Comparison of efficacy and safety of sequential combined spinal epidural anaesthesia versus spinal anaesthesia in high risk geriatric patients.

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ABSTRACT

Context: With sequential combined spinal epidural anaesthesia the advantages of both spinal and epidural anaesthesia can be obtained avoiding many of the side effects of spinal anaesthesia. Aim of study: To compare efficacy and safety of sequential combined spinal epidural anaesthesia versus spinal anaesthesia in high risk geriatric patients undergoing major orthopaedic procedure. Material and methods: The study was a prospective, randomized comparative one conducted in 60 patients aged 65 to 80 years of ASA III and IV, posted for major orthopedic surgical procedures. Group A received sequential combined spinal epidural anaesthesia with 1 ml of 0.5% hyperbaric bupivacaine and 25µ fentanyl spinally. Group B received spinal anaesthesia with 2 ml of 0.5% hyperbaric bupivacaine and 25µ fentanyl. In group A, 1.5-2 ml of 0.5% isobaric bupivacaine was given for every unblocked segment through epidural route to extend block to T10. In group B if after 10 to 15 min the block did not reach T10 sensory level, supplementation with general anaesthesia was given. Motor block of lower limbs was assessed bilaterally using Bromage Scale. Results: Onset of block (8.8±1.7 vs 10.4±1.7 min) and time to achieve Bromage I block (11.6±1.6 vs 12.9±1.8 min) were longer in CSEA group than spinal group. Level of block achieved was higher in spinal group compared to CSEA (T6 vs T10). No significant difference was observed with duration of analgesia. There was significant fall in MAP in the spinal group in the initial 30 min. Conclusion: Sequential combined spinal epidural technique is effective and safe, with stable haemodynamics and prolonged analgesia compared to spinal anaesthesia in geriatric patients undergoing major orthopaedic surgery.

Key words: sequential combined spinal epidural anaesthesia, high risk, geriatric patients

INTRODUCTION

The block in sequential combined spinal epidural anaesthesia (CSEA) results from a relatively small amount of the spinal local anaesthetic followed by the epidural drug which help to increase the subarachnoid block to desired level. It is now being used in elderly high risk patients for orthopaedic surgery with encouraging results.1 With sequential CSEA the advantages of both spinal and epidural anaesthesia can be obtained avoiding many of the side effects of spinal anaesthesia.

AIM OF STUDY

To compare the efficacy and safety of sequential combined spinal epidural anaesthesia versus spinal anaesthesia in high risk geriatric patients undergoing major orthopaedic procedures.

MATERIAL AND METHODS

It was a prospective, randomized comparative study conducted between August 2009 and November 2011. After obtaining approval from the institution ethical committee and informed written consent, 60 patients aged 65 to 80 years of both sexes, belonging to American Society of Anesthesiology (ASA) physical status III and IV, posted for major orthopedic surgical procedures were included in the study. Any patients with absolute contraindication for regional anaesthesia were excluded. The patients were randomly allocated into two equal groups by a sealed envelope technique. Group A received sequential CSEA whereas Group B received spinal anaesthesia.

All patients had standard monitoring like electrocardiogram, non invasive blood pressure (NIBP), pulse oximeter and invasive monitoring such as central venous pressure (CVP), if specific indication was present. A preload of 500 ml normal saline was given to every patient before start of procedure.

Group A patients received sequential CSEA with 1 ml of 0.5% hyperbaric bupivacaine and 25 µ fentanyl through 27G Whitacre spinal needle which was introduced through a 16G Touhy needle in the epidural space. The spinal needle was withdrawn after injection of drug into CSF, 16G epidural catheter was then inserted and secured. The patient was kept sitting for 5 min and then placed in supine portion.

Group B received spinal anaesthesia with 2 ml of 0.5% hyperbaric bupivacaine and 25µ fentanyl through 25 G Whitacre spinal needle in sitting position. They were also kept sitting for 5 min and was then made supine for surgery. Sensory block was assessed after 10 min by pin prick method. In group A, 1.5-2 ml of 0.5% isobaric bupivacaine was given for every unblocked segment through epidural route to extend block to T10. In group B if after 10 to 15 min the block did not reach T10 sensory level, supplementation with general anaesthesia was given.

Motor block of lower limbs was assessed bilaterally using Bromage Scale.
The following variables were recorded onset and level of sensory block, degree of motor block, duration of analgesia and supplementation with general anaesthesia. Systolic arterial blood pressure (SBP) and heart rate (HR) were monitored before administering anaesthesia and throughout the intraoperative period. If SBP was < 90 mm Hg, small incremental dose of ephedrine 6 mg was administered intravenously (IV). Bradycardia, (HR < 60/min) was treated with 0.6 to 1.2 mg atropine IV. Sedation was provided with midazolam 1-3 mg IV in titrated doses.

