Original Article

A Prospective Randomized Trial Comparing the Spinal and General Anesthesia in Lumbar Disc Surgery: A Study of 44 Cases

1. Muhammad Wasim Khan 2. Nadia Omer 3. Mubasher Iqbal 4. Adil Aziz Khan 5. Shahid Mumtaz Abbasi

1. Asstt. Prof. of Neurosurgery Mohid-Ud-Din Islamic Medical College, Mirpur 2. Senior Registrar of Anesthesia Fauji Foundation Hospital Rawalpindi 3. Senior Registrar of Anesthesia Mohid-Ud-Din Islamic Medical College Mirpur 4. Registrar of Neurosurgery Fauji Foundation Hospital Rawalpindi 5. Asstt. Prof. of Medicine Fauji Foundation Hospital Rawalpindi

ABSTRACT

Objective: General anesthesia is most frequently used for lumbar disc surgery despite the evidence that spinal anesthesia is as safe and may offer some additional advantages. The purpose of this study was to compare the intraoperative parameters and postoperative outcome after spinal and general anesthesia in demographically well matched patients undergoing elective lumbar Decompressive surgery.

Study Design: Prospective randomized controlled study

Place and Duration of Study: This study was carried out at DHQ Hospital Mirpur AJK from January 2007 and May 2010.

Materials and Methods: In this randomized controlled study we analyzed the outcome obtained in 44 patients in whom either spinal or general anesthesia was induced for lumbar disc surgery. The variables recorded were anesthesia related class, surgical diagnosis, disc levels operated and pre,peri and postoperative measurements of variables like BP, and heart rate. All aspects of surgery, recovery, post anesthesia care and pain management were same irrespective of anesthetic type The narcotic and antiemetic requirement and length of stay in the hospital and incidence of urinary retention were also recorded in the post operative course.

Results: Demographically both groups were well matched. Anesthesia time was longer in patients receiving GA with increased heart rate and MABP perioperatively. There was more nausea and greater requirements for antiemetic and analgesics in patients receiving

GA(p value<0.05). Perioperative heart rate and MABP was on normal side and there was no urinary retention in patients who received spinal anesthesia.

Conclusion: Spinal anesthesia was a safe and effective as GA for patients undergoing lumbar Decompressive surgery. Spinal anesthesia had added advantages of short anesthesia duration, decreased antiemetic and analgesic requirements.

Abbreviations: GA general anesthesia, HR heart rate, I/V intravenous, MAP mean arterial pressure, PACU post anesthesia care unit, RCT randomized controlled trial, SA spinal anesthesia

Key Words: Laminectomy. Spine surgery. Spinal anesthesia. Spinal stenosis.

INTRODUCTION

Spinal and general anesthesia have both been used for lumbar Decompressive surgery but general anesthesia is used far more widely and almost exclusively in many practices. This preference may be due to greater acceptance by the patients, the ability to perform longer operations.[1] and anesthesiologist feeling more comfortable with secured airway in prone position.[2]

On contrary some anesthesiologist prefer spinal anesthesia for lumbar disc surgery because they believe it is accompanied by less blood loss[3], less hemodynamic instability[4,5].An additional advantage is the patient ability to reposition the extremities and chest to avoid nerve injury or pressure necrosis to either the face or chest wall.[6,2]

Spinal anesthesia also reported to have reduce incidence of pulmonary complications compared with GA[7,8]. There have been few RCTS regarding the subject in the literature.[9,10,11,12]

The purpose of this study to conduct RCT to compare the intraoperative parameters and postoperative outcome after spinal and general anesthesia.

MATERIALS AND METHODS

All the patients awaiting for lumbar Decompressive surgery for single or two levels between January 2007 to May 2010 at DHQ Hospital Mirpur AJK were enrolled for the study. After verbal and written informed consent a total number 42 patients of ASA physical status 1 and 2 undergoing either single or double level laminectomy or fenestration for lumbar discectomy were admitted during this period. Patients were excluded if they had severe cardiac, renal or hepatic disease.Patients with coagulation abnormalities,

or infectious conditions that would contraindicate spinal block were also excluded. If patients had any changes in surgical technique or massive bleeding during operation which needed blood transfusion, were also excluded from the study. Eligible candidates were given written informed consent. All the operations were done by the same surgeon. Patients were divided into two groups either GA or SA by randomization.

