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Original Research Article

Combined spinal-epidural versus spinal anesthesia comparison of efficacy in terms of analgesia and motor and sensory blockade

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ABSTRACT

Background: This study was conducted on patients to compare efficacy in terms of motor and sensory blockade and prolonged time of analgesia between spinal and combined spinal epidural methods of anesthesia.
Methods: This prospective study was conducted on 60 adult patients of either sex belonging to ASA grade I and II, from June 2014 to June 2016 at Maharishi Markendeshwar institute of medical sciences and research, Mullana in the department of anesthesia.
Results: The patients were randomly allocated into two groups of 30 each as defined in text, by a computer-generated number. Proper statistical methods were applied and results obtained. results were statistically significant $p<0.05$.
Conclusions: The Combined spinal epidural technique has been described in the medical literature for use in general surgery, orthopedics, trauma surgery of a lower limb, and urological and gynecological surgery. With this technique, surgical anesthesia is established rapidly, saving 15-20 minutes compared with epidural anesthesia. Patients who received the combined technique had more intense motor blockade than those who received epidural anesthesia alone.

Keywords: Spinal, Epidural, Anesthesia, Motor, Sensory, Analgesia

INTRODUCTION

Lower limb procedures in orthopedics and general surgery are one of the most common procedures performed in day-to-day practice. The technique of spinal anesthesia is simple, easy to perform and has a rapid onset of action. The technique is not without its disadvantages and complications. They include intra-operative hypotension, post-dural puncture headache and a limited duration of anaesthesia.[1,2] Epidural anesthesia is another most commonly used technique for providing surgical anesthesia as well as postoperative analgesia. Advantages of epidural anesthesia includes prolonged and better postoperative analgesia with flexibility of block intraoperatively by varying the degree and level sensory motor block using epidural catheter.

Combined spinal epidural anesthesia is similar "to paint the fence" from both its sides .[4]Combined spinal epidural is a kind of balanced anesthesia which utilizes techniques instead of drugs to accomplish the ideal kind of anesthesia for the patients.[4]

Combined spinal epidural anesthesia reduces the incidence of unpredictable level of blockade and problems of missed segments, after spinal anesthesia. Likewise, it decreases the incidence of incomplete motor block, poor sacral spread and local anesthetic toxicity that can happen with epidural anesthesia.

The aim of our study was to compare the degree and duration of sensory and motor block using sequential combined spinal epidural block in comparison to spinal

anesthesia for lower limb surgeries in terms of onset of analgesia, to observe maximum height of the block achieved, to measure the duration of sensory blockade, to measure the degree and duration of motor blockade.

METHODS

This study was a prospective study and conducted on 60 adult patients of either sex belonging to ASA grade I and II, from June 2014 to June 2016 at Maharishi Markendeshwar Institute of medical sciences and research, Mullana in the department of anesthesia. Proper clearance from institutional ethical committee was taken. The patients were randomly allocated into two groups of 30 each as defined below, by a computer-generated number. Proper statistical methods were applied and results obtained. results were statistically significant $p<0.05$.

Group I: Patients received spinal anesthesia at L_{3-4} intervertebral space with 15 mg, (3 ml) of 0.5% hyperbaric bupivacaine.

Group II: Patients received sequential combined spinal epidural anesthesia with 7.5 mg, (1.5 ml) of 0.5% hyperbaric bupivacaine through spinal route and 6 ml of 0.5% bupivacaine through epidural catheter.

Inclusion criteria

Patients who were ASA (American society of anesthesiologists) grade I and II patients, had age between 18-60 years and duration of surgery 1.5 to 2 hours included in the study.

Exclusion criteria

Patients who were contraindication for spinal anesthesia, cardiovascular ailments, Bleeding disorders, Local sepsis around spine and spinal deformities excluded from the study.

Pre-operative evaluation

Thorough pre-anesthetic check-up with detailed history and physical examination a day before surgery was done. Routine investigations were done in all patients-hemoglobin, complete urine examination, blood sugar, coagulation profile, 12 lead ECG, X-ray chest and renal function test. A written informed consent was obtained from all patients for both, to be included in the study and undergoing anesthesia. Regional anesthesia procedure was explained to the patient. Tablet ranitidine 150 mg and tablet alprazolam 0.25mg was given to all patients' night before surgery and repeated on the day of surgery.

