CERVICAL EPIDURAL ANAESTHESIA FOR PROXIMAL HUMERUS FRACTURE PLATING SURGERY IN A PATIENT WITH CKD GRADE 5- A CASE REPORT

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PRESENTATION OF CASE

A 52-year-old male presented to the Orthopaedics OPD with history of fall on an outstretched arm. He complained of pain, swelling and deformity of left arm.

CLINICAL DIAGNOSIS

A 52-year-old male patient weighing 52kgs presented to the preanaesthetic clinic with fracture of proximal humerus posted for ORIF surgery. He was hypertensive since 2 years on Tab. Nicardia 10mg b.i.d. He did not have any other comorbidities such as diabetes, ischaemic heart disease (IHD) and asthma. On examination, he was conscious and oriented with pain, swelling and deformity of left proximal humerus. Preoperative blood investigations revealed a normal haemogram (Hb10.9mg/dL, TLC7, 600cells/mm^3, platelet count 3,32,000 cells/mm^3) RBS 121.3mg/dL, blood urea 55.6mg/dL, serum creatinine 4.9mg/dL with urine protein 2+, ECG and chest x-ray were unremarkable. Coagulation profile and serum electrolytes were within normal limits. Further workup with ultrasound revealed bilateral renal parenchymal disease with grade 4 arteriosclerosis. He was in stage 5 CKD with eGFR of 13mL/min./1.73m^2. Cervicalspine x-ray was done to rule out any anatomical abnormalities. He was posted electively for proximal humerus fracture plating with PHILOS.

PATHOLOGICAL DISCUSSION

Proximal humerus fracture surgery is routinely performed under general anaesthesia or brachial plexus block by interscalene approach, but patients with compromised renal function are at increased risk of morbidity and mortality. We report successful perioperative management of a 52-year-old male patient with proximal humerus fracture with compromised renal function under cervical epidural anaesthesia.

Chronic Kidney Disease (CKD) is defined as either kidney damage or GFR <60mL/min./1.73m^2 for >3months. There is progressive loss in kidney function over a period of months or years. It is a multisystem dysfunction in which the pathophysiological effects exerts a considerable influence on the pharmacokinetics of anaesthetic agents and hence the response to anaesthesia. CKD presents as a unique challenge to the anaesthetist as it comes with its sequelae such as cardiac arrhythmias, acid-base disorders, anaemia, uraemia, renal osteodystrophy and also the underlying disease state that caused it. Drugs and metabolites normally excreted by the kidney can accumulate to toxic levels due to impaired glomerular filtration and renal tubular function leading to delayed recovery, elective ventilation in ICU and prolonged hospital stay.

Proximal humerus surgeries are conventionally performed under GA or brachial plexus block with interscalene approach or a combination of both. Interscalene brachial plexus block is associated with a high failure rate of 20-30%, which again requires supplementation with GA. Complications like PONV[1]and CNS toxicity seizures (1.4%), both have increased incidence in CKD.[2] Pneumothorax and accidental injection into vertebral artery, subarachnoid or epidural space[3] are other possible complications. CEA is effective in sensory blockade of superficial C1-C4 and brachial plexus. It can be administered in surgeries of neck, upper arm and chest.[4] Our patient was grade 5 CKD, so considering drawbacks of interscalene block and GA, we opted for cervical epidural anaesthesia, which is a routinely performed technique in our institute for thyroid and breast surgeries in ASA grade 3 and 4 patients.

In epidural anaesthesia, commonly higher concentrations (bupivacaine0.5% or lignocaine 2%) and higher volumes (up to 20-25mL) are used, but for CEA-diluted concentrations (bupivacaine0.25% or lignocaine 1%) and lower volumes are preferable, which benefitted us in this patient to prevent local anaesthetic-related drug toxicity and also motor blockade, which is a undesired effect of CEA, which may lead to respiratory muscle paresis requiring assisted ventilation.[5,6,7]

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Thus, CEA provided high quality surgical anaesthesia with minimal drugs and excellent postoperative analgesia for next 24 hours,[8] which avoided use of opioids and of course NSAIDS, which are contraindicated in our CKD patient. Other advantages were early ambulation, cost effectiveness and reduced incidence of postoperative morbidity such as respiratory complications and venous thromboembolism. There is also a favourable effect on haemodynamic parameters due to cardiac sympathetic blockade resulting in a prolonged coronary perfusion time and reduced left heart afterload.[9,10]

