Journal of Cardiovascular Disease Research

ISSN:0975 -3583,0976-2833 VOL 10, ISSUE 04 , 2019

THE IMPACT OF PATIENTS POSITIONING ON HAEMODYNAMICS DURING COMBINED SPINAL-EPIDURAL ANAESTHESIA: A PROSPECTIVE STUDY

Mamta Agarwal[1*], Kamal Agrawal[2], Anand Prakash Verma[3]

1-Assistant Professor, Department of Anesthesia, National Institute of Medical Sciences and Research, Jaipur
2-Professor, Department of Radiodiagnosis, National Institute of Medical Sciences and Research, Jaipur
3-Professor, Department of Radio diagnosis, National Institute of Medical Sciences and Research, Jaipur

Corresponding Author: ***Mamta Agarwal***

Assistant Professor, Department of Anesthesia, National Institute of Medical Sciences and Research, Jaipur(Rajasthan)

Abstract

Introduction- Spinal anaesthesia is the most commonly used method of anaesthesia and analgesia in below umbilical surgeries. Combined spinal epidural (CSE) anaesthesia gives more prolonged anaesthesia and analgesia than spinal anaesthesia. Position of patient may be particularly important because the different level of block may affect the hemodynamic changes. The aim is to compare the hemodynamic changes between sitting and lateral positions in combined spinal epidural anaesthesia. Methods: Eighty patients aged between 18-60 years belonging to ASA class –I and II were randomly divided into two groups. Each group consisiting of 40 patients. Group A received CSE in sitting position and group B patients received CSE in lateral position before returning to supine position. Baseline and intraoperative hemodynamic parameters were recorded. Onset and duration of sensory and motor block were noted. Also duration of time of first epidural topup was noted. Result: There was stastically significant difference ($p<0.05$) in the onset of sensory -motor blockade and duration of time of first epidural topup. Adverse events or hemodynamic instability noted more in group B in comparison to group A.

Keywords: Analgesia, Spinal anaesthesia, Combined spinal epidural (CSE) anaesthesia, hemodynamic Changes

INTRODUCTION

Spinal anaesthesia is an accepted technique for lower abdominal and lower limb surgeries. The position of patient is one of the major factors contributing to the success of a neuraxial block. It can be initiated with the patient either in sitting or lateral position and each position has its advantages and disadvantages. [1] Combined spinal epidural anaesthesia is associated with low failure rates and high acceptability. [2]

CSE involves the administration of local anaesthetic into the subarachnoid space followed by placement of an epidural catheter into epidural space. A literature review showed CSE to be as safe as spinal or an epidural alone. [3] However hypotension is a common complication of spinal and CSE anaesthesia. It may be due to cephalad spread of local anaesthetic into the subarachnoid space. [4] CSE most commonly used for orthopedic, trauma, general, vascular and gynaecological surgeries as well as in paediatric surgery. [5]

The advantages of CSE are the ability to provide anaesthesia of long duration with the epidural catheter once the initial subarachnoid block begins to recede. [6] In addition the epidural catheter may also used for prolonged postoperative analgesia. CSE reduces the local

ISSN:0975 -3583,0976-2833 VOL 10, ISSUE 04 , 2019

anaesthetic consumption by 25% and also reduces motor block especially in prolonged labour. [7, 8]

In CSE spinal needle is introduced below L2-L3 interspace. Spinal punctureabove L2 carry the risk of accidental spinal cord puncture which in turn can cause permanent neurological damage. [9] Moreover CSE can increase the risk of meningitis and postdural puncture headache(PDPH) [10] The sitting position facilitates the technical aspect of performing a block as midline can be recognized easily in sitting position. [6]

In the present study we aimed to compare the effect of CSE anaesthesia performed in sitting to lateral decubitus position. And to demonstrate which position was better regarding the hemodynamic and technical aspects.

MATERIAL AND METHODS:

After obtaining institutional ethics committee approval and written informed consent 80 patients, ASA grade I & II aged 18-60 years undergoing infra-umbilical surgeries were randomized into two groups before performance of CSE anaesthesia.

Group A(n=40) patients were placed in the sitting position,

Group B(n=40) patients in the lateral position before returning to the supine position.

Exclusion criteria were patient refusal, history of previous lumbar surgery, neurological disease, obvious lumbar scoliosis, coagulation disorders, any major cardiac-renal-hepatic-pulmonary illness.

