We describe a case of postoperative brachial plexus neurapraxia after lumbar spinal surgery performed on the prone, seated, knee-chest position. The arms were extended above the patient's head. (Br. J. Anaesth. 1994; 72: 605-607)

CASE REPORT

A 34-yr-old, 65-kg female presented for elective surgical L4-5 discectomy. Routine preoperative clinical assessment and investigations were all normal. The only previous surgery had been an uneventful dental extraction under general anaesthesia. Premedication with oral lorazepam 2.5 mg and metoclopramide 10 mg was administered 3 h before operation.

An i.v. infusion was commenced and anaesthesia was induced in the supine position with propofol 150 mg and fentanyl 100 μg. Neuromuscular block was produced with atracurium 30 mg and monitored using a peripheral nerve stimulator. After tracheal intubation with a cuffed armoured orotracheal tube, anaesthesia was maintained with isoflurane and nitrous oxide in oxygen (Fio₂ 0.4). Ventilation of the lungs was adjusted to maintain end-tidal carbon dioxide concentration at 4-5 kPa. Further bolus doses of fentanyl 150 μg and atracurium 15 mg were given throughout the procedure, which lasted 60 min. SpO₂, ECG, automatic indirect systemic arterial pressure monitors were used and anaesthetic gas and vapour concentrations were measured and displayed continuously.

After induction of anaesthesia, the patient was turned to the prone position with the ischial tuberosities supported by a "seat" and the chest supported with pillows. The operating table was tipped to 45° so that the patient's back was horizontal (Tarlov) [6]. The arms were placed alongside the head which was maintained in the sagittal position, the forehead being supported by a soft foam pad so that there was no direct pressure on the eyes. An external pneumatic compression apparatus was applied to the lower limbs below the knees.

The arms were positioned directly alongside, and in close proximity, to the patient's head so that the hands were at some distance from, but in front of the forehead. It was noted at the time that, being relatively young and very supple, she was not easily aligned directly in the midline of the operating table. This resulted in the left shoulder being slightly more abducted than the right in order to support the arm adequately (fig. 1).
The operation was uneventful, changing to the supine position at its completion was achieved easily and safely and no problems were encountered in the recovery period.

The patient first noticed some weakness/numbness and paraesthesiae of the left arm at approximately 8 h after operation but did not draw it to the attention of the medical staff until the following day. Its immediate significance was not appreciated and it was thought that she may have been lying on the arm whilst sedated with morphine i.m. Over the course of the first postoperative week it became apparent that as she recovered from the immediate effects of the surgical procedure, the symptoms in her arm were not recovering as anticipated. She was therefore referred for a neurological opinion.

The findings at this time included weakness of left deltoid, supinator, biceps, triceps, brachioradialis and wrist extensors. The left biceps and supinator jerks were absent and there was sensory impairment in the territory of the left fifth, sixth and seventh cervical dermatomes. Nerve conduction studies were normal. Electromyography revealed no spontaneous activity, but motor unit recruitment was reduced markedly in the left deltoid and triceps. Similar but less severe changes were noted in the left brachioradialis and biceps. These findings are consistent with a partial neurapractic lesion of the posterior and lateral cords of the left brachial plexus.

Five months after surgery there was considerable improvement in her neurological status. She had minimal weakness of the left biceps and brachioradialis but her tendon reflexes and sensation had returned to normal. There were no subclavian bruits. Both radial pulses were present and equal. Shoulder hyperabduction did not result in any symptoms referable to the left arm or hand. There were no abnormal findings on electromyography. At her last follow-up 10 months after operation, she complained of mild muscular aching in the left shoulder with hyperabduction did not result in any symptoms referable to the left arm or hand. There were no abnormal findings on electromyography. At her last follow-up 10 months after operation, she complained of mild muscular aching in the left shoulder with activity. There was no neurological deficit in the left upper limb and she had no signs of cervical disc disease or of a thoracic outlet syndrome. X-rays of the thoracic outlets revealed no cervical ribs.

**DISCUSSION**

Following observations on conscious volunteers, Smith, Gramling and Volpitto [7] described the abducted and extended arms position in pronated patients as being the most satisfactory. The illustrations in that article demonstrated clearly the arms in close proximity to the sides of the patient’s head. His subsequent publications over a 15-yr period on other aspects of prone positioning did not mention any problems encountered from positioning the arms in this way. Gwinnutt [8] described an isolated axillary nerve palsy resulting from positioning the arms as described and concluded that the degree of abduction and extension at the shoulder joint resulted in pressure on the axillary nerve by the head of the humerus, although it was unclear why the lesion should have been unilateral. This case was interesting in that exactly the same postoperative complication occurred when the patient had had her first spinal operation 15 yr earlier, a fact that she failed to remember until it recurred after operation on a second occasion.

The brachial plexus may be damaged by forceful rotation of the head to the opposite side, compression between the clavicle and the first rib, elevation by a cervical rib or fibrous band, or stretching over the abducted head of the humerus. A combination of these factors may also occur. In our patient the clinical and neurophysiological findings suggested a lesion of the posterior and lateral cords of the brachial plexus. These are most vulnerable to stretch across the underside of the coracoid process and glenohumeral joint during shoulder hyperabduction. Our patient demonstrates that the risk of brachial plexus injury is present even in young patients without predisposing bony anomaly in the region of the thoracic outlet. When considering Smith’s position for back surgery, it would be wise to elicit before operation if lifting the arms above the head normally produces paraesthesiae or other neurological symptoms. In such cases it would be advisable to position the patient prone with the arms along the sides. Unfortunately, visual access to the i.v. infusion cannulae and other monitoring probes attached to the arms or hands is difficult when the surgical drapes have been positioned. The possibility of accidental disconnection of infusion lines or subcutaneous transfusion after accidental displacement or an i.v. cannula, must be borne in mind.

In all patients, less extreme abduction than was used in this patient is advised (fig. 2). Care should also be taken not to allow compression of the ulnar nerve at the elbow.

**REFERENCES**