Patients in GA group were taken to the operation theater on a stretcher and monitors were attached. Baseline NIBP , pulse ,SPO2 and ECG were recorded. Patient were than given midazolam 2mg and 10 mg nalbuphine intravenously(IV) at pre induction. Patient was induced with propofal 2mg /kg. Intubation was facilitated with atracurium 0.6mg/kg. Anesthesia was maintained with 1.2% Isoflurane and Nitrous Oxide 50% in Oxygen. Muscle relaxant was repeated after every 20 min, 10 mg till the surgery was finished. Monitors were detached and patients were than log rolled on to the operating table on a prone position frame. Arms were positioned with shoulders perpendicular to the body and arms flexed 90 degrees at the elbow resting on arm board in front of the patient. The arms were padded and head was positioned on a pillow and head ring with padding for eye and nose to avoid any injury .Ventilator settings were adjusted to maintain end tidal CO2 of 30-35. ECG ,NIBP ,pulse oximetery and end tidal CO2 were continuously monitored and recorded every 10 minutes .At completion of operation the anesthetics were discontinued and patients were given 100% oxygen. Patients were then rolled back into supine position and reversal of atropine.02mg/kg and neostigmine.04mg/kg was administered. The patients were extubated and when appropriate were shifted to PACU.

In the SA group patients with already explained procedure were taken to operation table and preloaded with ringer lactate 15 ml/kg in 10-15minutes. Baseline NIBP, ECG and pulse oximetery were done. Patient were cleaned draped in sitting position and injection xylocain2% 2ml were given in L3-4 or L4-5 inters pace for skin infiltration. Injection bupivacain 0.75% ,15mg was injected with 25 G Quincke spinal needle after aspiration of free CSF. Patient was then shifted to supine position .When a spinal level between T6 and T10 was achieved (approximately after 10 min) the patient was rolled on to the prone position on laminectomy frame. The patient was allowed to self position until comfortable. The head of patient was elevated to provide surgical field that is approximately at the same level as heart. The monitors were reattached and oxygen was supplied with oxygen mask at 4L/minute . Injection midazolam 0.1-0.2mg/kg given IV for sedation. ECG, NIBP and pulse oximetery were recorded at 10 minutes interval. At the completion of surgery the patient was rolled from prone position on a bed and transferred to PACU .

Age and ASA status along with HR and MAP were recorded at time of entering operation theater .Total anesthesia (time patient entered the operating room until PACU admission) and surgical time (incision to placement of surgical dressing) were also documented. During course of anesthesia for episodes of bradycardia (heart rate less than 60 per minutes) or hypotension (systolic blood pressure less than 90 mmHg), 0.5 mg Atropine or 5 mg ephedrine were administered.

In immediate post operative period the variables recorded include HR and MAP on admission in PACU and every 10 min for the first hour . Severity of pain and nausea were recorded using VAS scale where100= maximum and 0 = no pain or nausea. Postoperative analgesic use and total administered dosage of nalbin were recorded till 24 hours after surgery. If the VAS score was more than 50 , then 5mg of nalbuphine was given intravenously and, if the score did not reduce within 10 minutes, an additional 2mg IV was administered and the total nalbuphine consumption was recorded. Intravenous Metoclopramide at 0.1 mg/kg IV was administered to patients with vomiting and for nausea with a score more than 50.

If patients were awake and had no pain, nausea, vomiting, or hemodynamic instability, they were discharged from PACU in Group GA. In Group SA, when patients had no pain, nausea, vomiting, and at least two segment regression of spinal block, they were discharged from the PACU.

Over next 24 hours occurrence of vomiting and VAS score for nausea and pain were recorded. Metoclopramide was given if score was more than 50. Need for analgesia was also recorded and additional dose of nalbuphine 5mg given IV was given if score is more than 50 otherwise mild discomforts were controlled by oral acetaminophen. Occurrence of urinary retention requiring catheterization were also noted in both groups.

RESULTS

Forty two patients were enrolled in the study. Demographic characteristics, ASA classification, diagnosis, number of involved vertebrae, surgical procedure preop heart rate and preop MABP did not differ significantly between two groups.(table 1)

Per operative Heart rate, and anesthesia time was longer in patients receiving GA but surgery time and MABP did not differ significantly.(Table 2)

During recovery heart rate remained elevated in patients in patients receiving GA with significantly increased antiemetic and narcotic requirements. (table3)

Postoperatively two patients receiving general anesthesia had urinary retention there were no pulmonary complications in either group. There were no spinal headache or retention of urine in patients receiving spinal anesthesia.