All patients were given standard antacid prophylaxis. Baseline blood pressure(BP) was recorded as the lower of the two BP readings taken at a 5 min interval before i.v. cannulation. After securing the intravenous access and establishing routine monitoring(ECG, noninvasive blood pressure and pulse oximeter) each patient received a 10ml/kg preload of crystalloid solution.

Patient were positioned either in the sitting position or the right lateral decubitus position for the placement of CSE. A skin wheal was raised with 1% lidocaine at L3-L4 to L4-L5 interspaces. After that an 18 Gauge Tuohy needle introduced and epidural space was confirmed by loss of resistance technique. After that epidural catheter was inserted 4 cm into the epidural space. Then a test dose containing 3 ml of 1.5 % lidocaine with 1:200,000 epinephrine (0.005mg/ml) was given epidurally to check for any inadvertent vascular placement (which can be recognized by tachycardia) or intrathecal placement(which can be recognized by worsening motor blockade). After removing epidural needle, Quincke spinal needle(25G) inserted one space belowand 2.5 ml of 0.5% hyperbaric bupivacaine was given and patient turned to supine position within 30 seconds.

The height of sensory block measured with swabs and the degree of motor block was measured by using the modified Bromage scale. Both were evaluated every 2 minutes for next 15 minutes. If the sensory block level upto T6 dermatome level not reached within 15 minutes, 3 ml of 0.25% bupivacaine was injected epidurally over 1-2 minutes. Surgery was allowed to start when at least the T6 dermatome was anaesthetized. The extent and degree of sensory and motor block obtained at the incision time was considered to be maximal score, as further followup was considered to be impractical once surgery commenced.

ISSN:0975 -3583,0976-2833 VOL 10, ISSUE 04 , 2019

Heart rate and blood pressure were recorded before the procedure and then at interval of 1, 3, 5, 10, 15, 30, 45, 60, 75, 90 minutes after subarachnoid block. Systolic blood pressure 20% below the baseline or <90 mmHg was treated with intravenous bolus of 100 ml lactated Ringer's solution and mephenteramine 6 mg if required.

The time interval from sensory block onset to first epidural topup was also recorded(when maximum sensory block recedes two segment). Any other events intraoperatively, pertaining to anaesthesia were recorded.

The side effects patients felt like nausea, vomiting and pruritis were also recorded intraoperatively.

RESULTS

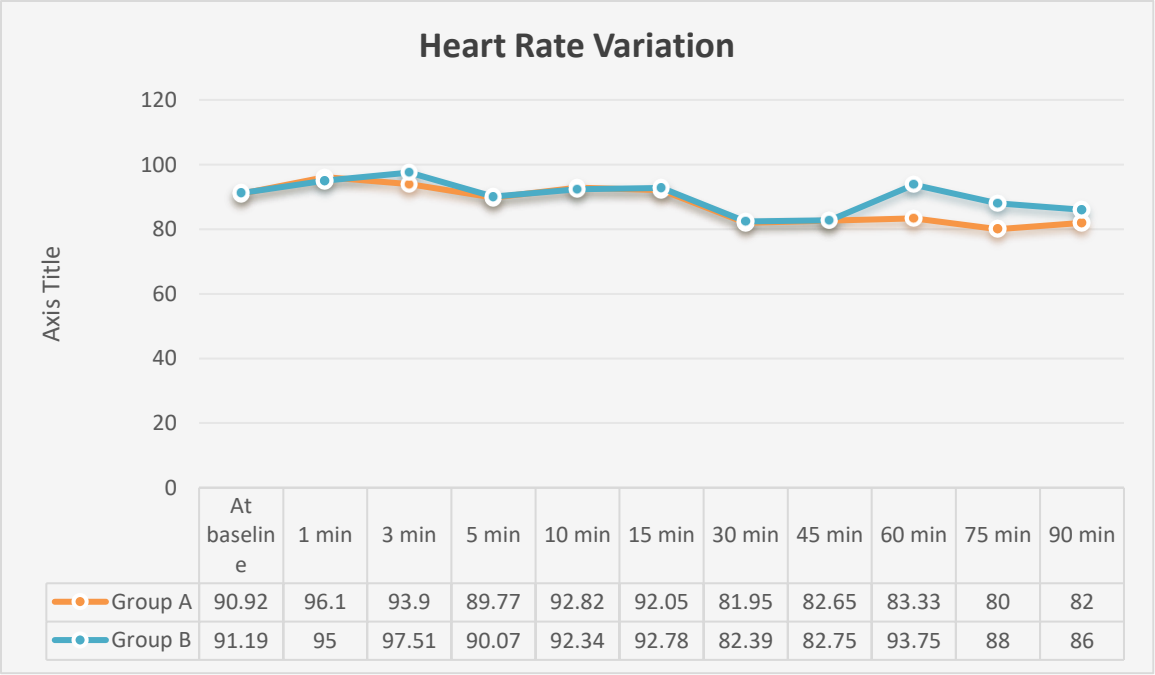
The mean age of study group A was 31.0 ± 10.3 year(mean ± SD) and in group B it was 34.8 ± 10.8 year (Table 1). The difference between two study groups was statistically not significant (P value =0.01) The degree of motor block was evaluated at the end of surgery.

