

Interventional Lumbar Spine Surgeries under Spinal Anesthesia Compared General Anesthesia: A Prospective Study Tertiary Hospital in Bangladesh

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Abstract

Background: When it concerns to lumbar spine surgery, patients have the option of either general or regional anesthetic. General anesthesia is the most often used anesthetic method (GA). These patients had spinal anesthesia (SA) and general anesthesia (GA) to see which had better intraoperative and postoperative results. **Methods:** Multicenter non-randomized quasi-experimental prospective study has been conducted in Rajshahi Medical College Hospital and tertiary care Hospital Rajshahi, Bangladesh. From June 2019 until December 2020. The research involved a total of 72 patients. There were 37 patients in the GA Group and 35 in the SA Group who were randomly assigned to the two groups. They also kept track of the patient's heart rate, systolic and diastolic blood pressure, blood loss, satisfaction with the operating circumstances, and the intensity of postoperative discomfort assessed using a visual analogue scale (VAS). **Results:** This study found that the SA group suffered from considerably less blood loss than the GA group. The SA Group saw substantially less changes in intraoperative maximal blood pressure and heart rate ($p=0.05$). This group was substantially satisfied with their surgeons' work ($p=0.05$). There were substantially fewer patients in the SA group who required postoperative analgesics and postoperative mean VAS than in the GA group. ($p < 0.05$ for both). **Conclusions:** While maintaining improved perioperative hemodynamic stability without increasing undesirable side effects, our research demonstrated that SA was superior to GA in delivering surgical analgesia and reducing blood loss.

Keywords: Anesthesia, General, Spinal, Lumbar Surgery, Rajshahi Medical College Hospital.

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INTRODUCTIONS

General or regional anesthesia can be used safely for surgery on the lower thoracic and lumbar spine. It has the benefit of allowing surgeons to do lengthy surgeries while still maintaining their airway integrity without risking patient safety (GA) [1, 2]. To put it another way, regional anesthesia's greatest benefits come from its ability to reduce intraoperative blood loss, which improves operating conditions [3], as well as its ability to lower the risk of perioperative cardiac ischemic incidents and postoperative hypoxic episodes, as well as to provide adequate postoperative pain control [4, 5]. 4-7 Additionally, patients should be

able to move themselves when awake to avoid brachial plexus damage and pressure necrosis of the face. Only spinal anesthesia makes this feasible (SA).

As Scott *et al.*, [4] demonstrated, individuals who had general anesthesia (GA) were more likely to experience pulmonary problems than those who underwent regional anaesthetic. In two retrospective investigations, SA had a better outcome than GA in individuals who had lumbar spine operations [6, 7]. Rapid onset and reversal of effects are required in an appropriate anesthetic method. It must also remain steady over time. The use of spinal anaesthetic as

opposed to general anesthesia. hemodynamic during surgery without the need for further blood transfusions. As a final point, a top-notch anesthetic should shorten hospital stay and lessen pain, nausea, and vomiting after surgery while also reducing the need for extra analgesics. There is some debate in the medical literature about whether SA or GA gives these advantages for lumbar disk surgery, as our research revealed when we investigated it. Patients having lower thoracic and lumbar spine surgery had no advantage from SA over GA, according to the study by Sadrolsadat *et al.*, [8]. They also discovered that SA had greater side effects than GA. Prior to drawing any definitive conclusions, they said, further research must be done.

According to the authors' clinical observations, patients who had lumbar spine surgery using SA reported higher levels of patient satisfaction and fewer side effects than those who had GA. That's in line with most prior research, but it's the opposite of what Sadrolsadat *et al* found. We planned the current study to analyze intraoperative and postoperative results when SA or GA methods are used in patients having lumbar spine surgery to better understand this important subject.

