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A Study to Evaluate Efficacy And Safety of Continuous Spinal Anaesthesia for Elderly Patients

KEYWORDS: Continuous spinal anaesthesia, hemodynamic stability, elderly, PDPH, Epidural catheter, high-risk.

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ABSTRACT

Objective: *Continuous spinal anaesthesia (CSA) is a well versatile technique that has been used successfully for various surgical procedures. Despite its advantages it is an underutilized technique due to fear of post-dural-puncture headache (PDPH) and neurological damage associated with this. We used this technique in 25 elderly patients to evaluate its efficacy and safety.*

Methods: *25 elderly patients with co-morbidity were scheduled for surgery under CSA. Lumber puncture was done at level of L3-4 with 19 or 20 G epidural tuohy needle and epidural catheter was threaded 3-5 cm. in subarachnoid space. After confirming proper position of catheter bupivacaine 0.5% (heavy) 1ml was given. Bupivacaine in dose of 0.2ml was repeated to achieve adequate level of anaesthesia or when there was patient discomfort.*

Results: *CSA technique was successful in all patients. None of our patients had PDPH or neurological side-effects. CSA provided excellent hemodynamic stability.*

Conclusions: *CSA with standard epidural catheters is safe and successful technique for anaesthesia in elderly patients with co morbidities. It provides better hemodynamic stability during the peri-operative period.*

Introduction:

Continuous spinal anaesthesia (CSA) is an underutilized technique in modern anaesthesia practice. It is almost as old as the technique of spinal anaesthesia itself. Augustus Bier described the first spinal anaesthetic with cocaine in 1899 and Henry Percy Dean described the technique of CSA in 1906 [1]. Since then, it has been in and out of anaesthesia practice several times. In 1990s micro-spinal catheters were introduced with promise to reduce the incidence of post-dural puncture headache (PDPH) and this made the CSA technique more acceptable [2,3]. But due to reports of permanent neurologic damage (cauda equina syndrome) associated with them, Food and Drug Administration (FDA) withdrew all micro catheters thinner than 24 G from use in USA in 1992 [4]. Incidences of PDPH and fear of neurological deficits have discouraged many anaesthesiologists from using this versatile technique. CSA is specifically suited to elderly patients with co-morbidities as they are more prone to haemodynamic instability and PDPH is also uncommon in older population [5-7]. Due to diastolic dysfunction and decreased vascular compliance, elderly patients compensates poorly for hypovolemia. Rapid infusion of large amounts of IV fluid and vasopressors used to counter excessive fall in blood pressure, may be harmful to patients with cardiac impairments. In such situation, CSA, by enabling the reduction and fractionation of the induction dose through a catheter, reduces the haemodynamic effects of Spinal Anaesthesia. We used standard epidural catheter with tuohy needle for continuous spinal anaesthesia in 25 elderly patients to evaluate its efficacy and safety.

Methods and materials

We used CSA technique in 25 patients. 15 patients were having fracture of lower limb bones, 5 patients were scheduled for hernia repair, 2 patients were for total knee replacement and 3 patients were scheduled for open prostatectomy. Patients were of age group 65-95 years. Pre-anaesthetic check up was repeated in the evening prior to the surgery and informed written consent was taken from all patients. All patients were kept fasting for six hours. Tab alprazolam 0.25mg orally at bedtime and two hours prior to surgery with a sip of water was given as premedication. In operating room, intravenous line was secured and Ringer Lactate infusion was started. Routine monitors including pulse oximetry, ECG and non-invasive blood pressure (NIBP) were attached and baseline heart rate and blood pressure were noted. Using 18 or 19 G Tuohy epidural needle with midline approach in L3-4 interspaces, epidural space was identified by standard loss of resistance technique. After reaching epidural space, needle was further advanced till lumbar puncture was done and free flow of clear cerebrospinal fluid (CSF) was obtained. Epidural catheter was threaded into the subarachnoid space up to a distance of 3-5 cm. Intrathecal placement of catheter was confirmed by aspiration of CSF through catheter. Procedure-related paresthesias, pain or any difficulty during spinal puncture and catheterization, were recorded in each case. Catheter was then secured to the patient's back and patient was returned to the supine position. 1 ml of 0.5% of hyperbaric bupivacaine was injected through catheter initially. We waited for 15 minutes for sensory level to establish. If after 15 min, level of sensory block was

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lower than T10, bupivacaine 0.2 ml was injected to achieve T10 level. Surgery was started after reaching T10 sensory level. Bupivacaine was administered again in doses of 0.2 ml to maintain adequate level of sensory block or when there was patient discomfort. In all the patients, the catheters were removed at the end of surgery. Post-operatively, patients were observed for PDPH or any neurological complication.