The mean postoperative hospital stay in the patients receiving GA (4.6 days) was less than receiving spinal anesthesia(5.1days) which was not statistically significant (p value.058).

Table No.1 Preop variables

Variables	Spinal Anesthesia	General Anesthesia	P value
Mean age in years	36.50	36.72	0.389
Sex			0.500
Male	13	12	
Female	9	10	
Diagnosis			0.627
Disc prolapsed	15	15	
Spinal stenosis	7	7	
Operation Levels			0.500
Single	21	20	
Double	1	2	
ASA class			0.500
1	18	17	
2	4	5	
Preop baseline heart rate	80.2 (73-87)	80.4 (72-88)	0.51
Preop MABP	95.8 (89-101)	96 (87-105)	0.82

Table No.2: Intraoperative parameters

Variables	Spinal Anesthesia	General Anesthesia	P value
Mean anesthesia time in minutes	115.22	164.04	0.001
Std Deviation	12.48	19.48	
Mean operation time in minutes	75.22	81.09	0.454
Std. Deviation	12.48	14.10	
Mean intraoperative BP	88.04	90.72	0.487
Std.Deviation	3.76	5.65	
Mean intraoperative Heart rate	67.45	85.18	0.003
Std.Deviation	3.97	7.29	

DISCUSSION

Both spinal and general anesthesia have been used in patients undergoing lumbar disc surgery but only few controlled studies are available to suggest whether either of these techniques is superior to other.[10,11,9 13]

Several studies have compared SA and GA in lumbar disc surgery and many of which have concluded SA as preferred method[8,10,11,12], whereas Sadrolsadat et al[13] are in the opinion that SA had no advantages over GA.

Our current prospective randomized controlled study although composed of very small number of patients supported spinal anesthesia as a safe and effective alternate to GA in these patients. Our results confirm the clinical impression that spinal anesthesia is comparable to general anesthesia with some additional advantages.

Table No.3: Post op recovery Data

Variables	Spinal Anesthesia	General Anesthesia	P value
Mean heart rate	76.25	88.21	0.003
MABP	88.52	102	0.00
Narcotic Requirements			0.00
None	19	0	
One dose	3	15	
Two doses	0	7	
Antiemetic requirements			
None	19	2	0.00
One dose	3	11	
Two doses	0	9	

All of our patients were treated in the same operating room by one surgeon and same anesthesia team.

In this study spinal anesthesia reduced anesthesia time significantly (p value <0.05) where as operation time did not differ in both groups. Shorter operation time has been reported in some studies[10] due to less bleeding in patients receiving SA. It has been suggested that patients receiving SA bleed less in lower extremity surgery as compared to GA.[14,15,16,17,10] They are in the opinion that reduced blood loss was due to the combination of sympathetic blockade and lower intrathorcic pressure when patients were allowed to breath spontaneously.[18] The reduced bleeding in previous reported cases might be due to reasons because spinal anesthesia inhibit surgically induced stress levels to a greater degree than GA.[19,20,21]

In our study mean intraoperative BP remained comparable in both groups but intraoperative mean heart rate remained significantly high in patients receiving GA. Blood loss in both groups remained minimal.

Our patients receiving spinal anesthesia experienced less post operative pain as well as fewer episodes of nausea and vomiting comparable to other studies.[10,12] Heart rate and MABP remained physiologically more stable in these patients during recovery reflecting lower levels of systemic stress and pain. The increased incidence of nausea and vomiting in patients receiving GA was most likely due to anesthetic method itself..Nitrous oxide has been reported as a cause of postoperative emesis.[1-2] General anesthesia has also been reported to impair gastric emptying. [22,23]

Two of patients who received GA developed retention of urine were catheterized in the ward. Our patients receiving SA did not have spinal headaches or retention of urine Urinary retention has been reported more in spinal anesthesia in some studies[24], Jellish et al[10] found no difference whereas Mclain et al had more urinary retention in patients receiving GA in their studies.

We did not have any other complications in either group. Postoperative hospital stay was comparable in both groups.

CONCLUSION

Our results support the conclusion in the literature that spinal anesthesia was as safe and effective as GA for patients undergoing lumbar spine surgery. Spinal anesthesia had the added advantages of short anesthesia time, decreased postoperative analgesic and antiemetic requirements.