METHODS

There were 72 patients who were scheduled for discectomy, laminectomy, foraminotomy, or a cord tumor and had an American Society of Anesthesiologists (ASA-PS) I-II physical status. The study excluded patients with a history of seizure or intracranial hypertension, contraindications to spinal anesthesia (such as patients' refusal, coagulopathy, infection at the site of needling, or low blood sugar levels), severe spinal stenosis, a near-total or total myelographic block, myelographic demonstration of arachnoiditis, or inadvertently generated high spinal pressure. Also omitted from the study were individuals who had surgical technique alterations or significant bleeding during surgery that required blood transfusions. Candidates who met the requirements for the position received written informed consent. The study was performed in Rajshahi Medical College Hospital and tertiary care Hospital Rajshahi, Bangladesh. From June 2019 until December 2020. An 80 percent power calculation showed that at least 30 patients per group were required to detect a 20 percent difference between two groups in the VAS rating, with equal to $P > 0.05$. The sample size was estimated on this basis.

The same surgeon performed each operation. Patients were randomly assigned to one of two groups: GA or SA, with 37 or 35 patients in each group, respectively. Randomization was done using sealed

envelopes. They didn't give the patients anything to get them in the mood. Propofol (2 mg/kg IV), Lidocaine (1.5 mg/kg), and Fentanyl (1.5 g/kg IV) were used to anesthetize individuals in the GA group. Atracurium (0.6 mg/kg IV) facilitated endotracheal intubation. 1.2 percent Isoflurane was used to keep the patient asleep, as well as 50 percent Nitrous Oxide in Oxygen. Intraoperative analgesia was provided by morphine (10 mg). After that, the patients were correctly positioned in a prone posture with their arms resting on the arm boards and their elbows flexed to 90 degrees. The faces were strapped to a smooth brace to relieve pressure on the nose and eyeballs.

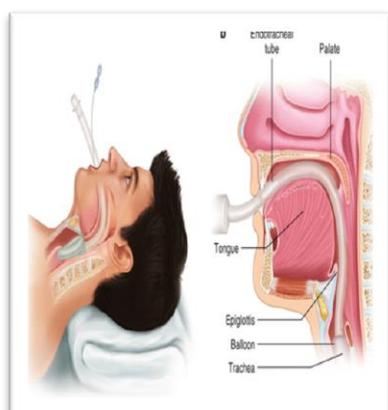
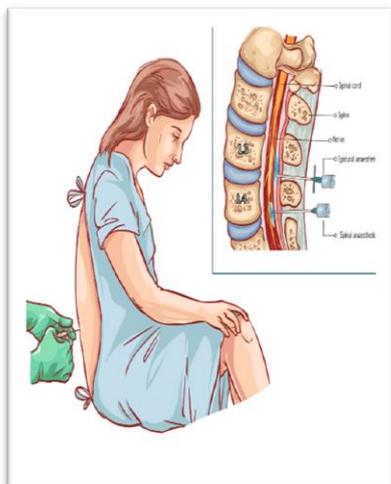
Every 15 minutes, ECG, noninvasive blood pressure monitoring, and pulse oximetry measured the heart rate, systolic and diastolic blood pressure, mean arterial blood pressure, and oxygen saturation. Patients were given 100 % oxygen when the operation was completed, and the anesthetic medicines were stopped. Neostigmine 0.04 mg/kg and Atropine 0.02 mg/kg were used to reverse the neuromuscular blockade that had previously occurred. Patients with spontaneous breathing, pulse oximeter oxygen saturation greater than 95%, end-tidal carbon dioxide 35-40 mmHg, respiratory rate less than 30 minutes, and tidal volume greater than 5 ml per kilogram were transferred to the post-anesthesia care unit (PACU) with the trachea extubated.

In the SA group, patients were preloaded with 7 ml/kg Lactated Ringer's solution for 10-15 minutes before the block was administered using 3.0 – 3.2 ml 0.5 % Bupivacaine in an 8.5 percent Dextrose solution with 25 g Fentanyl.