DISCUSSION OF MANAGEMENT

The patient was counselled regarding different anaesthesia techniques and consent was taken for central neuraxial blockade. Tab. Alprax 0.5mg was given and the patient was kept nil orally from 10 p.m. on the day before surgery. After arrival to the operation theatre, an IV line was started with 20G cannula and normal saline (0.9%) drip was started. All anaesthetic equipment were checked, multipara monitors were connected and baseline readings recorded BP140/80, HR70/min. and SPO_2 100%. According to institution protocol, patient was premedicated with Inj. Ranitidine 50mg,Inj.Ondansetron 4mg,Inj.Metoclopramide 10mg and Inj. Glycopyrrolate 0.2mg IV were given. With the patient in sitting position and neck flexed, painting and draping was done. C7-T1 intervertebral space located and infiltrated with local anaesthetic lignocaine 2%. Using an 18G Tuohy's needle, epidural space was located at a depth of 4cms by using loss of resistance to air technique. 18G epidural catheter was introduced in caudad direction and fixed at 10cms (Figure 1). Correct placement of epidural catheter was verified by negative aspiration for blood or CSF followed by administration of 1% lignocaine +adrenaline solution (1:2,00,000) 3mL. The patient was positioned supine on the operating table and oxygen supplemented with nasal cannula at the rate of 3 L/min. A bolus dose of Inj. Bupivacaine 0.25% (25mg) 10mL + Inj. Fentanyl 25mcg was injected through the epidural catheter. Onset of action was noted within 10 minutes of injection. Level of sensory blockade was tested bilaterally with pinprick test from T12 dermatome level (Figure 2).A sensory block from C2-T6 level was noted after 20 minutes of injection. The patient was kept under conscious sedation using Inj. Midazolam 1mg+Inj.Fentanyl 25mcg hourly doses. Intraoperatively, vitals were monitored every 10minutes. Epidural topup with Inj. Bupivacaine 0.25%, 7mL (17.5mg) was given at 60 minutes and again at 120 minutes into the surgery, which lasted for 150 minutes. At the end of surgery, total urine output was 100 mL. Postoperative analgesia was provided with epidural top up dose of Inj. Bupivacaine 0.25%, 5mL (12.5mg) SOS after assessing VAS score for 24 hours and the catheter was removed after 24 hours. Patient had good pain relief postoperatively. No complications were noted in the intraoperative and postoperative period and patient was haemodynamically stable throughout this period.

Figure 1. Epidural Catheter Being Threaded Through the Tuohy's Needle at C7-T1 Space

Figure 2. Intraoperative Picture with Epidural Catheter in Situ

FINAL DIAGNOSIS

ORIF of proximal humerus fractures are conventionally performed under General Anaesthesia (GA) or interscalene brachial plexus block. With the rising concern for GA-related implications on cardiorespiratory and metabolic status of the patient, a preference for regional anaesthetic techniques has increased worldwide. Cervical epidural approach first described by Dogliotti in 1933 for upper thoracic procedures has been an upcoming technique since the past few years and has attracted investigators to explore its viability for various surgeries on carotid artery, thyroid, parathyroid, breast and upper limb.

Administration of local anaesthetic into the cervical epidural space results in anaesthesia of cervical plexus, brachial plexus and superior thoracic dermatomes. Advantages are lower cost, reduced intraoperative blood loss, stable cardiovascular stability, reduced stress response, good postoperative analgesia and early ambulation of the patient.[5] In experienced hands, the use of CEA alone is well established owing to the stable cardiorespiratory status and the avoidance of

polypharmacy and airway instrumentation.[5,11,12] The incidence of complications is quiet low.[13] The potential advantage of employing this technique is where GA is contraindicated as respiratory and haemodynamic inhibition is minimal with epidural. Some studies have documented the efficacy and safety of CEA as a sole anaesthetic technique for upper extremity and thoracic wall surgeries,[6,9] but rarely used in shoulder surgeries. CEA was selected in our patient as he was a known case of hypertension with CKD stage 5 (ASA grade 4), and in our institution, it is a routinely performed technique for breast and thyroid surgeries in high-risk patients.

With a skilled and experienced anaesthesiologist, the technique of cervical epidural anaesthesia can be used as a safe and effective alternative to GA and brachial plexus block to provide anaesthesia in high-risk upper limb surgeries. Thus, sole cervical epidural block can be considered a safe and effective anaesthesia technique for upper limb surgeries causing minimal haemodynamic changes especially in high-risk patients.

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