Table 1: Age wise distribution of study participants

	Group	N	Mean	SD	p-value
Mean age (in years)	A	40	31.0	10.3	
	B	40	34.8	10.8	0.01

Total 80 patients were recruited into the study and of these there were no dropouts(block failure).and those who do not have block onset for more than 30 minutes were excluded from the study.

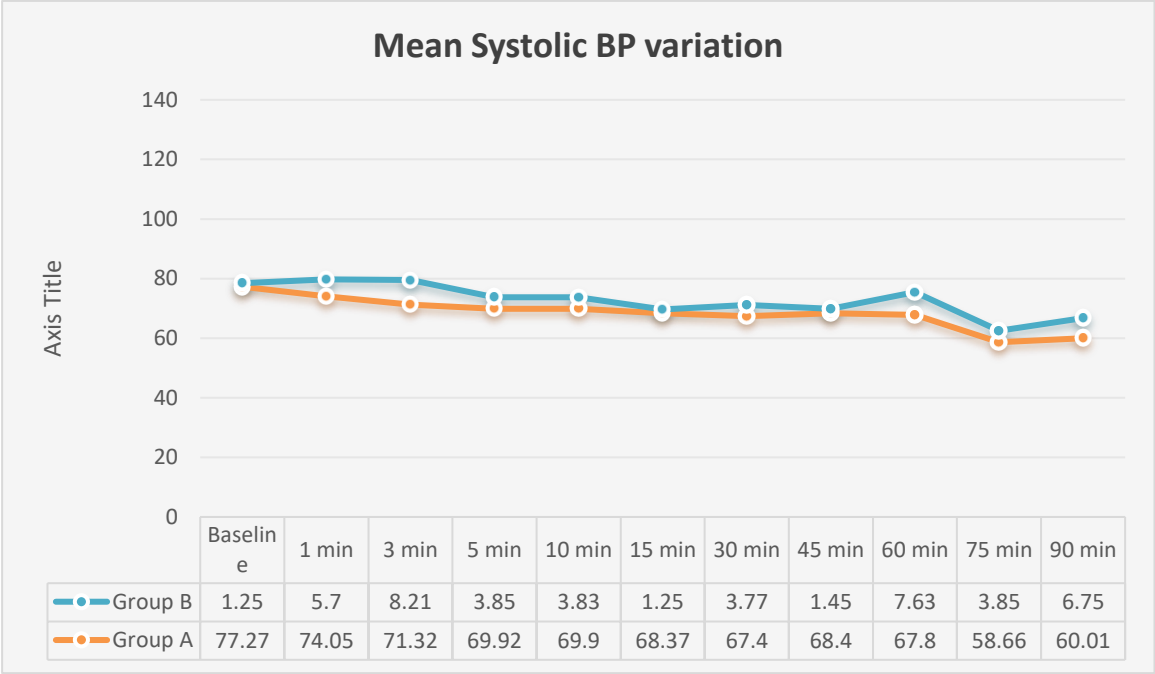
Figure 1: Heart rate variation among the study groups



ISSN:0975 -3583,0976-2833 VOL 10, ISSUE 04 , 2019

The mean difference between both the groups was statistically significant at 3 minutes and 90 minutes after administration of the drug and the variation of heart rate from baseline was lesser in group A as compared to group B.

