

Postoperative brachial plexus neuropathy after total knee replacement under spinal anaesthesia

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Summary

We describe a case of idiopathic postoperative brachial plexus neuropathy. A 68-yr-old man underwent elective total knee replacement under spinal anaesthesia. Two days after surgery, there was sensory loss and weakness in the right forearm and hand, which suggested an ulnar nerve neuropathy. Two weeks later the patient complained of a dull ache between the scapulae, followed by a burning sensation in the forearm and severe pain in the elbow. A diagnosis of brachial plexus neuropathy was made based on clinical examination and nerve conduction studies. The pain disappeared after a few months, although weakness of the right arm persisted 9 months later. The differential diagnosis between brachial plexus neuropathy and ulnar nerve neuropathy is important, as the prognosis of brachial plexus neuropathy is generally good. (*Br. J. Anaesth.* 1995; **75**: 642–644)

Key words

Anaesthetic techniques, subarachnoid. Complications, neuropathy. Surgery, orthopaedic.

Brachial plexus neuropathy is a rare syndrome of unknown aetiology, with an incidence of 1.6 cases per 100 000 [1]. It has been described variously as paralytic brachial neuritis, serum brachial neuritis, acute brachial radiculitis, neuralgic amyotrophy or the shoulder-girdle syndrome of Parsonage and Turner [2, 3]. The neuropathy is characterized by acute onset of severe pain in the upper arm followed by paralysis of the affected muscles as the pain diminishes. Paraesthesiae, sensory loss and atrophy may also occur. The neuropathy has a predilection for the upper trunks of the brachial plexus, although all parts may be affected to a variable extent [4, 5]. It is more common on the right side and it occurs bilaterally in 10–30 % of patients [4, 5]. The diaphragm may also be affected, probably because of denervation of the fifth cervical nerve which sometimes supplies the diaphragm [6]. The incidence of the neuropathy is two to three times greater in males [4, 5]. Despite the dramatic and disabling symptoms, the prognosis of brachial plexus neuropathy is generally good, with more than 90 % of cases achieving full functional recovery within 3 yr [5].

We report a case of brachial plexus neuropathy which occurred after total knee replacement under

spinal anaesthesia and which was considered initially to be ulnar nerve neuropathy.

Case report

A 68-yr-old man with osteoarthritis of the right knee was undergoing elective total knee replacement. Past medical history was unremarkable except for a possible history of rheumatic fever as a child. He was not receiving any medication and had no known allergies.

One hour before surgery he was premedicated with temazepam 20 mg orally. In the anaesthetic room, routine monitors were attached and a cannula was inserted into a vein in the left hand. The patient was placed in the left lateral position and the lumbar area of the back was cleaned with 2.5 % chlorhexidine in 70 % alcohol. A 22-gauge Quincke needle was inserted in the L3–4 interspace without difficulty. Clear cerebrospinal fluid was obtained and plain 0.5 % bupivacaine 4 ml was injected slowly. Sensory block spread up to T8.

Midazolam 6 mg, in divided doses, was given during surgery. The patient was sedated lightly and lay supine with both arms positioned across the chest. During surgery he occasionally repositioned his arms. Surgery lasted 180 min and was uneventful. Heart rate and arterial pressure were within normal limits during the entire procedure. In the recovery room he received cyclizine 50 mg i.v. as a prophylactic antiemetic before starting patient-controlled analgesia with morphine. At this time the patient was fully alert and had no discomfort in any part of his body. The patient-controlled analgesia was stopped after 36 h because of severe nausea and vomiting, which eventually settled after additional injections of cyclizine.

Two days after surgery he complained of a “pins and needles” tingling sensation in the fourth and fifth fingers of the right hand and the medial border of the forearm. On examination there was a small scratch over the medial epicondyle, sensory loss in the paraesthetic area and weakness of the interosseus muscles. Ulnar nerve neuropathy caused by compression, either during or after surgery, was tentatively diagnosed and physiotherapy started.

Two weeks later the patient complained of a dull ache between the scapulae, which was followed by a burning sensation along the medial aspect of the forearm, pain in the elbow and extreme weakness of the right hand. The pain was severe enough to keep him awake at night. On examination there was obvious wasting of the intrinsic muscles of the hand, weakness of finger movement and sensory loss over the inner forearm in the C8 and T1 dermatomes. Radiographs of the cervical spine were unremarkable except for some degenerative changes. A neurologist tentatively diagnosed brachial plexus neuropathy based on clinical examination, and a course of steroids was given for 2 weeks to inhibit possible inflammation. This treatment had no effect on the pain and thus the patient was admitted to hospital for further investigation.

