

# Postoperative brachial plexus neuropathy following general anaesthesia

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## Abstract

Despite considerable knowledge and preventive strategies, brachial plexus injuries remain a frequent occurrence in the perioperative setting. The importance of careful positioning is stressed, however most careful positioning is also not sufficient to prevent the lesion; some patients seem to be more prone even in the best of conditions. Our patient despite being operated in supine position developed postoperative tingling and weakness of right upper extremity due to a neurogenic lesion at C5, C6 nerve root as confirmed by EMG and nerve conduction studies. The patient underwent supervised physiotherapy and had a near total resolution of symptoms in 10 days.

## INTRODUCTION

Intraoperative positioning nerve injuries are largely preventable complications of an otherwise uneventful anaesthetic. We present the case of our patient who developed a brachial plexus neuropathy following a general anaesthetic in the supine position. The ASA task force recommendations to prevent neuropathies are reviewed.

## CASE HISTORY

A 40 year old male had undergone an endoscopic procedure for bilateral upper ureteric calculi which resulted in right sided ureteric injury. Left sided DJ stenting and right sided percutaneous nephrostomy was performed. Following this, the patient developed septicemia and acute renal failure for which he underwent four sessions of haemodialysis. He was referred to our tertiary care hospital for further management. After initial stabilization, the patient was posted for elective ureteric reconstruction (Boari's flap) surgery.

The preoperative investigations were as follows:

Hemoglobin 10gm%, Serum Creatinine 3.1, Blood urea nitrogen 52mg, Serum Sodium/Potassium:137/4.3 meq/ L. All other investigations were normal and the patient did not have any other complaints.

In the operating room, a lumbar epidural catheter was inserted under standard aseptic precautions and subsequently general anesthesia with endotracheal intubation was performed. It was then noticed that the operating table had developed a technical fault and could not be tilted in right up

position and neither a break in the table could be achieved. Patient was given the operating position by placing a wedge under the right flank while he was kept supine. Both arms were placed palm up on arm boards at an angle of 60-70 degrees from his trunk, secured with straps. All pressure points were padded and head was supported with a head ring.

Patient underwent an uneventful surgical procedure. Anaesthesia was maintained with Oxygen, Nitrous oxide, Isoflurane and intermittent doses of Atracurium supplemented with epidural infusion of 0.125% Bupivacaine at 4ml/hr. Surgery lasted for 5 hours and 15 minutes with an intraoperative blood loss of 350 cc. Patient was reversed, extubated and shifted to PACU with the epidural catheter insitu.

Immediate postoperative course was uneventful where he was given one unit of blood and intermittent epidural top ups of 0.125% Bupivacaine for analgesia. On the first postoperative day, the patient complained of difficulty in moving the right upper extremity and a tingling sensation in the arm. Anesthesiologists attending to the patient in PACU noticed an inability of the patient to lift his right arm, abduct the shoulder, flex or supinate the forearm. However, wrist downwards movements were normal. Patient was immediately started on IV Dexamethasone 8 mg TDS (given for 2 days) and Multivitamins. Neuromedicine services were consulted.

A CT Brain was performed which was normal. EMG and Nerve conduction studies confirmed a proximal neurogenic lesion at C5, C6 root of brachial plexus. Epidural catheter was removed on the third postoperative day. Power improved from Grade 0/5 to Grade 2-3/5 in deltoid, pectoral, biceps and triceps group of muscles. On day 4, patient was discharged to the ward where regular supervised physiotherapy was carried out. Patient regained a power of 4/5 grade by the 10<sup>th</sup> postoperative day in all groups of affected muscles. Elbow movements had completely recovered, however abduction was still mildly affected. The patient was discharged home on request with an advice to continue physiotherapy at home and follow up at regular intervals.

### DISCUSSION

Analysis of the American Society of Anesthesiologists closed claims database of 1990-1999 revealed that 4183 closed claims were due to anesthesia related nerve injuries<sub>1</sub>. Regional anesthesia was more frequently associated with nerve damage claims than general anesthesia. However, ulnar nerve injuries were more common under general anesthesia<sub>2</sub>.

Three principal mechanisms that result in nerve injury are laceration, compression and stretching<sub>3</sub>. Laceration is the least common whereas stretching is the most common culprit in brachial plexus injury in the perioperative setting. Proximally the brachial plexus is attached to vertebral and prevertebral fascia and distally anchored to axillary sheath. Hence it cannot slide but has to stretch when traction is placed on shoulder and neck.

Various etiologies cited for perioperative nerve injury are: neural ischaemia (prolonged hypotension, vasoconstriction or hypothermia), traumatic injury (needle and catheter placement), local anesthetic toxicity, prolonged pressure (positioning, improper cast, and dressing), and patients with preexisting neurological and systemic disorders e.g. diabetes, coagulopathies, surgical trauma and rarely infectious complications. Definite mechanism of injury is rarely determined but since patient developed neurological symptoms it is assumed that something must have gone wrong or done incorrectly according to the doctrine of *res ipsa loquitur* (thing speaks for itself)

Many cases of brachial plexus injury associated with median sternotomy<sub>45</sub>, lateral decubitus<sub>67</sub> and prone position<sub>8</sub> have been reported. Ours was a case where patient despite being in supine position developed postoperative neuropathy. A

similar case of brachial plexus injury in supine position has been mentioned which occurred due to unexpected movement of the patient during recovery from anesthesia while his hands were strapped<sub>6</sub>.

Fortunately prognosis of perioperative brachial plexus injury is good and conservative treatment is the main stay. Paralysed muscles should not be overstretched, whereas activity of opposing muscles and joint movements should be permitted. Knowledge and prevention are best treatments.

ASA formed a task force to advise regarding prevention of perioperative nerve injury and the summary of consensus was<sub>10</sub>

### PREOPERATIVE ASSESSMENT

To ascertain that the patient can comfortably tolerate the operating position

### UPPER EXTREMITY POSITIONING

Arm abduction limited to 90 degrees in supine position. However in prone position, abduction greater than 90 degrees may be comfortably tolerated.

Prolonged pressure over post condylar groove and spiral groove of humerus should be avoided. Extension of the elbow beyond a comfortable range may stretch the median nerve.

### PROTECTIVE PADDING

Padded armboards may decrease the risk of upper extremity neuropathy. The use of chestrolls in laterally positioned patients. Padding the elbow at the fibular head.

### EQUIPMENT

Properly functioning automated blood pressure cuffs do not increase the risk of upper extremity neuropathies. Shoulder braces in steep head down position may increase the risk of brachial plexus injury.

### POSTOPERATIVE ASSESSMENT

Early recognition of peripheral neuropathies.

### DOCUMENTATION

Charting specific positioning actions during the care of patient may result in improvement of care.

### CONCLUSION

This case highlights the need for careful positioning of every patient on the operation table which should be accompanied

by periodic rechecks of position in long duration surgeries. Prevention starts from the preoperative visit and prompt intervention should be done if any new neurodeficit is seen postoperatively. Complications, though rare, may be devastating for the patient.

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