Anesthesia technique

After taking the patient in operation theatre, multipara monitor was attached and preoperative pulse rate (PR), blood pressure (BP) and oxygen saturation (SpO_2) were noted. Anesthesia workstation and all the necessary drugs and equipment were kept ready. An intravenous access was taken using 18 G intracath. Preloading was done with intravenous ringer lactate infusion (10 ml/kg body weight) 20 minutes before surgery. Patients was randomly allocated to one of the groups as per computer generated number.

Group I

Spinal anesthesia was given under all aseptic precautions at L_{3-4} intervertebral space. After confirming the free flow of cerebrospinal fluid (CSF), 3 ml of 0.5% hyperbaric bupivacaine was administered.

Group II

Under all aseptic precautions sequential spinal epidural anesthesia was administered in sitting position at L_{3-4} intervertebral space. Patients received 1.5 ml of 0.5% hyperbaric bupivacaine through spinal route and 6 ml of 0.5% bupivacaine through epidural catheter immediately after giving supine position.

The following intraoperative parameters were studied: Onset of analgesia, Maximum height achieved (Thoracic dermatome), Duration of analgesia in minutes, Maximum Bromage grade achieved, Total duration of motor blockade in minutes

RESULTS

After obtaining approval from the institutional ethical committee, the present study was conducted in 60 adult patients with ASA grade I and II of either sex between the age group of 18 and 60 years who underwent elective lower limb orthopedic surgeries lasting for one and a half to two hours duration. All patients were divided into two groups containing 30 patients each.

Group I (n=30): Patients in this group received 3 ml of 0.5 % hyperbaric bupivacaine in L_3-L_4 intervertebral space in sitting position.

Group II (n=30): Patients in this group received 1.5 ml of bupivacaine in L_3-L_4 intervertebral space in sitting position and 6 ml of 0.5 % isobaric bupivacaine through the epidural catheter.

The following intraoperative parameters were recorded:

1. Demographic parameter: age, sex and ASA grade.
2. Quality of block: a) Onset of sensory block, b) Maximum level of sensory block achieved, c) Total duration of analgesia, d) Maximum Bromage grade achieved and e) Total duration of motor blockage.

Maximum number of patients that is 13 (43.3%) in group-I were between the age group of more than 50 years and in group-II, maximum number of patients 12 (40.0%) were in

age group of more than 50 years. After statistical analysis p value was 0.915. Hence both the groups were comparable.

Table 1: Age wise distribution of the patients in each group.

Age (years)	Group-I		Group-II		Total	P value
	N	%	N	%		
20-29	6	20	6	20	12	0.915
30-39	7	23.3	6	20	13	
40-49	4	13.3	6	20	10	
More than 50	13	43.3	12	40	25	
Total	30	100	30	100	60	

Table 2 shows the distribution of cases according to gender in both groups. In group-I, 15 (50.0%) of patients were females and 15 (50.0%) were males, as compared to the group-II where 20 (66.7%) of patients were males and 10 (33.3%) were females. Statistical analysis of both the groups yields comparable results with the non-significant p value of 0.19.

Table 2: The distribution of cases according to gender in both groups.

Gender	Group-I		Group-II		Total	P value
	N	%	N	%		
Female	15	50	10	33.3	25	0.190
Male	15	50	20	66.7	36	
Total	30	100	30	100	60	

Table 3: Distribution of patients according to their respective ASA grading.

ASA grade	Group-I		Group-II		Total	P value
	N	%	N	%		
I	28	93.3	23	76.7	51	0.073
II	2	6.7	7	23.3	9	
Total	30	100	30	100	60	

As shown in the Table 3, 28 (93.3%) of the patients in group I were ASA grade I as compared to group II which had 23 (76.7%). The number of ASA grade II patients was two (6.7%) in group I and seven (23.3%) in group II. On statistical analysis, the p value was not significant (p=0.073).

Sensory block parameters

Table 4 Shows the distribution of cases according to onset of sensory block and total duration of analgesia.

In group I onset of sensory block was 3.25±0.41 and in group II it was 5.07±O.55 minutes. On statistical analysis p<0.05, thus significant.