Afterwards, the patients were made to sit and prepared before being draped. After a local infiltration of 2-3 ml of 2 percent Lidocaine, spinal anesthesia was administered with a 25-gauge Quincke spinal needle in the L4 or L5 interspace. Bupivacaine and Fentanyl were injected into the intrathecal space after the spinal fluid was examined, and patients were then put in a supine position. The patients were placed in a prone posture five to ten minutes after the spinal level of block had been established (which was usually between T-6 and T-10). After that, a nasal cannula delivered 2L/min of oxygen. 0.5 mg Atropine or 5 mg Ephedrine were given to individuals who had bradycardia (a heart rate fewer than 60 beats per minute) or hypotension (a systolic blood pressure less than 90 millimeters of mercury).

Patients were sedated for the duration of surgery with a 25-50 g/kg/min IV Propofol infusion. Immediately following surgery, the patient was taken from the prone position to supine and brought to the post-anesthesia care unit (PACU).

Spinal Anesthesia vs. General Anesthesia



An array of demographic data was collected on each patient upon their arrival in the operating room. Maximum heart rate and mean arterial blood pressure variations from the baseline were recorded after anesthesia administration. The volume of blood suctioned from the surgical field was used to monitor and record blood loss. Up to 24 hours following surgery, postoperative analgesic use and total Meperidine dosage provided were tracked. There was also information on the frequency with which patients reported feeling queasy. Patients with vomiting or nausea that lasted longer than 10 minutes were given 0.1 mg/kg IV of intravenous metoclopramide. 0.4 mg/kg intravenous Meperidine was given if the VAS score exceeded 40 mm. If the score did not decrease within 10 minutes, an additional 0.2 mg/kg was given, and the total amount of intravenous Meperidine delivered was recorded.

There was also a dichotomized measure for patient and surgeon satisfaction (Yes or No). A patient's surgical and postoperative recovery times (measured from the time they arrived in the PACU to when they

were discharged) were documented. Patients in Group GA who were awake, pain-free, nausea-free, and hemodynamically stable, were discharged from the PACU. After two segment regressions of spinal block in patients in Group SA, they were discharged from the PACU.

Data is shown as a mean standard deviation (SD) or as a number (percent). Student's t-test was used to compare two groups on age, weight, height, maximal blood pressure and heart rate variations, operation length, recovery stay duration, and blood loss. Postoperative analgesic use and complication rates were examined by Pearson chi-square test or Fisher's exact test, depending on the situation. Statistical significance was defined as a *P*-value of >0.05 or lower. To conduct the statistical analysis, we used SPSS version 24.0 (IBM).

RESULTS

Whenever somebody showed up to demographic profile, surgery duration, or time spent in the intensive care unit (ICU), there was no significant

difference between the two groups (Table 1). There were considerably fewer changes in intra-operative maximal mean arterial blood pressure and heart rate in SA than in GA ($p > 0.05$) (Table 2). The SA group suffered considerably less blood loss than the GA group ($p > 0.05$) (Table 2). The satisfaction of surgeons and patients was substantially higher in SA than GA ($p >$

0.05) (Table 2). The SA group used considerably less postoperative analgesics and total Meperidine than the GA group ($p > 0.05$). There was no significant difference in the incidence of postoperative nausea between the two groups (Table 2). In the SA or GA groups, no one had hypotension or bradycardia.

Table 1: Patient characteristics, surgical time, and post-operative recovery time were compared between two groups

Variable	Group SA (n = 35)	Group GA (n = 37)
Age (year)	42.1 ± 3.1	45.1 ± 2.9
Sex (M/F)	22/13	20/17
ASA (I/II)	11/24	15/22
Weight (Kg)	75.0 ± 4.0	72.0 ± 3.8
Height (cm)	161.0 ± 7.0	158.0 ± 5.0
Duration of surgery (min)	115.0 ± 3.2	111.0 ± 7.4
Duration of recovery stay (min)	55.0 ± 6.7	50.0 ± 5.9

Values are presented as mean ± SD or number. SA: Spinal anesthesia; GA: General anesthesia. No

significant difference was noted between two groups

Table 2: Between-group outcome comparisons of surgical procedure and recovery time

