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Continuous Spinal Anaesthesia as an Alternative Mode of Anaesthesia in High - Risk Patients - A Case Report

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Abstract: ***A 56 - year - old female, presented to the emergency department with complaints of fever and multiple discharging wounds on her right knee. Her medical history included ischemic heart disease (IHD) with reduced ejection fraction and uncontrolled diabetes mellitus. She was posted for emergency wound debridement under high risk. Due to difficult epidural catheter placement, the anaesthetic technique used was Continous spinal anaesthesia, which provided better haemodynamic stability and lesser peri - operative complications. This case report highlights the use of Continous spinal anaesthesia in high - risk patients, which uses titrated doses of local anaesthetic providing segmental blocks, better intra - operative vitals and lesser complications associated with co - morbid conditions.***

Keywords: emergency department, discharging wounds, ischemic heart disease, uncontrolled diabetes, continuous spinal anaesthesia

1. Introduction

Continuous spinal anesthesia is the technique of initiating and maintaining spinal anesthesia with small doses of local anesthetic injected intermittently into the subarachnoid space using an indwelling catheter. It has been used for various procedures for the elderly patients, patients with end stage diseases like cancer and in high - risk patients. It is not a very popular technique due its complication like cauda equina syndrome and difficulty with insertion of micro catheters. However in our case, we used epidural catheter, inserted into the subarachnoid space and achieved the required level of segmental anaesthesia for the procedure without the effects of hypotension associated with single shot spinal anaesthesia.

2. Case Report

A 56 year old lady of 60kg weight, 155cm height was accepted under ASA V (E), who was scheduled for emergent knee debridement. She had multiple discharging wounds on her right knee, with a history of fever of 20 days duration and pain in the right knee since 15 days. Her medical history was significant for newly diagnosed IHD with a reduced ejection fraction of 36% and uncontrolled Diabetes Mellitus.

On general physical examination, pallor was noted. Systemic examination was within normal limits. Removable artificial dentures were present. Airway examination was within normal limits. ECG showed poor R wave progression and 2D ECHO showed reduced Left Ventricular function, EF: 36%, global LV dysfunction, LV anterior wall akinesia. Other organ function and biochemical disturbances included anemia (Hemoglobin of 10.6g/dl), Acute on chronic kidney disease (serum creatinine of 1.33mg/dl), and hypokalemia (serum potassium of 3.0mEq/L). We estimated her subjective metabolic equivalent of tasks ≤4 and revised cardiac risk index of 6.6%.

Physician's opinion was sought and a diagnosis of acute on CKD and IHD with reduced EF was made. On repeating serum electrolytes Sodium was 139mEq/L and Potassium was 3.0mEq/L, however patient was asymptomatic. Case was accepted under ASA - V (E) in view of IHD with reduced EF, acute on CKD and hypokalemia. She was advised to start Inj. Insugen R, switch to Tab. Cilacar. Also advised to repeat serum electrolytes and to start Tab. Ecosprin 75mg and Tab. Clopidogrel 75mg post wound debridement procedure. A plan of epidural anaesthesia with sciatic nerve block was made.

After informed consent, patient was taken to the operating room and standard ASA monitors were placed. Oxygen through nasal prongs was supplied. Pre - operative blood sugar was 92mg/dl. Patient was placed in sitting position for anaesthesia administration. Under aseptic precautions, parts were painted and draped. Inter vertebral disc space L2 - L3 was palpated and identified. Epidural anaesthesia was tried and back flow of blood was noted in the catheter.

The procedure was tried a second time by a senior anaesthesiologist and back flow of blood still noted in the epidural catheter on insertion. Therefore, procedure was abandoned in view of difficult epidural catheter placement and a plan of continuous spinal anaesthesia was made.

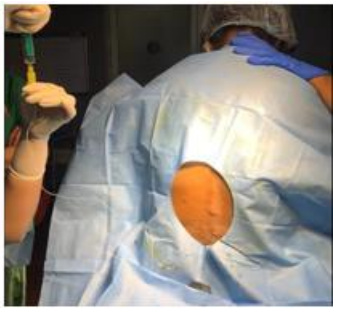
At the L_3 - L_4 intervertebral disc space, an 18G tuhoy's needle was inserted upto 4.5cm and free flow of CSF was noted, catheter was inserted and fixed at 8cm.1.5ml of 0.75% Inj. Ropivacaine was injected intrathecally slowly. A sensory block of L1 was achieved and was adequate for the procedure. Subsequently vitals remained stable. No signification hypotension or tachycardia noted perioperatively. Level of spinal anaesthesia was monitored.

After 45 minutes, an additional 0.5 ml of 0.75% Inj. Ropivacaine was injected through the catheter as the level of block had regressed. Vitals remained stable throughout the

procedure and no significant hypotension noted. Surgery was completed and was uneventful. Catheter was not used for post operative analgesia, removed post procedure. Patient was monitored for PDPH post operatively.

Surgery lasted for 80 minutes, with a blood loss of 300ml and a urine out put of 150ml. Throughout the procedure the patient was stable, maintaining a heart rate of 68 - 74bpm and blood pressure of 110/70 mm Hg to 130/80 mm Hg. Intra - operatively the blood sugar level was found to be 108mg/dl. The patient was comfortable during the course of the procedure.

Postoperatively, USG guided sciatic nerve block with 10ml of 0.75% Ropivacaine, 10ml of 2% Lignocaine with Adrenaline was given, to provide postoperative analgesia. The post operative analgesia lasted for over 16 hours post procedure.

