



The clinical effects of combined spinal -epidural anaesthesia versus spinal anaesthesia in patients undergoing major orthopaedic surgery

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ABSTRACT The sequential combined spinal epidural Anaesthesia(CSEA) is now being used in elderly high risk patients for orthopaedic and gynecological surgeries with encouraging results. This present study was carried out to compare the clinical effects of combined spinal epidural anaesthesia versus spinal anaesthesia in 60 patients undergoing major orthopaedic surgery. Group A(n=30) received 1ml(0.5%) of hyperbaric Bupivacaine plus 25 µgm fentanyl for spinal block and 2ml of 0.5% plain Bupivacaine for every unblocked segment through epidural catheter(CSE anaesthesia). Group B received spinal anaesthesia with 2 ml(10 mg) of 0.5% hyperbaric Bupivacaine plus 25 µgm fentanyl. Onset and level of sensory block, degree of motor block, duration of surgery and analgesia, total dose of epidural Bupivacaine required to establish desired level of block and to prolong block and various side effects were recorded.

KEYWORDS : Sequential Combined spinal epidural anaesthesia (CSEA), Spinal, Bupivacaine, Fentanyl, Hyperbaric

INTRODUCTION

The use of neuraxial block for orthopaedic surgery has increased rapidly during last decades. The two most common regional techniques for orthopaedic surgery are spinal and epidural anaesthesia. Spinal block is a simple method but associated with hypotension and bradycardia which may be rapid in onset and is sometimes profound. As the volume and concentration of local anaesthetic needed for epidural anaesthesia is very large, the slower onset of hypotension and bradycardia may give the anaesthesiologist more time to correct haemodynamic changes⁷.

To avoid some problems of spinal and epidural blocks, a combined spinal – epidural anaesthesia(CSEA) has been described. CSEA is characterised by a rapid onset, efficacy and minimal risk of adverse effects of spinal blockade as well as by the possibility of extend the block and prolong its duration with extradural administration of drugs.

This study was carried out to compare the clinical effects of combined spinal epidural anaesthesia versus spinal anaesthesia in sixty patients undergoing major orthopaedic surgery.

AIM AND OBJECTIVES

-To study the clinical effects of CSEA versus spinal anaesthesia in patients undergoing major orthopaedic surgery.

-To study the low dose of Bupivacaine plus fentanyl for painless conduction of operation without prolonging recovery.

-To study the sensory and motor block, duration of analgesia and complications in both groups.

MATERIAL AND METHOD

After approval from ethical committee of SMIMER and obtaining informed written consent, sixty patients aged 51 to 90 years of ASA I, II and III for orthopaedic surgery were selected. Patients having peripheral neuropathy, coagulopathy, spinal deformity, infection at the site of injection and known hypersensitivity to local anaesthesia drugs were excluded from study.

After complete general physical and systemic examination, routine investigations and preloaded with crystalloid solution, patients were premedicated with injection glycopyrolate 0.04 to 0.08 mg/kg and injection midazolam 0.05 to 0.07 mg /kg intramuscularly 30 minutes before surgery.

Patients were randomly divided into two groups:

Group A: Patients received sequential combined spinal epidural anaesthesia. Epidural space was identified with 18 G toughy needle by loss of resistance technique. Pencil point 27 G spinal needle was introduced through 18 G epidural needle and 1ml(5mg) of 0.5% hyperbaric Bupivacaine plus 25 µgm fentanyl was given for spinal

block. The spinal needle was withdrawn, 20G epidural catheter was inserted and secured. If block did not reach the desired level i.e T₁₀, top -up 2 ml of 0.5% isobaric Bupivacaine was given for every unblocked segment.

Group B: 2 ml(10 mg) of 0.5% hyperbaric Bupivacaine plus 25 µgm fentanyl for spinal block given to patients.

Pulse and blood pressure were recorded at 5 minutes interval for first 30 minutes, 10 minutes interval for next 30 minutes and 15 minutes interval till the end of surgery. If systolic blood pressure was decreased 20 % from preoperative anaesthesia level, epinephrine (5mg) intravenously was given. Bradycardia was treated with 0.6 mg to 1.2 mg intravenous atropine.