Variable	Group SA (n = 35)	Group GA (n = 37)	P value
Maximum mean arterial blood pressure changes (mmHg)	-25.1 ± 4.2	+21.0 ± 6.7	< 0.05
Maximum heart rate changes (mmHg)	-13.2 ± 3.9	+17.5 ± 5.5	< 0.05
Blood loss (mL)	210 ± 40	350 ± 35	< 0.05
Surgeon satisfaction	35 (100)	30 (81.8)	< 0.05
Patients' satisfaction	35 (100)	25 (67.6)	< 0.05
Postoperative analgesic use	0 (0)	6 (16.2)	< 0.05
Total Meperidine use (mg)	0 (0)	150 ± 6.4	< 0.05
Postoperative nausea	2 (5.7)	1 (2.7)	> 0.05

Values are presented as mean ± SD or number (%). SA: Spinal anesthesia; GA: General anesthesia

DISCUSSION

Lower spine surgery has been performed under spinal, epidural, or general anesthesia, but only a few randomized controlled prospective studies have been conducted to determine whether one of these treatments is superior in reducing peri-operative problems. Using a case-controlled analysis of 400 patients, McLain *et al.*, [9] found that spinal anesthesia was just as effective as general anesthetic for performing lumbar decompression surgery. They concluded that SA reduced the length of anesthesia, decreased the incidence of nausea, and required fewer analgesics. While McLain *et al.*, [9] found SA to be superior to GA, Sadrolsadat *et al.*, [8] found no such advantage for SA.

They also concluded that GA could reduce the side effects associated with anesthetic technique. Their findings needed to be confirmed through other clinical trials, thus they asked such be conducted. Tetzlaff *et al.*, [10] undertook a retrospective record analysis to look at

the results of many elective lumbar spine surgical procedures done under SA or GA anesthesia. There were fewer minor problems with SA than with GA, thus it's a viable option for lumbar spine surgery.

They conducted a retrospective analysis and stressed the importance of doing a prospective randomized clinical trial investigation to document their findings. SA may be superior to GA, according to this research. Postoperative painkiller use and blood loss were reduced due to SA's use, as were maximum blood pressure and heart rate fluctuations. Furthermore, in SA, surgeons and patients reported higher levels of satisfaction. All procedures were carried out by the same neurosurgeon, and anesthesia was administered in strict accordance with standard operating procedure to avoid the introduction of ambiguous factors. Previous research has shown that SA is less invasive than GA for lower-limb orthopedic and vascular operations [11, 12].

When lumbar spine surgery was performed under epidural anesthesia instead of general anesthesia, less blood was lost [13]. These conclusions have been confirmed by the findings of our research. SA probably

reduces blood loss through two different pathways. Sympathetic blocking causes vasodilatation and hypotension, among other things [14]. Under SA, patients experience spontaneous breathing, resulting in a decrease in intrathoracic pressure and a reduction in epidural vein distension. This is yet another way for reducing post-SA hemorrhage, and perhaps the most crucial [15]. Because SA inhibits stress hormones from rising more effectively than GA, the finding that maximum intraoperative mean arterial blood pressure and heart rate fluctuations were considerably lower in Group SA is not surprising [16-18]. SA reduced postoperative pain and analgesic needs, resulting in better postoperative outcomes for patients. Patients in SA reported great levels of satisfaction and few problems, according to Hassi *et al.*, [7].

CONCLUSIONS

As a result of the study's retrospective design, no additional anesthetic procedures were compared. They do, however, stress that patients are generally satisfied with SA, which was also observed in our study. There are two possible causes for the decrease in SA postoperative analgesic use. The preemptive impact of SA reduces pain scores by blocking the afferent nociceptive sensitization pathway, which is one explanation [13]. After the operation, patients reported having less of a need for analgesics. It's possible that a second mechanism is a lingering sensory blockage in the SA brain cells. This is due to the sensory recovery taking longer than the motor recovery to complete.

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