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Case Report

Graded Epidural Anaesthesia as the Sole Anaesthetic Technique for Bilateral Total Knee Replacement in a Patient with Low Ejection Fraction: A Case Report

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ABSTRACT

In patients with cardiac disease, it's always a challenge for the anaesthetist to administer general anaesthesia as well as central neuraxial blockade. The major perioperative task in these patients with low cardiac output is maintaining hemodynamic stability. Here, we are discussing a case of successful management of a geriatric patient having ischemic heart disease with ejection fraction of 25% posted for bilateral total knee replacement under graded epidural anaesthesia.

Ischemic heart disease or coronary artery disease, involves the narrowing of coronary vessels as a result of atherosclerosis, in which patients may end up with heart failure. For patients with HF, management of neuraxial anaesthesia may be modified to avoid inducing hypotension. Neuraxial anaesthesia causes sympathetic blockade which can decrease cardiac preload resulting in hypotension. Modified neuraxial anaesthetic techniques are a reasonable option (low dose combined spinal epidural or graded epidural anaesthesia) particularly for HF patients susceptible to hypotension. Here, we report a case of a geriatric patient with ischemic heart disease with EF 25% posted for bilateral total knee replacement under graded epidural anaesthesia uneventfully.

Case Report

A 68-year-old male, who is a known case of hypertension and type 2 diabetes mellitus for 8 years, with history of ischemic heart disease diagnosed 2 years back presented with complaints of bilateral knee pain and was diagnosed with osteoarthritis of knee joint. Patient was planned for bilateral knee replacement. Preoperative ECG showed features of LVH and ECHO demonstrated systolic dysfunction with left ventricular ejection fraction of 25%. Routine blood investigations were done and was within normal limits. Currently patient was on Tab Aspirin 75mg OD, Tab Atorvastatin 20mg OD, Tab Metoprolol 25mg OD, Tab Lisinopril 10mg OD, Tab spironolactone 25mg OD and Tab Metformin 500mg BD.

Pre-operatively, the patient's vitals were stable, systemic examination was within normal limits, and airway and spine assessment were normal. In the operating room, two 18-gauge intravenous (IV) cannulae were secured in bilateral upper limbs and 5-lead ECG, non-invasive blood pressure monitoring (NIBP), pulse oximetry and invasive blood pressure monitoring (22G cannula in right radial artery) were attached, and baseline hemodynamic parameters were noted. Under strict aseptic precautions, after adequate LA infiltration, an 18G epidural catheter was placed in L3-L4 intervertebral space in sitting position using the loss of resistance technique and fixed at 10 cms. Correct position of epidural catheter was confirmed by a negative test dose of 3 ml lignocaine 2% with 15 mcg of epinephrine. Epidural infusion with 0.5% bupivacaine at 5 mL/hour started after giving bolus dose of 0.5% bupivacaine 6 mL. Blood loss was within acceptable limits and urine output was adequate (1 ml/kg/hour). Intra-operatively, the

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patient received one unit of packed red blood cells and no vasopressor was given. Bilateral total knee replacement was performed uneventfully in 6 hours. At the end of surgery, the patient got shifted to post operative care unit for monitoring before shifting to the ward. Patient was mobilised the next day after surgery and the post-operative stay was uneventful.

Discussion

It is important to optimise patients with significant heart disease for surgery preoperatively. This is done with pharmacological support of agents such as calcium channel blockers, angiotensin converting enzyme inhibitors, angiotensin-II receptor blockers and diuretics. Regional anaesthesia used alone or in combination with general anaesthesia has advantage of reducing preload and afterload which can improve cardiac output. However, hypotension must be prevented to avoid myocardial hypoperfusion. Also, subarachnoid block may be associated with inability to control the level of block which can result in considerable hemodynamic imbalance. Therefore, administration of combined spinal-epidural anaesthesia after preloading with crystalloid Ringer's lactate (RL) was our modality of choice. We gave spinal anesthesia with low volume of drug in the sitting position so that high levels were not achieved and the epidural catheter provided backup in case of very low spinal levels and for maintaining the level of blockade when there was recession of the level of blockade. It permitted the advantage of an early onset of effect as well as the flexibility of graduated doses of local anaesthetics through epidural catheter. This not only helped to titrate the level of block but also was advantageous in maintenance of hemodynamic stability.

Cardiovascular dysfunction has been reported as the commonest co-morbid condition found in pre-operative patients presenting for elective procedures [1]. Patients with ischemic heart disease undergoing noncardiac surgery are at an increased risk for perioperative cardiovascular events. In any surgeries involving low left ventricular output, maintaining hemodynamic stability has become a challenging issue. Efforts should be taken to prevent intraoperative hypotension, tachycardia and arrythmias [2-3]. Maintaining the cardiovascular, renal, pulmonary, and central nervous system functions in aged patients is one of the important determinants of outcome from surgical procedures under general or regional anesthesia.

In patients with IHD, induction as well as extubation should be smooth and measures are to be taken inorder to maintain hemodynamic stability. Anaesthetic management of a patient with low left ventricular output is always challenging. The anaesthetic goals include avoiding myocardial depression, maintenance of normovolemia, prevention of increase in afterload and sudden hypotension. Regional anaesthesia was chosen over GA for this patient as it blunts the neurohumoral stress response to surgery, produces vasodilatation and thereby decreasing afterload. It is associated with early recovery and mobilisation after surgery [4]. It also decreases the incidence of postoperative delirium as compared to general anesthesia in geriatric population [5]. Epidural can also help in postoperative pain relief. Nerve blocks such as femoral nerve catheter block, adductor canal block and the local anesthetic infiltration between the popliteal artery and capsule of the knee (IPACK) block have been successfully used recently for postoperative analgesia following TKR [6], However local anesthetic systemic toxicity is always a concern when large volumes are used and can further depress the myocardium in the patients presented so we avoided them [7].

Conclusion

Graded epidural anaesthesia may be used as the sole anaesthetic technique for a patient with IHD and a low ejection fraction provided the anaesthesiologist has the skill and competency.

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