Onset and level of sensory block, degree of motor block by Bromage scale, duration of surgery and analgesia, total dose of epidural Bupivacaine required to establish desired level of block and to prolong block and any side effects were recorded.

Statistical analysis were done by student's 't' test, Z test and p<0.05 was considered significant.

OBSERVATIONS AND RESULTS:

The present study was conducted in 60 patients of either sex, scheduled for major orthopaedic surgery and randomly divided in to two groups: Group A received CSEA(1 ml of 0.5% hyperbaric bupivacaine plus fentanyl 25 µgm in spinal block)

Group B received spinal anaesthesia with 2ml of 0.5% hyperbaric Bupivacaine plus 25 µgm of fentanyl.

There were no significant difference in age, sex, height and weight(p>0.05). In both groups, maximum no. of patients belonging to ASA Grade II.

The onset of sensory block in Group A and Group B was 7.76±2.2 minutes and 6.9 ±1.7 minutes respectively which was statistically insignificant (p>0.05).

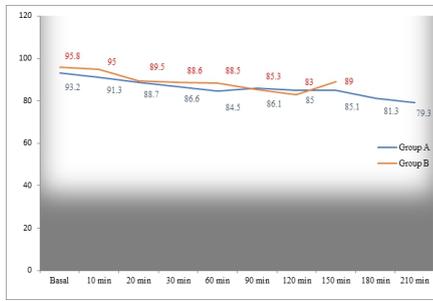
Table 1: Comparison of motor block by Bromage Scale

Bromage Scale	Group A		Group B	
	No.	%	No.	%
0	0	-	0	-
1	17	56.6%	0	-
2	13	43.4%	10	33.3%
3	0	-	20	66.7%

In Group A, 56.6% of patients had Grade I and 43.4% of patients had Grade II motor block, while in Group B, 33.3% of patients Grade II and 66.7% patients had Grade III motor block. None of the patients in Group B had motor block of Grade I. So it stated that with decreasing

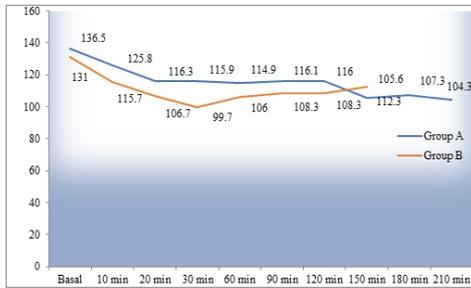
the concentration of bupivacaine, the degree of motor block was reduced.

Chart 1 : Comparison of pulse rate / minute in both groups over period of time



The above table shows the change in pulse rate during operation in both groups. The difference observed between the groups was insignificant ($p > 0.05$) but in 13.4% of patients in group B developed bradycardia.

Chart 2: Comparison of systolic blood pressure in both groups over period of time



The above chart shows significant difference in systolic blood pressure ($p < 0.01$) after 10 minutes of block. 13.4% of patients in Group A and 56.6% of patients in Group B developed hypotension and was treated with injection Ephedrine and I.V. fluids.

Table 2: Duration of analgesia

Duration of analgesia(min)	Group A		Group B	
	No.	%	No.	%
0-60	0	-	0	-
61-120	0	-	1	3.3%
121-180	10	33.4%	15	50.0%
181-240	18	80.0%	13	43.3%
241-300	2	6.6%	1	3.4%
Mean±SD	210±29.47		198±33.17	
't' test	1.85			
P value	<0.05			

Table shows significant difference between both the groups ($p < 0.05$). To achieve the required level of anaesthesia (T10) or for prolongation of surgery, local anaesthetic was supplemented through epidural catheter and this was the reason of prolong duration of analgesia in Group A as compared to Group B.

The mean duration of surgery in both groups was same (114±48.82 minutes).

Table 3: Complications during surgery

Complications	Group A	Group B	P value
Hypotension	4(13.4%)	17(56.6%)	<0.05
Bradycardia	-	4(13.4%)	<0.001
Pruritus	-	2(6.6%)	-
Nausea	-	-	-
Vomiting	-	-	-
Post dural puncture headache	-	-	-
Urine Retention	-	-	-

This table shows 13.4% of patients in Group A and 56.6% of patients in Group B had hypotension. In Group B, 13.4% of patients developed

bradycardia while none of the patients in Group A had bradycardia and these differences were statistically significant ($p < 0.05$). Only 6.6% of patients in Group B had pruritus and none of the patients in both groups developed nausea, vomiting, post dural puncture headache and retention of urine.