In group I total duration of analgesia 161.00±29.98 and in group II it was 176.00±25.81minutes. On statistical analysis was p<0.05 thus significant.

Table 5 shows the distribution of cases according to maximum sensory level achieved.

In group I the number of patients which attained T_6 were 16 (53.3%) and in group II it was 6 (20%), on comparing both p<0.05 was statistically significant. In group I the number of patients which attained T_8 were 8 (26.7%) and in group II it was 9(30%), on comparing both p>0.05 both the groups yield comparable result and thus non-significant. In group I the number of patients which attained T_{10} where 6 (20%) and in group II it was 15 (50.0%), on comparing both p<0.05 it was statistically significant.

Motor block parameters

Table 6 shows the distribution of cases according to Bromage grade achieved.

In group I nine (30.30%) patients attained Bromage grade 3 and in group II one (3.3%) patient attained Bromage grade 3. On comparative study p was<0.05, which was significant.

In group I, twenty-one (70.00%) patients attained Bromage grade 4, and in group II 29 (96.7%) patients attained Bromage grade 4. On comparative study between the two groups yields p value of<0.05 which was significant.

Table 7 shows distribution of cases according to total duration of motor blockage in (minutes).

In group I the total duration of motor blockage was 133.00±20.37 minutes and in group II it was 150.00±36.10 minutes. On statistical analysis the result was significant p value<0.05.

Table 4: The distribution of cases according to onset of sensory block and total duration of analgesia.

Variables	Group-I		Group-II		T	P value
	Mean	± SD	Mean	± SD		
Onset of sensory block (min)	3.25	0.41	5.07	0.55	-14.455	0.000
Total duration of analgesia (min)	161.00	29.98	176.00	25.81	-2.077	0.042

Table 5: The distribution of cases according to maximum sensory level achieved.

Maximum sensory level achieved	Group-I (%)		Group-II (%)		Total	P value
T6	16	53.3	6	20	22	0.007
T8	8	26.7	9	30	17	0.774
T10	6	20	15	50	21	0.015
Total	30	100	30	100	60	

Table 6: The distribution of cases according to Bromage grade achieved.

Max. Bromage grade achieved	Group-I (%)		Group-II (%)		Total	P value
3	9	30.3	1	3.3	10	0.006
4	21	70.0	29	96.7	50	
Total	30	100	30	100	60	

Table 7: Distribution of cases according to total duration of motor blockage in (min).

Total duration of motor blockage in (mins)	Group-I		Group-II		T	P value
	Mean	**± SD**	**Mean**	**± SD**		
	133.00	20.37	150.00	36.10	-2.246	0.029

DISCUSSION

The present study was conducted to evaluate sequential combined spinal epidural block versus spinal block for lower limb surgery.

We compared between sequential combined spinal epidural block versus spinal block in lower limb surgeries in 60 patients, 30 in each group.

Group I: Spinal anesthesia was given under all aseptic precautions at L_{3-4} intervertebral space. After confirming the free flow of CSF, the patient was given 3 ml of 0.5% hyperbaric bupivacaine.

Group II: Under all aseptic precautions sequential spinal epidural anesthesia was administered in sitting position at L_{3-4} intervertebral space. Patients received 1.5 ml of 0.5% hyperbaric bupivacaine through spinal route and 6 ml of 0.5% bupivacaine through epidural catheter immediately after giving supine position.

Patient demographics

As shown in Table 1-3 both the groups were comparable with regard to age, sex and ASA grade as on statistical analysis, the p value was not significant (p>0.05).

Quality of block

Onset of sensory block

The onset of analgesia was evaluated in the present study Gupta et al, Talikota et al and Banerjee et al.[5-7] As shown in Table 4 the mean onset time (in min) was 3.25 in group I±0.41 SD and 5.07±0.55 in group II. The early onset of analgesia in group I can be attributed to the larger dose of spinal anesthetic.

In the study conducted by Gupta et al on sequential combined spinal epidural versus epidural anesthesia in orthopedic and gynecology surgery, the mean and SD was 10±5 for CSE (combined spinal and epidural anesthesia) and 25±7.07 for epidural. In this study, we see early onset of sensory block in SCSE than epidural.[5]

In the study conducted by Nagaraju on comparison of efficacy and safety of sequential combined spinal epidural technique and spinal block for lower abdominal surgeries, the mean and SD was 5.48±1.920 in group A (spinal) and 7.40 mean in group B (CSE).[6] In this study we see early onset of sensory block in spinal than CSE.

