LUPINE PUBLISHERS

Global Journal of Anesthesia & Pain Medicine

DOI: 10.32474/GJAPM.2020.03.000160

ISSN: 2644-1403

Case Report

Continuous Spinal Anaesthesia: Forgotten Technique of Regional Anaesthesia: A Case Report

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Received: May 13, 2020 **Published:** May 22, 2020

Abstract

Background: Continuous spinal anaesthesia (CSA) is an underutilized technique in modern aesthesia. It allows incremental intermittent dosing of an intrathecal local anaesthetic via an intrathecal catheter which allows titration of block level, block of indefinite duration and better hemodynamic stability than single-shot spinal anaesthesia (SSA). Our aim is to evaluate ease of use, efficacy, and safety of CSA. Case: 91 years male was posted for Right hip resurfacing arthroplasty for right inter trochanteric femur fracture with co morbidity of Squamous cell carcinoma of lungs, CAD with old MI with DCM (EF 15 to 20%) and Heart failure. CSA was used with 0.5ml of 0.5% bupivacaine via intrathecal 20G catheter. Conclusion: Onset was rapid with adequate segmental blockade, better hemodynamic stability, and fewer adverse effects. Lack of exposure among younger anaesthesiologists has made this technique under used though it has low failure rate and is easy to use.

Keywords: Cerebrospinal fluid (CSF); Continuous spinal anaesthesia (CSA); Intrathecal (IT); Local anaesthesia (LA); Post-Dural puncture headache (PDPH); Single-shot spinal anaesthesia (SSA)

Introduction

Continuous spinal anaesthesia (CSA) is an under used anaesthetic technique for lower limb and abdominal surgeries. Though single-shot spinal anaesthesia (SSA) and continuous epidural anaesthesia (CEA) has been most commonly used and has many advantages which provides hemodynamic stability and the ability to achieve adequate level of dense block and titrate dose of local anaesthetics, CSA has been used successfully for high-risk cases. CSA in comparison to SSA can be technically challenging to perform due to difficulty in threading the catheter, catheter kinking, inability to aspirate or administer local anaesthesia (LA). CSA potentially has a higher risk of post-Dural puncture headache (PDPH) due to cerebrospinal fluid (CSF) leakage through the Dural puncture and the use of larger bore needle [1]. Cauda equina syndrome is one of the grievous effects which have decreased the popularity of CSA. CSA provides many advantages such as level of sensory blockade can be titrated to the desired dermatome level with great precision with intrathecal (IT) catheters, allowing better control of hemodynamic consequences of sympathetic blockade [2], fewer side effects and also more rapid in onset. This can be very advantageous in patients with co morbid conditions such as cardiac diseases, respiratory conditions, prior spinal surgery, morbidly obese patients and accidental Dural puncture. Also, it is useful in longer surgical procedures as IT catheter can be used to titrate desired level of blockade. It has more rapid onset and delivers denser sensory block compared to epidural anesthesia [2].

PDPH incidence is low with CSA. Rate of CSF leakage has not been correlated to headache severity but leaving a catheter in situ for 24 h might decrease CSF leakage by inducing an inflammatory response around the catheter site that would help seal the arachnoid–Dural rent [2] and reduce PDPH. IT catheter also allows saline injection to reduce PDPH rate and severity as shown in study by Charsley and Abram [3]. In 2016, Cohn et al. reported on the complications associated with 761 short-term IT macro catheters in obstetric patients over 12 years period which showed no serious complications, including meningitis, epidural or spinal abscess, hematoma, arachnoiditis, or cauda equina syndrome associated with IT epidural catheters [4].

Method

Patient's demographic profile and American Society of Anaesthesiologists (ASA) physical status was noted and co morbidities were further evaluated using ASA surgical risk calculator while doing pre anaesthetic check-up. Written consent was taken. The success of CSA was defined as ability to complete the surgery with the anaesthetic technique without conversion to GA. We analysed the initial intrathecal LA volume and used 1.5 ml as the cut-off point for the initial intrathecal volume of bupivacaine 0.5% which was obtained from the prospective UK Anaesthesia Sprint Audit of Practice (ASAP-2) [5]. A small (0.5 ml) injection of plain 0.5% bupivacaine will produce a satisfactory block which can then be maintained by further small top-ups. If the block is inadequate, further (0.5 ml) injections of heavy solution will extend it. To avoid accumulation of drug in the sacral dura, it is advisable to insert only 3 cm of catheter (prevents sacral placement), to inject only small volumes (<1 ml) of drug at any time and to abandon the technique if an adequate block is not produced by 3 ml of local anaesthetic.

In a study [6] it supported the use of lower spinal volume, especially in fragile, elderly patient which showed none of the patients had incidence of hypotension with initial intrathecal volumes of 0.5 and 0.8 ml. CSA allows small aliquots of intrathecal LA given at regular intervals to achieve adequate level of block in case the surgery is prolonged. Small volume dose of 0.5-ml of 0.5% heavy bupivacaine produces block level adequate for hip surgery and CSA IT catheter allows us to top up the LA. This intermittent dosing also allows us to assess block level after each injection of LA and helps to gain block level needed for the desired operative procedure. Larger initial doses are associated with increased risk of hypotension. Incidence of hypotension in our study which was defined as a decrease in mean arterial pressure of >20% from the baseline value and required vasopressors. When equal volumes and doses of local anaesthetic are injected with patient's supine, segmental spread of block is greater and onset is faster with hyperbaric than either isobaric or hypobaric solutions [7,8]. Concentration of LA may be advantageous to determine the volume of the drug used as smaller volume of drug can be given, thus lesser adverse effects.