DISCUSSION

Spinal and epidural blocks have a long history of safe use for a variety of surgical procedure and pain relief. The CSE technique is applicable where a block is initiated by subarachnoid anaesthesia and its continuation is facilitated by the presence of an epidural catheter, either to maintain anaesthesia for prolonged procedures or for post operative pain control. It was introduced by Soresi in 1937 using "single needle – single interspace" technique. Later on, various modification and different methods came into use, each having some advantages over the other.

The present study was conducted in 60 patients of >50 years belonging to ASA I, II and III and randomly divided into two groups.

Group A received CSEA with 1 ml (5mg) of 0.5% hyperbaric Bupivacaine plus fentanyl (25 µgm) for spinal block and incompleteness of spinal block was managed with 2 ml of 0.5% plain Bupivacaine through epidural catheter for every unblocked segment and achieved desired level of anaesthesia i.e T₁₀ level.

Group B received spinal anaesthesia with 2ml(10mg) of 0.5% hyperbaric Bupivacaine plus fentanyl (25µgm).

In the present study, majority of the patients in both groups were in age group of 51 to 60 years and only 2 patients in age group between 81 to 90 years. Maximum patients in both groups were of ASA I and II.

In the present study, the mean onset of sensory block in Group A and Group B was 7.76 ± 2.2 minutes and 6.9±1.7 minutes respectively which was statistically insignificant. **Bhattachrya et al, 2007**, observed that the mean onset of sensory block was 10.10 ± 1.1 minutes in CSEA group (5 mg of 0.5% hyperbaric Bupivacaine plus fentanyl 20 µgm for spinal block+ epidural catheter) and 9.8 ± 1.0 minutes in spinal group (10 mg 0.5% hyperbaric Bupivacaine + 20 µgm of fentanyl) during their study which was statistically insignificant and confirmation with our study. This may be due to spinal component in both groups of present study.

Volume of local anaesthetics administered for spinal block make difference in level of anaesthesia. In present study, in Group A, 1 ml(5mg) and in Group B, 2ml (10 mg) of 0.5% hyperbaric Bupivacaine was given. 46.6% of patients in Group B had achieved level of anaesthesia up to T₆ & T₈ whereas 66.6 % of patients in Group A achieved upto T₁₀ while 33.4% of patients receive 2ml of 0.5 % plain Bupivacaine for every unblocked segment to achieve T₁₀ level. None of the patients were required general anaesthesia in both groups. **Bhattachrya and colleagues (2007)**², found that 10% of patients required general anaesthesia in Group B (10 mg of 0.5% Bupivacaine + 20 µgm of fentanyl) whereas none of the patients in Group A (CSEA with 5 mg of 0.5% of Bupivacaine + 20 µgm of fentanyl) during their study in orthopaedic hip surgery. **David et al (2000)**¹ observed that peak sensory block level was only two dermatomes higher in Group B (10 mg of 0.5% Bupivacaine for spinal block) than group A (4 mg of 0.5% Bupivacaine + 20 µgm fentanyl for spinal block). Thus comparing this studies, in CSEA group, the analgesia level was 2-4 dermatomes lower than the spinal group.

In the present study, 56.6% of patients in CSEA group had Grade I whereas 66.7% of patients in spinal group had grade III motor block. **Priya Gupta et al (2002)**⁶ during their study of comparison of CSEA versus epidural block for orthopaedic and gynaecological surgery observed that all the patients in CSEA (12.5 mg of 0.5% Bupivacaine for spinal + epidural catheter) had grade III while in epidural block (15 ml of 0.5% plain Bupivacaine) 70% of patients had only grade I motor block. None of the patients had grade III motor block which was in contrast with our study. In present study, in group A, 1 ml (5 mg) and in Group B, 2 ml (10 mg) of local anaesthetics was given. In group B, volume and dose of local anaesthetics were more. This explains that higher level of sensory block and profound motor block was achieved in Group B as compared to Group A.

