'Just a sharp scratch': permanent radial, median and ulnar neuropathy following diagnostic venepuncture

Introduction

Venepuncture is the most common invasive medical procedure (Galena, 1992), performed on millions of patients worldwide. Complications are extremely rare but include neurovascular injuries resulting in significant morbidity. This article presents the first case of complete neuropathy at the antecubital fossa following venepuncture, involving the radial, median and ulnar nerves, and discusses relevant anatomy, preventative measures and medicolegal considerations.

Discussion

Complications of venepuncture

The majority of serious complications comprise solitary neuropathies involving the median, radial, anterior interosseous or superficial sensory nerves. Ulnar neuropathy has not previously been reported, probably because of the nerve's protected position away from sites of venepuncture. Direct needle injury is very rare (0.004–0.016%) (Berry and Wallis, 1977; Newman and Waxman, 1996) and most neuropathies are the result of compressive haematomas leading to compartment syndrome (Horowitz, 1994). Although bruising and haematoma are not uncommon in large case series (approximately 1% blood donors and 12.3% diagnostic venepunctures; Galena, 1992) they are not associated with compartment syndrome or neuropathy, indicating the infrequency of such complications.

Anatomical considerations

The superficial veins lie directly over nerves rendering them susceptible to injury. However, the classic anatomical relationship of nerves running deep to veins separated by fascia may be too simplistic; in the upper extremities the relationship appears more intimate, with major branches of cutaneous nerves lying superficial to, or being intertwined with veins (Horowitz, 2000).

Symptoms and signs of venepuncture-related neuropathy

The principal symptom is numbness or tingling, which may present days later. Often 'shooting', 'electrical' or 'burning' pain is experienced immediately, frequently radiating down the arm. Occasionally there are involuntary movements of the fingers, or loss of arm or hand strength. Tinel's sign may be elicited by palpating the antecubital fossa. Haematoma is associated with swelling and bruising.

Case Report

An 82-year-old woman was admitted to hospital with acute left ventricular failure following a recent myocardial infarction for which she had been commenced on clopidogrel. An uneventful venepuncture in her left antecubital fossa yielded a normal full blood count and coagulation profile. Diuretics were commenced to which she responded well.

Five days later she described pain, swelling and bruising of her left forearm with numbness over her thumb, index and middle fingers. Prophylactic low molecular weight heparin was discontinued and the arm elevated. Nine days later she was unable to move her left hand. Bruising extended from the shoulder to the hand with swelling distal to the antecubital fossa (*Figures 1* and 2). Woody subcutaneous oedema was present around the antecubital fossa with forearm tenderness. The radial pulse was present with good capillary circulation in all fingers. Neurological examination revealed complete wrist drop, minimal finger flexion and no small muscle function of the hand. The dorsal aspect of the forearm and hand were hypersensitive, with numbness over the volar aspect of the thumb, index and middle fingers.

These findings were consistent with an ischaemic neuropathy of the median, radial and ulnar nerves as a result of compartment syndrome, secondary to a compressive haematoma at the antecubital fossa following venepuncture. Surgery to relieve compartment pressures at this stage was thought to provide little chance of recovery, with the additional risk of supervening infection. Initial treatment was therefore conservative consisting of physiotherapy, vitamin B and gabapentine. An ultrasound scan confirmed the presence of a haematoma occupying the entire flexor compartment of the forearm. Nerve conduction studies revealed completely absent sensory potentials, with motor potentials 1%, 30% and 60% of normal in the radial, median and ulnar nerves respectively. This confirmed a severe subtotal axonotmesis of the radial nerve with partial axonal injury to the median and ulnar nerves. The prognosis was one of permanent major neurological deficit and despite intensive hand physiotherapy there was little functional recovery 1 year later.

Figure 1. Extensive bruising over the volar aspect of the arm.

Figure 2. Bruising over the dorsal aspect of the arm with wrist drop.

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Prognosis

The majority of venepuncture-related nerve injuries recover within days (Newman and Waxman, 1996) or weeks (Berry and Wallis, 1977). However, a small number of patients are left with residual symptoms ranging from numbness and pain (Newman and Waxman, 1996) to permanent loss of function. If no recovery occurs within a year the prognosis is poor, with the gradual replacement of Schwann cells with fibrous scar tissue. Causalgia, the complex regional pain syndrome associated with nerve injuries, is severely disabling and likely to persist for many years with little chance of spontaneous improvement (Horowitz, 1994). Once established, causalgia is extremely refractory to many approaches including pharmacological, nerve stimulation and nerve blocks (Horowitz, 1994).

Preventative measures

A large, visible vein should be chosen with superficial placement of the needle encouraged by inserting the needle at 5–15° (Berry and Wallis, 1977). One should minimize needle movement and multiple attempts, and avoid flexing joints which immobilizes nerves (Horowitz, 1994). Venepuncture should be abandoned if associated with symptoms of nerve injury. The application of pressure has been shown to reduce the incidence of bruising, which reduces the risk of ensuing haematoma and possible neuropathy. Despite these steps complications do occur following properly performed atraumatic venepuncture (Horowitz, 1994), and early recognition is most important as successful treatment may obviate prolonged disabling symptoms (Berry and Wallis, 1977). Any new neurological symptom should lead to an immediate examination. If a haematoma is present then rapid surgical decompression and haematoma evacuation offers the best chance of recovery, and may lead to full recovery.

Medicolegal aspects

Informed consent is required for venepuncture, and is usually given in the implied form by the offering of an arm. Negligence could result not only from specific injuries, but also delegation of venepuncture by a consultant to an unqualified person. Therefore venepuncture should be carried out by appropriately trained staff (Laurie and Adam, 1996).

Conclusions

Although complications following venepuncture are rare, it is the most commonly performed invasive medical procedure. This case highlights that complications can be extremely disabling and must be identified and treated early. The administration of any drug affecting coagulation should alert physicians to the possibility of vascular complications. Doctors must remain ever vigilant to the possibility of such complications each time they warn the patient of 'just a sharp scratch', and act quickly when they do occur. BJHM

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Ectopia lentis caused by blunt eye trauma

A 59-year-old man presented to the eye clinic with a history of blunt injury to his right eye, caused by a can of Coke being thrown at him. He complained of slight eye discomfort and blurred vision. Apart from reduced visual acuity and mild conjunctival injection, the initial eye examination was thought to be normal (*Figure 1*). However, pupillary dilatation revealed an inferior dislocation of the lens (*Figure 2*). The causes of ectopia lentis (lens dislocation), in addition to trauma, include high myopia, uveal tumours, homocystinuria, and Marfan, Ehlers–Danlos and Weill–Marchesani syndromes (Nelson and Maumenee, 1982; Kanski, 2003).

Examination with pupillary dilatation is recommended in all cases of eye trauma, however trivial it may seem initially. BJHM

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Figure 1. Right eye (undilated pupil), showing mild conjunctival injection.

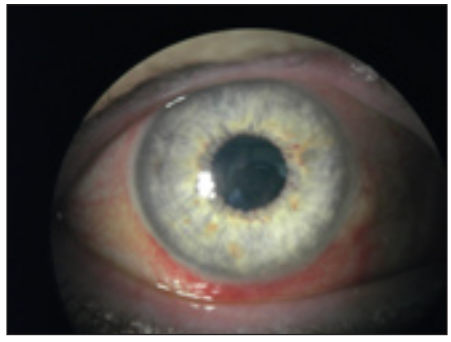

Figure 2. Right eye (dilated pupil), showing inferior lens dislocation.