Figure 2: Mean change in Systolic BP over the follow up period

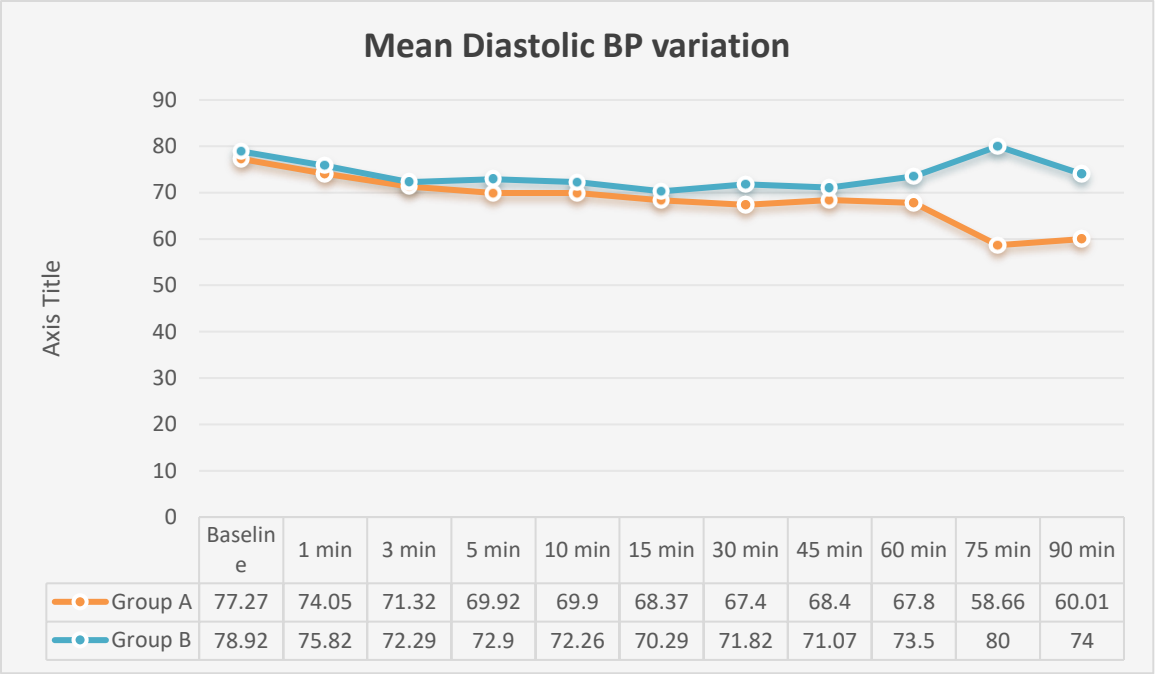


	Baseline	1 min	3 min	5 min	10 min	15 min	30 min	45 min	60 min	75 min	90 min
Group B	1.25	5.7	8.21	3.85	3.83	1.25	3.77	1.45	7.63	3.85	6.75
Group A	77.27	74.05	71.32	69.92	69.9	68.37	67.4	68.4	67.8	58.66	60.01

The mean difference between both the groups was statistically significant at 1 min, 3 min, 5 min after administration of the drug and the variation of systolic BP from baseline was lesser in group A as compared to group B.

Figure 3: Mean change in diastolic BP over the follow up period

ISSN:0975 -3583,0976-2833 VOL 10, ISSUE 04 , 2019



The mean difference between both groups was statistically significant at 30 min after administration of the drug and the variation of diastolic BP from baseline was lesser in group A as compared to group B.

Table 2: Mean time of onset of sensory and motor block among the study subjects

Onset of block (in minutes)	GROUP	N	Mean	SD	p-value
Sensory block	Group A	40	2.11	0.21	<0.001*
	Group B	40	1.12	0.16	
Motor block	Group A	40	3.13	0.22	<0.001*
	Group B	40	1.94	0.42	

The mean time of onset sensory block in group B (lateral) was 1.12 ± 0.16 min and in group A (sitting) was 2.11 ± 0.21 min and the difference between both the groups was found to be significant (p value <0.001) and the mean time of onset of motor block was 1.94 ± 0.42 min and group A was 3.13 ± 0.98 min. so quick onset of motor block was seen in lateral group and the difference was found to be statistically significant (p value <0.001).