3. Discussion

Ischemic heart disease (IHD) is the leading cause of morbidity and mortality all over the world. Patients with IHD are at an increased risk for peri - operative complications such as myocardial ischemia, myocardial infarction, cardiac failure, arrhythmias and cardiac arrest which increase the risk of morbidity and mortality. Therefore, there is the need for careful assessment, optimization, and anesthesia planning for patients with IHD undergoing cardiac or noncardiac surgery. Any of the factors which increase cardiac work such as physical work, emotional stress, stress associated with surgery and anaesthesia increases myocardial oxygen demand. This is normally compensated in individuals by increasing the coronary blood flow. In patients with IHD, the increase in oxygen demand is not compensated as coronary flow is already compromised. Primary anaesthetic goal in such patients is to avoid the factors which impair myocardial oxygen supply - demand balance.

In our patient, sole epidural anaesthesia was preferred because of the high risk posed by uncontrolled sugars, hypokalemia and IHD with reduced ejection fraction. In view of difficult epidural, plan of anaesthesia was changed to continuous spinal anaesthesia, which provides haemodynamic stability as anaesthesia can be delivered in titrated doses. Our anaesthetic goal was to keep myocardial oxygen supply greater than demand and thus avoid ischaemia. Avoiding tachycardia and extremes of blood pressure changes are our goals. Continuous spinal anaesthesia is one such technique where you can block specific segments which are required for surgery. It has been successfully used in major surgeries involving high risk patients like those with congestive cardiac failure, patients with severe aortic stenosis undergoing lower extremity surgery, previous spinal surgery, significant cardiac disease, morbid obesity, difficult airway and difficult epidural catheter placement.

Continuous epidural anaesthesia is a routine regional anaesthesia technique used for lower limb surgeries. But it has its own drawbacks such as technical difficulties of catheter insertion, risk of hematoma formation in patients with coagulation disorders or patients on anticoagulant treatment and those who require larger anaesthetic dose, migration of catheter tip into blood vessel or subarachnoid space.

Single shot spinal Anaestheisa is also a good alternative regional technique for lower limb procedures, but it comes with gross hypotension even with preloading and in some cases preloading may be contraindicated. The duration of action can be limited and incidence of perioperative hypotension is observed more often than not.

Continous spinal anaesthesia (CSA), although not used regularly, is one technique which reduces hemodynamic complications. The fast onset of block of limited segments which will reduce the amount of block in sympathetic system, allows the cardiovascular system to adapt more easily, which is beneficial in patients with IHD. As anaesthesia is provided using small, titrated doses it provides better haemodynamic stability compared to single shot spinal anaesthesia and combined spinal epidural anaesthesia. It also allows regular intrathecal administration of local anaesthetic to extend anaesthesia in case the surgery is prolonged. The possibility of systemic toxicity is also reduced as the dose of local anaesthetic administered is small. According to various studies, the risk of spinal infections, PDPH and severe neurological complications were also low if the catheter is removed early. Early postoperative analgesia can also be achieved on administartion of second dose if the surgery ends earlier than expected. Another advantage to continuous spinal anaesthesia is it's low failure rate and faster onset.

CSA can also be used in patients with severe respiratory problems where using general anaesthesia and positive pressure ventilation is not a feasible option. It can also be used in individuals who are susceptible to post - operative cognitive dysfunction like the elderly, dementia, stroke and chronic renal failure.

A case report by Nayar R, Satyanarayana PS, used the technique of Continous spinal anaesthesia for a patient with ischemia of the right lower limb due to peripheral vascular disease, with multiple co morbid conditions such as coronary artery disease, hypertension and COPD, who underwent a femoro - femoral crossover graft. It highlights the benefits of the rapidity of action, ability to achieve segmental level and minimising the amount of drugs used in high risk cases with multiple co - morbid conditions.

4. Concerns

1) Postanaesthetic cauda equina syndrome was a known complication of continuous spinal anaesthesia using Inj. Lignocaine 5% which can be prevented now with the advent of newer drugs like Ropivacaine and

Levobuoivacaine which have lesser neurological complications.

2) Micro catheters were introduced to reduce the incidence of complications like hypotension, headache, cauda equina syndrome and PDPH. The use of finer sized catheter was expected to minimize the incidence of PDPH. Deposition of local anaesthetic in the region causing cauda equina syndrome is more common with continuous infusion of the local anaesthetic which can be avoided by using intermittent doses technique. But the use of finer catheter in turn proved to be more dangerous as they increased the resistance to injection of drug and coiling and knot formation was also more, causing higher incidence of neurological complications.
3) The technical difficulties encountered were more with the use of micro catheters. These are:
   - Difficulty in threading the catheter
   - Catheter kinking
   - Catheter breakage during removal

In our patient however, epidural catheter was used and no such difficulties were encountered.

5. Conclusion

Continuous spinal anesthesia administered using a small initial dose, the titration the block upto required height using small aliquots of intrathecal local anaesthetic through the catheter is the key to achieving haemodynamic stability. It can also provide effective early postoperative analgesia. Continuous spinal anesthesia with standard epidural catheters is feasible and successful in patients with extended duration of surgery where administration of general anesthesia is associated with risks. With the advent of newer drugs that prevent neurological complications, continuous spinal anaesthesia is an alternative mode of anaesthesia for high - risk cases.

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