Case Report

Gentleman, 91 years, was posted for right hip resurfacing arthroplasty for right inter trochanteric femur fracture. Patient was a known case of squamous cell carcinoma of lungs under chemotherapy, CAD with old MI (Anterior) with DCM (EF 15 to 20%), Heart failure and Hypertension. Pre anaesthetics check-up was done a day before surgery and informed written consent was taken. His METS score was less than 4, NYHA grade III, El Ganzouri risk index score of 3 and was in category of ASA grade IV. Investigations reports showed Hb of 12.5, platelets 273000, Na 129 k 3.6 urea 32 crt 0.7, PT 16.3, INR 1.16. ECG showed LAD, ECHO with mild dilated LA, LV, Akinetic LVS and EF of 15 to 20%. Baseline vitals revealed pulse 87 bpm, BP 128/68 mm Hg, RR13, temp 36.8 c, SpO2 96% with 4 ltrs of O2. Bilateral wheeze and crepitations could be heard on auscultation while no murmur was appreciable. CSA was performed in sitting position, midline approach at level of L3-L4 using 18G tuhoy needle and 20G catheter was placed in situ. 1.5 ml of 0.5% heavy bupivacaine was given as a single dose via epidural catheter and block level was accessed after a while which showed T10 blockade and procedure was proceeded.

Operative duration was 2.8 hrs with blood loss of 450 ml volume being replaced with intravenous fluids with no other adverse intra operative events. The patient was haemodynamically stable with a heart rate maintained between 60-75 minutes and mean BP of 110/70 mm Hg. Fentanyl 25 mcg was given at the end of procedure for post-operative analgesia and VAS score during postoperative ward stay was 0. There was no post Dural puncture headache, neurological deficit, or evidence of infection. Both Surgeon and the patient were comfortable during the procedure

Discussion

Geriatric surgeries are challenging due to high incidence of co-existing disease, haemodynamic and metabolic stress, brain, heart, or kidney disease which leads to high morbidity during and after surgery.

No single anaesthetic technique or agent appears to have universal advantage for the elderly surgical patient with regards to survival [9]. Neither regional nor general anaesthesia has clearly demonstrable superiority of outcome in patients who are elderly [10]. Favrel et al [11] also showed that continuous spinal anaesthesia (CSA) using small titrated dose of 0.5% hyperbaric bupivacaine was better than single dose spinal anaesthesia in elderly patients. CSA by enabling the reduction and fractionation of the induction dose through a catheter, reduces the haemodynamic consequences of spinal anaesthesia [12] making it a suitable option in patients with cardiac and vascular surgeries and patients with ASA III and IV. Slow onset of block of the sympathetic system with this technique, allows the cardiovascular system to adapt more easily [13]. The potential for improved cardiovascular stability has led to its use in patients with severe aortic stenosis, femoro-popliteal graft surgery and even abdominal aortic aneurysm repair. Other reported successful applications of this technique include patients with severe respiratory compromise, analgesia in labour for a mother with pulmonary stenosis, caesarean section in a patient with severe coronary artery atherosclerosis and caesarean section in a patient with severe pre-eclampsia.

With adequate size catheters and use of 0.5% bupivacaine CSA provides more rapid action and more pronounced sensorimotor blockage CEA with fewer side effects. Isobaric bupivacaine was initially suggested as the preferred anaesthetic agent, as hyperbaricity was believed to result in drug deposition in the

spinal cord base [14,15].However in a study by Favarel-Garrigues [11], hyperbaric bupivacaine lead to a higher level of anaesthesia with more predictable action, making it possible to control the level of the block by dose and position. Lack of adequate spinal catheters catheters, side effects such as infection, PDPH and cauda equina syndrome has limited the use of CSA. Fine catheters (28 gauge) is recommended as quantity and direction of anaesthesia can be controlled. Unavailability of fine catheter size has reduced the practice of CSA. The prospective UK ASAP-2 study [5] showed a significant correlation between hypotension, mortality and dose of intrathecal LA which proposed with LA dose should be decreased to the lowest possible, which may potentially reduce mortality for high-risk and elderly patients. Thus, intrathecal dose of bupivacaine 0.5% should be reduced "towards 1.5 ml" [6]. Some studies have also incorporated its use for post-operative analgesia. Routine use of CSA may occur only after the development of equipment and techniques that reduce the rate of PDPH and difficulties in placement over that currently available [2]. It is not as technically difficult when practiced regularly. Some studies have also incorporated its use for post-operative analgesia. Failure rate is low (6%) and may vary with different institution [6].

Conclusion

Rapid onset, ability to achieve segmental level and minimal use of local anaesthetic drug may be advocating factor for use of CSA. Thus, it can be safely used in elderly patients with high risk and with co morbid conditions. Lack of exposure and training among the younger anaesthesiologists has made this technique under used.

Financial Support and Sponsorship

Nil

Conflicts of Interest

There are no conflicts of interest

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DOI: 10.32474/GJAPM.2020.03.000160