In the study conducted by Guha et al on quality and extent of intrathecal bupivacaine block by extradural injection of bupivacaine or normal saline in combined spinal epidural technique.[7] 60 patients undergoing infra-umbilical surgery were divided into three groups. The mean and SD were 4.50±0.71 in A_1 (control), 8.60±0.70 in A_2 (10 patients who received 16 ml isobaric bupivacaine extradural), 3.35±2.62 in group B (patients received 2 ml intrathecal heavy bupivacaine and 10 ml normal saline extradural) and 4.63±0.58 in group C (who received 2 ml of heavy bupivacaine intrathecally and 10 ml isobaric bupivacaine extradural. The present study was in accordance with the above three studies.

Maximum dermatomal level achieved (thoracic dermatome)

In the present study: in group I the number of patients which attained T (thoracic dermatome 6th) were 16 (53.3%) and in group II it was 6 (20%), on comparison of two groups p<0.05, hence was statistically significant.

In group I the number of patients which attained T_8 were 8 (26.7%) and in group II it was 9 (30%), on comparing both groups p>0.05 both the groups yield comparable result and thus non-significant.

In group I the number of patients which attained T_{10} were 6 (20%) and in group II it was 15 (50.0%), on comparing both p<0.05, hence was statistically significant.

The study conducted by Bhattacharya et al compared SCEA (spinal combined epidural anesthesia) with spinal anesthesia technique.[8] In this study he observed, the highest level of block was T_{10} with a range from T_6-S_5 in SCEA group whereas the highest level of block in spinal group was T_6 with the range from T_4-S_5. This observation was in accordance with the present study.

The lower level could be beneficial in lower extremity surgeries so as to avoid hemodynamic instability resulting from sympathetic blockade, particularly in a compromised patient.

In the study, conducted by Okasha et al the maximum height achieved in CSE with EVE (epidural volume extension) was T_1 in 20% cases and below T_2 in 80 % cases where as it was below T_2 in all patients of group with CSE without EVE (p<0.02).[9] This observation is not in accordance with our study. The mechanism attributed towards this could be due to the larger volume of saline injected in the epidural space which rapidly increases the epidural pressure and causing thecal compression to push the intrathecal drug in cephalad direction.

Total duration of analgesia

In the present study the mean and SD (standard variation) of total duration of analgesia in our study in group I was 161.00±29.98 and for group II it was 176.00±25.81, which is shown in table number.[4] This shows duration of analgesia is more in combined spinal epidural block.

The study conducted by Bhattacharya on sequential combined spinal epidural anesthesia versus spinal anesthesia in high-risk geriatric patients for major orthopedic surgery, the mean and SD was 260±10 in CSE and 190±10 in spinal block .[8] The observation is in accordance with the present study.

In the study conducted by Tummala et al, a comparative study to evaluate the efficacy and safety of combined spinal epidural anesthesia versus spinal anesthesia in high-risk geriatric patients for surgeries around the hip joint. The mean and SD were 180±10 in spinal and in 240±10 SCSE block.[10]

This study was in accordance with the present study which signifies that duration of analgesia is more in SCSE group. Thus, duration of analgesia is prolonged with sequential combined spinal epidural anesthesia.

Maximum Bromage grade achieved

Table no 6 shows the distribution of cases according to Bromage grade achieved. In group I, nine (30.30%) patients attained Bromage grade 3 and in group II one (3.3%) patient attained Bromage grade 3. In group I, 21(70.00%) patients attained Bromage grade 4 and in group II, 29(96.7%) patients attained Bromage grade 4. On statistical analysis, p value is <0.05 which is statistically significant. This implicates a dense motor block that was achieved with Bromage grade 4 in majority of patients in group II who received SCSE anesthesia.

The study conducted by Bhattacharya on sequential combined spinal epidural anesthesia versus spinal anesthesia in high-risk geriatric patients for major orthopedic surgery.[8] All patients achieved maximum Bromage grade in both groups. The time taken to achieve maximum Bromage grade was with mean of 12.9±2.1 SD in CSE and 11.90±1.1 in spinal anesthesia. The degree of motor block was assessed by the operating surgeon which was rated as excellent in both groups.