In group A, to prolong anaesthesia, all patients received first epidural top up with 5 ml of 0.5% isobaric bupivacaine one and half hours after start of surgery. Blood loss of more than 15% was managed with transfusion of blood in both the groups. After surgery, all the patients were shifted to post anaesthesia care unit (PACU). Patients in Group A received 0.125% of 8 to 10 ml bupivacaine through epidural catheter and group B received parenteral opioids on demand. Close monitoring of vital parameters continued throughout the stay in PACU.

Data was analyzed using SPSS 11.0 software. Difference between means were analyzed using “Normal test for means” and corresponding ‘P’ values were calculated. Normal test for significant difference between two proportions were also used for analysis. The level of statistical significance was ‘P’ value < 0.05.

OBSERVATIONS:

Distribution of patients in both groups were similar with respect to demographics and type and duration of operative procedures.

Onset of block in Group B was earlier as compared to Group A (8.8 vs 10.4 min) and time to achieve Bromage 1 motor block was significantly faster in Group B compared to Group A (11.6 ± 1.6 vs 12.9 ± 1.8 min) which were statistically significant (p 0.002 and 0.006). When the duration of analgesia of both groups were compared, there was no significant difference between two groups (Table 1). The highest level of sensory block achieved by a majority of patients (56.7 %) in Group A was T10. But it was T6 in majority (60 %) of patients in Group B (Table 2).

When preinduction MAP was compared to MAP at 1 min there was no significant change in both groups. But when preinduction MAP was compared to subsequent MAP readings at 3, 5, 10, 15 and 30 min, there was a significant fall in MAP observed in spinal group (Table 3, Figure 1). There was no significant difference between mean HR in both groups throughout the observation period with reference to the preinduction values (Table 4, Figure 2).

The difference in incidence of hypotension and bradycardia between the groups were great. In group A, the incidence of hypotension and bradycardia was 10% each, whereas in group B it was 80% and 70% respectively. Only 10% in group A required vasopressor while it was 80% in group B. In spite of rapid extension of sequential CSEA block, very low incidence of hypotension was seen which was significantly less than spinal block. Only 10% (3/30) of patients in group A suffered hypotension and required a single dose vasopressor (epidural 6 mg) to maintain SBP to 100 mm Hg, whereas in group B 80% (24/30) suffered hypotension and required single dose epidural 6 mg, 40% of them required two incremental doses of vasopressor to maintain SBP to 100 mm Hg.

In group B, 2 ml of 0.5% hyperbaric bupivacaine with fentanyl produced analgesia for 2½ hrs in 90% cases but 10% required supplementation with general anaesthesia.

DISCUSSION:

Geriatric patients because of many associated comorbidities especially enhanced atherosclerosis may not tolerate hypotension following spinal anaesthesia well. Level of block obtained following a spinal anaesthesia is approximately 3-4 spinal segments higher in elderly compared with young adult patients²³. The sequential CSEA is particularly advantageous in old high risk orthopaedic patients where slower onset of sympathetic block is desirable to reduce haemodynamic side effects⁴.

Previous studies have shown that CSE provides surgical conditions comparable to spinal anaesthesia which is quick and reliable, with advantages compared with epidural block alone⁵⁶. To reduce the incidence and severity of hypotension sequential CSE technique has been described. Here the dose of local anaesthetic given spinally will be inadequate for performing the surgery and it will produce less intense hypotension. The block is then extended with supplemental doses of epidural local anaesthetic. The advantage is that the onset of block is not delayed but desired level of sensory block can be obtained². A slower onset, lower level and longer time to achieve Bromage 1 block allows cardiovascular system to adapt to changes.

It has been a common practice to add opioids to spinal anaesthetics. This will help to reduce the dose of local anaesthetic which will in turn reduce the degree of hypotension. In the present study 25µ fentanyl was added to local anaesthetic in both the groups to convert an inadequate dose of local anaesthetic to an adequate dose. These effects were proven by studies by David et al.⁸ Spinal deposition of fentanyl in dose of 25µ or less is unlikely to result in respiratory depression⁹.

In our study the aim of injecting hyperbaric bupivacaine in sitting position and to keep the patient in the
The onset of blockade in CSEA was delayed because of the lower dose of drug used. Though duration of analgesia was similar in both groups, the provision to provide analgesia throughout the postoperative period made CSEA a more attractive proposition. However, there is increased risk of postdural puncture headache and cauda equina syndrome with CSEA.10

CONCLUSION:
Sequential combined spinal epidural technique is effective and safe, with stable haemodynamics and prolonged analgesia as compared to spinal anaesthesia in geriatric patients undergoing major orthopaedic surgery.
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REFERENCES


Figure: 2 Changes in heart rate