Table 3: Mean duration of time of epidural topup among the study subjects

	GROUP	N	Mean	SD	p-value
Duration of time of epidural topup (in minutes)	Group A	40	103.85	4.19	<0.001
	Group B	40	122.85	5.82	

The mean time from induction to two segment regression of maximum sensory blockade at which first epidural topup was given among the study group. It was found that it was significantly prolonged(p value < 0.001) in group B(lateral) than group A(sitting).

Table 4: Level of maximum sensory block attained maximum block at T10

ISSN:0975 -3583,0976-2833 VOL 10, ISSUE 04 , 2019

LEVEL ATTAINED	GROUP A (SITTING)		GROUP B (LATERAL)	
	N	%	N	%
T4	1	2.5	1	2.5
T6	4	10	4	10
T8	15	37.5	14	35
T10	20	50	21	52.5
T12	0	0	0	0
TOTAL	40	100	40	100

21 out of 40 patients in group B(lateral) and 20 out of 40 patients in group A(sitting)attained the maximum block at T10.

DISCUSSION

This study aimed at compairing the effect of CSE in the sitting and lateral positions on the onset, intensity as well as duration of sensory and motor blockade. The study also compared the time interval from maximum sensory blockade achieved to the point at which first epidural topup was given. Hemodynamic comparison and occurrence of side effect such as hypotension, bradycardia, shivering, nausea and vomiting.

The time of onset of sensory blockade at T 10 for group A (sitting) was 2.11 ± 0.21 min and in group B (lateral) was 1.12 ± 0.60 with p value < 0.001, which was statistically significant. Thus the patient in lateral position have faster onset of sensory blockade.

PKS Laithang bam, N Ratan Singh et al (2013)[11] also observed similar faster onset of sensory blockade in lateral position.

Level of maximum sensory block attained was similar in both groupswith p value of 0.19 which was not statistically significant. 21 out of 40 patients in group B(lateral) and 20 out of 40 patients in group A(sitting)attained the maximum block at T10.

The mean time of onset of motor blockade with Bromage score 1(inability to flex the hip) showed the dissimilarity in both the groups. The mean time of onset of motor block in group B was 1.94 ± 0.42 min and group A was 3.13 ± 0.22 min with p value < 0.001, which was statistically significant. This indicated quicker onset of motor blockade in the lateral group.

It was similar to study by Hielde C. Coppenjans et al (2006)[12] who evaluated that sitting position leads to less hypotension as compared with lateral position in combined spinal epidural anaesthesia. Patient in sitting group required less ephedrine(p=0.01) and there was fewer problems with identifying the epidural space. However more patients this group required epidural supplementation (35% vs 3%, p value = 0.001).

In the lateral group block extended more cephalad than with the sitting position (p value = 0.004). There was no significant difference in the level of maximum motor block attained in both the groups. 39 patients in group A and 40 in group B attained maximum motor blockade of Bromage 3.

Out of two groups there was significant difference in time to two segment regression from maximum sensory block achieved. The mean time of two segment regression of sensory blockade and first epidural topup in group A was 103.4 ± 5.19 min and group A was 122.8 ± 5.82 min, with p value < 0.001. incidence of side effects such as hypotension, bradycardia,

ISSN:0975 -3583,0976-2833 VOL 10, ISSUE 04 , 2019

shivering, nausea and vomiting was more in lateral group as compared to sitting group. Incidence of bradycardia was 7.5% in lateral group and none of the patients experienced bradycardia in group A(sitting). Incidence of hypotension & vomiting was 27.5% in group B(lateral). And 20% of the patients experienced significant hypotension & vomiting in group A(sitting).

Ece Dumanlar et al (2013)[13] did the study on comparison of maternal and neonatal effects of Combined spinal epidural anaesthesia in either the sitting or lateral position during elective caesarean section, they found ephedrine requirement and heart rate changes were similar in both the groups. Maximum sensory block level in lateral group were significantly higher than in sitting group despite similar motor block recovery times in both the groups. Regression times of sensory block and first rescue analgesic requirement in lateral group were significantly longer than in sitting group.

Guang Hanet et al (2014)[14] did a study on combined spinal epidural anaesthesia between decubitus and sitting position in aged patients undergoing total hip replacement. In their study they found for aged patients undergoing total hip replacement combined spinal epidural anaesthesi a is safer and more effective in the sitting position than in decubitus position.