Over the next few months he was treated with amitriptyline and carbamazepine, and the pain eventually disappeared 3 months later. During this period several investigations were performed: full blood count, erythrocyte sedimentation rate, serum vitamin B₁₂ and folate, urea and electrolytes, liver enzymes, thyroid hormones, plasma electrophoresis, serum autoantibodies, Venereal Disease Research Laboratory (VDRL) and *Treponema pallidum* haemagglutination assay (TPHA) tests; all were within normal limits. Chest x-ray excluded the presence of a cervical rib, although there was a prominent transverse process of the seventh right cervical vertebra. There was no paralysis of the diaphragm. A magnetic resonance imaging scan of the neck showed moderate cervical spondylosis between C4 and C6, but there was no obvious compression of the brachial plexus. Nerve conduction studies indicated denervation of the right arm muscles supplied from the C8 and T1 region of the brachial plexus, and loss of the sensory action potential of the ulnar nerve. These suggested pathological changes distal to the dorsal root ganglion. A diagnosis of brachial plexus neuropathy was made.

Nine months after the initial symptoms the pain in his arm disappeared so that he did not need to take any medication. However, weakness and mild wasting of the muscles in the right hand and some dysaesthesia over the ulnar nerve distribution remain.

Discussion

Brachial plexus neuropathy is diagnosed by five main clinical criteria: weakness of the muscles of the upper limb, no compressive or traumatic cause, pain in the affected area, electrophysiological features of denervation and either full or partial recovery [7–9].

The patient in our report had weakness and pain over the C8 and T1 dermatomes, and there was denervation in the muscles supplied by the right radial, median and ulnar nerves. There was no obvious injury to his arm and the patient freely repositioned his arms during surgery. Thus it seems unlikely that there was compression of the brachial plexus during surgery, although this possibility cannot be denied. The main symptoms had dis-

appeared within 9 months. The criteria for the diagnosis of brachial plexus neuropathy were therefore fulfilled in this patient.

Various possible causes of brachial plexus neuropathy have been described, although the aetiology has not been fully elucidated. These include viral infections, allergic reaction to injection of foreign sera or vaccinations or a manifestation of connective tissue diseases, such as systemic lupus erythematosus [5, 10]. There is also a recurrent hereditary form, which is often associated with short stature, hypotelorism and cranial nerve palsies [9, 11].

The cause of brachial plexus neuropathy in our patient was unclear. He had not experienced any pain or numbness in his arm before operation and had no congenital abnormalities or family history of this disease. He had not received foreign sera vaccination since childhood. No apparent symptoms or signs of connective tissue diseases were found. However, he may have had rheumatic fever, which is known to be associated with brachial plexus neuropathy [8].

It might be possible that brachial plexus neuropathy was triggered by either surgical stress or spinal anaesthesia, or both. In a report of 136 patients with brachial plexus neuropathy, the disease manifested after minor surgery in 12 patients who received inhalation, i.v. or spinal anaesthetics [2]. The authors claimed that it was unlikely the brachial plexus neuropathy was caused by mechanical compression. Symptoms were manifest 3–14 days after surgery [2]. In another report of 99 patients, brachial plexus neuropathy developed in two after orthopaedic surgery in areas other than the affected limb [5]. The type of anaesthetic was not reported nor were the possible implications of surgery and anaesthesia discussed [5]. There have also been other reports of brachial plexus neuropathy which occurred after surgery [3, 9]. Recently, Malamut and colleagues detected, over a 2-yr period, six cases of brachial plexus neuropathy, which occurred 1–13 days after surgery [12]. They claim that postoperative brachial plexus neuropathy is an under-recognized disease which is usually ascribed to brachial plexus stretch injuries that occurred during anaesthesia [12].

Brachial plexus neuropathy has also been associated with both pregnancy and delivery [8, 9, 11, 13, 14]. Extradural analgesia was given in at least one case [13]. It is not known if physiological changes or stress induced by surgery, anaesthesia, pregnancy or delivery trigger brachial plexus neuropathy.

Ulnar nerve neuropathy caused by compression is the most common postoperative nerve lesion and is a significant source of anaesthesia-related compensation claims [15]. Symptoms often manifest more than 24 h after surgery and may occur even after regional anaesthesia with light sedation [16]. We initially considered this had occurred in our patient because of the classical symptoms and signs. However, the subsequent development of pain between his scapulae prompted a revision of the tentative diagnosis and referral to a neurologist who diagnosed brachial plexus neuropathy. Differential diagnosis between brachial plexus neuropathy and ulnar nerve

neuropathy is important because the symptoms can be similar. Accurate diagnosis of brachial plexus neuropathy enables the patient to be informed that, although it may take a few years, the potential for recovery is good and that when symptoms are established, there is usually no further deterioration.

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