The mean duration of analgesia in our study was 210±29.47 minutes in

CSEA group and 196.±33.17 minutes in spinal group which was statically significant ($p < 0.05$). The same results were observed by **Bhattacharya et al (2007)**². In the present study, the duration of surgery was same (114±25.4 minutes) in both groups.

In our study, in CSEA group, none of the patients had developed hypotension initially, but 13.4% of patients developed hypotension after supplementing the epidural drug, and required single dose of vasopressor while in spinal group, 56.6% of patients developed hypotension and required single dose of vasopressor. 13.4% of patients in spinal group had bradycardia while none of patients in CSEA group had bradycardia and it was statically significant ($p < 0.05$). **David et al (2000)**¹ observed 10% of patients who received 4mg of Bupivacaine developed hypotension and required single dose of vasopressor. In contrast 90% of patients who received 10 mg of Bupivacaine developed hypotension and required seven dose of vasopressor in their study of minidose Bupivacaine- fentanyl spinal anaesthesia versus conventional dose of spinal Bupivacaine for hip surgery in elderly patients. The result was in contrast with our result.

In the present study, none of the patients had headache, backache, postdural puncture headache, nausea & vomiting. Only 2 patients had technique failure when epidural catheter could not be negotiated through epidural needle and were excluded from study.

SUMMARY AND CONCLUSION

Sequential combined spinal epidural technique results in high success rate, obviates a separate needle placement and minimizes the patient's discomfort. Addition of fentanyl with local anaesthetics helps in intensifying the nociceptive blockade, allowing the low dosage of local anaesthetics to provide completely satisfactory spinal anaesthesia. Thus, low doses of local anaesthetics reduces the incidence of hypotensive episodes.

REFERENCES

1. Ben David, Bruce MD, Roma, Frankel, Arzumov, Tatianna, Yuri, Volpin, Gershon: Minidose Bupivacaine -Fentanyl spinal anaesthesia for surgical repair of hip fracture in the aged patients. *Anesthesiology*. vol92(1) January 2000; 6
2. Dipasri Bhattacharya, Dewari I, Chowdhuri S: Comparative study of sequential combined spinal epidural anaesthesia versus spinal anaesthesia in high risk geriatric patients for major orthopaedic surgery. *Ind. J. Anaesthesia*. 2007; 51(1):32-36.
3. DP Samaddar, Sampath Kumar: Modified combined spinal epidural analgesia. A new approach. *Ind. J. Anaesth*. 2007; 51(1): 32-36
4. Fernandez GD, Rue M, Moral V et al: Spinal anaesthesia with Bupivacaine and fentanyl in geriatric patients. *Anaesth. Analg* 1996; 83: 537-541
5. MS Khanna, Ikwinder KJP Singh: Comparative evaluation of Bupivacaine plain versus Bupivacaine with fentanyl in spinal anaesthesia in geriatric patients. *Ind. J. Anaesth*. 2002; 46(3): 199-203
6. Priya Gupta, CK dua, UC Verma, KN Saxena, Indranil Chakraborty: Sequential combined spinal epidural versus epidural anaesthesia in orthopaedic and gynaecological surgery: A comparative evaluation: *Ind. J. Anaesth*. 2002; 46(6):453-456
7. Ronald D Miller, Lee A. Fleisher, Roger A. John's, John J. Survese,; Miller's Anaesthesia. Sixth edition 2005: 1666-79.
8. Sarla Hooda, Naveen Malhotra, Lalit Kumar : Evaluation of three doses of intrathecal Bupivacaine with fentanyl in geriatric patients undergoing hip surgery. *J. Anaesth. Clinical Pharma*. 2006; 22(3) :267-272
9. Titti Thoren, Bjorn Holmstrom, Narinder Rawal, Jens Schollin, Solveig Lindeberg, Gunnar Skepper : Sequential combined spinal epidural block versus spinal block for caesarean section. *Anaesth. Anal*. 1994; 78: 1087-1092. *Int. Anaesth. Research Society*.
10. Wakanatsu M, Katon H, Kondo U, Yamamoto T, Tanaka S: Combined spinal epidural anaesthesia for orthopedic surgery in elderly. Article in Japanese. PMID 1770567.