommon because of the deep course of the nerve in the forearm. Injuries to the PIN are often missed.

Hirachi et al have categorised traumatic PIN palsy into three types:

- **Type I**—complete PIN palsy producing weak wrist extension with a radial drift, extension loss at the metacarpo-phalangeal joints of all the fingers and the thumb, and weak abduction of the thumb.

![Figure 1](http://emj.bmj.com/)

**Figure 1** Loss of extension of thumb and all fingers at the MCP joint.
In penetrating injuries it is imperative that the distal neurological status of the involved limb should be properly examined and recorded. One other important thing in the management of penetrating injuries is that they need to be explored if there is doubt of neurovascular damage. In the event of such doubt arising appropriate referral to a specialist department is mandatory.

In our patient with the penetrating wound the PIN palsy was missed because of incomplete examination resulting in delay in the diagnosis and subsequent management. This case therefore highlights the importance of exploring penetrating wounds and proper examination to rule out distal neurovascular deficit associated with such injuries.

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doi: 10.1136/emj.20.6.566

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