The study conducted by Talikota, the degree of motor blockade was assessed by Bromage grade.[6] In group I (spinal), 100% patients achieved grade 3 motor blockade, whereas in SCSE group, four (16%) patients achieved grade 2 motor blockade and one (4%) patient achieved grade 4 motor blockade.

Thus, motor blockade provided by SCSE anesthesia is comparable with that provided by spinal anesthesia. However, the limitation is whether it is statistically significant or not remains unanswered as we do not have the p values of other studies.

Total duration of motor blockage

In the present study, as shown in Table number 7 the mean duration of motor block with SD in group I was 133.00±20.37 and in group II was 150.00±36.10. The duration of block was longer in group II, p value<0.05 is significant.

In study conducted by Gupta et al on sequential combined spinal epidural versus epidural anesthesia in orthopedic and gynecology surgery, the mean and SD was 73.9±20.9 for (CSE with no EVE), and 103.6±9.9 for EVE-S (CSE followed by EVE using 5 ml of 0.9% saline).[11]

This is in accordance with our study as the duration of motor block is significantly prolonged in SCSE group. Thus, SCSE anesthesia offers good muscle relaxation and prolonged duration of motor blockade.

CONCLUSION

The Combined spinal epidural technique has been described in the medical literature for use in general surgery, orthopedics, trauma surgery of a lower limb, and urological and gynecological surgery. With this technique, surgical anesthesia is established rapidly, saving 15-20 minutes compared with epidural anesthesia. Patients who received the combined technique had more intense motor blockade than those who received epidural anesthesia alone.so combined mode of anesthesia is recommended over single mode wherever it is feasible

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REFERENCES

1. Felsby S, Juelsgaard P. Combined spinal epidural anaesthesia. Anesthanalg. 1995;80;821-6.
2. Sharma K, Chari P, Gupta S. Combined spinal anaesthesia for lower limb orthopedic procedures. J anaesth clin pharmacol. 1994;10:257-60.
3. Vercauteren M. Twenty years of clinical use of combined spinal epidural anaesthesia: the evolution equipment. Clin dialogues regional anaesthesia. 2002:17:1-4.
4. Eldor J. Combined spinal epidural general anaesthesia. Reg anaesth. 1994;19:365-6.
5. Gupta P, Dua CK, Verma UC, Saxena KN, Chakraborty I. Sequential combined spinal epidural versus epidural anaesthesia in orthopaedic and gynaecological surgery: a comparative study. Indian j anaesth. 2002;46:453-6.
6. Talikota N, Muntha B, Thatisetti PV. Comparison of Efficacy and Safety of Sequential Combined Spinal Epidural Technique and Spinal Block for Lower Abdominal Surgeries: A Randomized Controlled Trial. Int J Sci Study. 2015(3):4.
7. Banerjee SG, Bandyopadhyay U, Pan PK, Sinha A. Study of quality and extent of intrathecal bupivacaine block by extradural injection of bupivacaine or normal saline in combined spinal epidural technique. Anaesthesia essays res. 2014;8(1):54-8.
8. Bhattacharya D, Tewari I, Chowdhuri S. Comparative study of sequential combined spinal epidural anaesthesia versus spinal anaesthesia in high-risk geriatric patients for major orthopaedic surgery. Indian j anaesth. 2007:51(1):32-6.
9. Okasha MM, Kamal S, Ramzy A. Epidural volume extension with saline in combined spinal epidural anaesthesia for dynamic hip sc rew surgeries using low dose of intrathecal hyperbaric bupivacaine. Ain-Shams j anesthesiol. 2014:07:350-5.
10. Tummala V, Rao Vallury MK, Sanapala A. Combined spinal epidural anesthesia, high risk geriatric patients of bupivacaine or normal saline in combined spinal epidural technique. Anesthesia. Essays res. 2014:1:54-5.
11. Gupta S, Naithani U, Sinha N, Doshi V, Karthik S, Bedi V. Comparison of hydroxyethyl starch versus normal saline for epidural volume extension in combined spinal epidural anesthesia for cesarean section. J obstet anaesthesia crit care. 2012:2(1):16-22.

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