In this study we observed that there was stastically significant difference ($p<0.05$) in the time of onset of sensory and motor blockade and duration of time of first epidural topup. Adverse events or hemodynamic instability noted more in group B as compared to group A.

CONCLUSION

In this study we observed that onset of sensory block was faster in group B which was statistically significant but not clinically significant. Level of maximum sensory block was similar in both the groups and was not clinically significant.

Onset of motor block was faster in group B, which was stastically significant. There was no stastically significant difference in the level of maximum motor block attained in both the groups. Mean time for two segment regression of maximum sensory blockade and epidural supplementation in group A was 103.4 ± 5.19 min and group B was 122.8 ± 5.82 min.

Incidence of side effects such as nausea, vomiting, hypotension and bradycardia was more in lateral group compared to sitting group. Thus we conclude that lateral position had the least requirement of epidural supplementation but required more vigilance because of faster onset of sensory and motor block and tendency for more episode of hypotension.

BIBLIOGRAPHY

1. Birnbach, D.J. and Browne, I.M. (2009) Anesthesia for Obstetrics. In Miller, R.D. ... Miller's Anesthesia, 7th Edition, Churchill Livingstone, Edinburg, 2203-2240

2. Davies SJ, Paech MJ, Welch H, Evans SF, Pavy TJ. Maternal experience during epidural or combined spinal-epidural anesthesia for cesarean section: a prospective, randomized trial. Anesth Analg. 1997 Sep;85(3):607-13.

3. Kar-Binh Ong, R Sashidharan, Combined spinal–epidural techniques, *Continuing Education in Anaesthesia Critical Care & Pain*, Volume 7, Issue 2, April 2007, Pages 38–41

ISSN:0975 -3583,0976-2833 VOL 10, ISSUE 04 , 2019

4. Patel M, Samsoon G, Swami A, Morgan B. Posture and the spread of hyperbaric bupivacaine in parturients using the combined spinal epidural technique. Can J Anaesth. 1993 Oct;40(10):943-6.

5. Cook TM. Combined spinal-epidural techniques. Anaesthesia. 2000 Jan;55(1):42-64.

6. Yun EM, Marx GF, Santos AC. The effects of maternal position during induction of combined spinal-epidural anesthesia for cesarean delivery. Anesth Analg. 1998 Sep;87(3):614-8.

7. Van de Velde M, Mignolet K, Vandermeersch E, Van Assche A. Prospective, randomized comparison of epidural and combined spinal epidural analgesia during labor. Acta Anaesthesiol Belg. 1999;50(3):129-36.

8. Wilson MJ, MacArthur C, Cooper GM, Shennan A; COMET Study Group UK. Ambulation in labour and delivery mode: a randomised controlled trial of high-dose vs mobile epidural analgesia. Anaesthesia. 2009 Mar;64(3):266-72.

9. Reynolds F. Damage to the conus medullaris following spinal anaesthesia. Anaesthesia. 2001 Mar;56(3):238-47.

10. Verstraete S, Walters MA, Devroe S, Roofthooft E, Van de Velde M. Lower incidence of post-dural puncture headache with spinal catheterization after accidental dural puncture in obstetric patients. Acta Anaesthesiol Scand. 2014 Nov;58(10):123-9.

11. Laithangbam, PKS; Singh, N Ratan; Fanai, Rebecca L; Singh, S Sarat; Shashank, DS; Nayagam, Hem Anand. Comparison of the lateral, Oxford and sitting positions for combined spinal and epidural anesthesia for elective caesarean section. Journal of Medical Society 27(1); Jan–Apr 2013:p 70-73, .

12. Coppejans HC, Hendrickx E, Goossens J, Vercauteren MP. The sitting versus right lateral position during combined spinal-epidural anesthesia for cesarean delivery: block characteristics and severity of hypotension. Anesth Analg. 2006 Jan;102(1):243-7.

13. Tan ED, Günaydın B. Comparison of Maternal and Neonatal Effects of Combined Spinal Epidural Anaesthesia in Either the Sitting or Lateral Position During Elective Cesarean Section. Turk J Anaesthesiol Reanim. 2014 Feb;42(1):23-32.

14. Han G Juliana samuels, Fredrick Mans. Combined spinal epidural anaesthesia between decubitus and sitting position in aged patients undergoing total hip replacement . Anaesthesia pharmacology, 2014:93;193-96.