Results

CSA technique was successful in all patients. Four patients reported mild paresthesia during needle or catheter placement but there was no incidence of neurological damage in any patient. Initial dose of 1 ml bupivacaine was sufficient in twelve patients. Eight patients required one additional dose of 0.2 ml, four patients required two additional doses and one patient required three additional doses of 0.2ml of bupivacaine. Three patients had systolic blood pressure less than 90 mmHg which was adequately controlled by fluid and 3-6 mg of ephedrine. None of our patients had PDPH or neurological side-effects.

Table no. 1: Demographic profile

	Male	Female
Sex	14	11
Age (Years)	74.40 ± 7.20	75.24 ± 6.74
Weight(Kg)	62.14 ± 12.00	56.40 ± 9.84

Data are expressed as mean ± SD

Table no.2: Various systemic diseases

Systemic disease	**Number of patients**
Cardiac Disease	11
COPD with Cardiac Disease	6
COPD	8

Table no.3: Hemodynamic Variables (N=25)

Baseline Systolic BP (mmHg)	145.20 ± 19.20
Maximum Systolic BP decrease (mmHg)	26.20 ± 14.00
Baseline Diastolic BP (mmHg)	91.32 ± 14.12
Maximum Diastolic BP decrease (mmHg)	16.22 ± 9.12
Baseline HR rate (Beat/minutes)	57.30 ± 11.10
Maximum HR Increase (Beat/minutes)	9.00 ± 12.00

Data are expressed as mean ± SD

Discussion

Continuous spinal anaesthesia combines the advantages of both epidural and spinal anaesthesia. CSA has several advantages over a single-dose spinal anaesthesia. In continuous spinal anaesthesia, small incremental doses of local anaesthetic titrated to the individual patient's needs are administered. This results in reduced requirement of local anaesthetic and so reduced incidence and severity of side –effects and better cardiovascular stability. Moreover, anaesthesia can be extended by supplemental application of spinal local anaesthetics whenever surgery is prolonged.

PDPH is a complication associated with CSA which has discouraged the use of this versatile technique by many anaesthesiologists. Exact Incidence of PDPH after CSA is not known. Some studies have reported very low incidence while other have shown incidence of 6-9%. [5,6] Incidence of PDPH depends upon age of patients, size of needle and dural puncture technique. Incidence is higher in younger patients and lower in older patients. In our study involving elderly patients, we did not have any episode of PDPH. Dohler et al reported no cases of PDPH in 154 patients, aged over 70 years.[7] Similarly Van Gessel and colleagues found no incidence of PDPH after CSA with 20 G catheter in 100 patients aged more than 65 years.[8] We used epidural catheter for continuous spinal anaesthesia. There were two reasons for this. First spinal micro catheters are not easily available and we have no experience of using them. Second reason is that proper placement of spinal catheter is comparatively difficult and they have high failure rate. The failure rate is very low with tuohy needle as placement in the subarachnoid space is easily ascertained by the escape of CSF. The use of larger catheters avoids slow injection through high resistance micro catheters which has been implicated as a possible cause of inadequate anaesthesia and cauda equina syndrome [4]. We did not notice any failure in our cases. Similarly Van Gessel and colleagues also demonstrated that this technique is 100% successful in experienced hands [8].

Haemodynamic stability is a distinct advantage of CSA. Systolic blood pressure reduction in our patients was 26.20 ± 14.00 mmHg. Favrel et al in their study comparing continuous spinal anaesthesia with single shot spinal anaesthesia (SDSA) found that variations in mean arterial pressure (MAP) were significantly greater in the SDSA than CSA [9]. The maximum decrease in MAP was significantly greater in the SDSA group (40.2% & 1.9% of the baseline value) than in the CSA group (19.9% & 1.6%, $P < 0.0001$) [9]. Klimscha et al also found that haemodynamic changes after CSA are significantly fewer than that in single shot spinal or continuous epidural anaesthesia [10]. Haemodynamic stability in the CSA group may be explained by a slower onset of segmental block in these patients. This allows the cardiovascular system to adapt more easily than when the sympathetic block appears abruptly, such as with SDSA. This slow onset of sympathetic block in patients undergoing CSA as compared to those undergoing SDSA have been reported in many studies [10,11].

CSA is a viable option when accidental dural puncture occurs. In such case, rather than attempting epidural puncture at another site and exposing the patient to risk of another dural puncture, epidural catheter may be threaded in subarachnoid space to convert it into CSA. In fact, catheterization of epidural catheter in subarachnoid space has been found to reduce the incidence of PDPH if left for 24 hours or more [12-14].

To conclude, Continuous spinal anaesthesia with standard epidural catheters is safe and successful technique for anaesthesia in elderly patients with co morbidities. It provides better haemodynamic stability during the perioperative period. The incidence of PDPH is negligible. There are no adverse neurological outcomes. As a result, continuous spinal anaesthesia may be the technique of choice for lower limb and lower abdominal surgery in the elderly and high-risk patients, when haemodynamic stability is critical.

Conflict of interests

All authors have none to declare

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