REFERENCES

1. Backofen JE, Schauble JR. Hemodynamic changes with prone positioning during general anesthesia. Anesthesia Analog 1985;64:194
2. Philipps OC, Ebner H, Nelson AT. Neurological complications following spinal anesthesia with lidocaine:a prospective review of 10440 cases. Anesthesiology 1969;30:284-289.
3. Kakiuchi M. Reduction of blood loss during spinal surgery by epidural blockage under normotensive general anesthesia. Spine 1997;22:889-894.
4. Jellish WS, Shera JF. Spinal anesthesia for spinal surgery 2003;17:332-4.
5. Scott NB, Kehlet H. Regional anesthesia and surgical morbidity. Br J Surg 1998;75:299-304.
6. Dripps RD, Vandam LD. Long term follow up of patients who received 10098 spinal anesthetics: failure to discover major neurological sequalae. JAMA 1954;156:1486-1491.
7. Nazon D, Abergel G, Hatem CM. Critical care in orthopedic and spine surgery. Crit Care Clin 2003; 19:33-63.
8. Dermil CB, Kalayci M, Ozkocak I, et al. A prospective randomized study comparing perioperative outcome variables after epidural of general anesthesia for lumbar disc surgery. J Neurosurg Anesthesiol 2003;15(3):158-192.
9. Silver DJ, Dunsmore RH, Dickson CM. Spinal anesthesia for lumbar disc surgery: a review of 576 operations. Anesth Analg 1976;55:550-554.
10. Jellish WS, Thalji K, Stevenson JS. A prospective randomized study comparing short and intermediate term perioperative outcome variables after spinal or general anesthesia for lumbar disc and laminectomy surgery.
11. Mclain R, Bell GR, Kaflas l, et al. Complications associated with lumbar laminectomy: a comparison of spinal versus general anesthesia. Spine 2004; 29: 2542-2547
12. Mclain RF, Kalfas L, Bell GR, et al. Comparison of spinal and general anesthesia in lumbar laminectomy surgery: a case controlled analysis of 400 patients. J Neurosurg Spine 2005;2: 17-22.
13. Sadrolsadat SH, Mahdavi AR, Moharari RS, et al. A prospective randomized trial comparing the technique of spinal and general anesthesia for lumbar disc surgery: a study of 100 cases. Surg Neurol 2009;71(1):60-5.
14. Bannister GC, Young SK, Baker AS, et al. Control of bleeding in cemented arthoplasty. J Bone Joint Surge Br 1990;72:444-446.
15. Cook PT, Davies MJ, Cronin KD, et al. A prospective randomized trial comparing spinal anesthesia using hyperbaric cinchocaine with general anesthesia for lower limb vascular surgery. Anaesth Intensive Care 1986;14:373-380.
16. Davis FM, McDermot E, Hickton C, et al.Influence of spinal and general anesthesia on haemostasis during total hip arthroplasty. Br J Anaesth 1987;59: 561-571.
17. Thorburn J, Louden JR, Vallance R. Spinal and general anesthesia in total hip replacement: frequency of deep vein thrombosis. Br J Anaesth 1980;52:1117-1121.
18. Covino BG. Rationale for spinal anaesthesia. Int Anaesth Clin 1989;27:8-12.
19. Davis FM, Laurenson VG, Lewis J, et al.Metabolic response to total hip arthroplasty under hypobaric subarachnoid or general anesthesia. Br J Anesth 1987;59:725-729.
20. Kehlet H: The stress response to anesthesia and surgery: release mechanisms and modifying factors. Clin Anaesth 1984;2:315-339.
21. Pflug AE, Halter JB.Effect of spinal anesthesia on adrenergic tone and the neuroendocrine response to surgical stress in humans. Anesthesiol 1981; 55:120-126.
22. Nimmo WS, Littlewood DG, Scott DB, et al: Gastric emptying following hysterectomy with extradural analgesia. Br J Anaesth 1978;50: 559-561.
23. Reigel B, Alibert F, Becq MC, et al. Lumbar disc herniation with surgical option: general versus local anesthesia. Round table Agressologie 1994; 34:33-37.4
24. Young DV. Comparasion of local,spinal and general anaesthesia for inguinal herniorraphy. Am J Surg 1987;153:560-563.

Address for Corresponding Author:
Dr. Muhammad Wasim Khan
Mirpur Polyclinic Dawood Plaza, opposite Riaz Hospital Allama Iqbal Road Mirpur AJK.
Phone: 05827445718, Cell: 0092-3005038993