

Comparison of blood loss in spinal and general anesthesia for lumbar disc surgery

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Abstract

Aim: Lumbar spine surgeries can be performed under general anesthesia or spinal anesthesia. We aimed to compare the effects of spinal and general anesthesia on intraoperative bleeding in patients undergoing lumbar disc surgery.

Material and Methods: Fifty patients scheduled to undergo elective single-level lumbar discectomy under spinal or general anesthesia were studied. The amount of blood loss was calculated by subtracting the wash solutions from the amount in the aspirator reservoir and evaluating bleeding in the gauze used throughout the operation. The time between the first incision and the final suture was evaluated as the surgical time. Patients' demographic data, duration of surgery, amount of fluid given intraoperatively, intraoperative hemodynamic data, intraoperative blood loss, intraoperative/postoperative ephedrine requirements, postoperative nausea and vomiting and the duration of stay in PACU were evaluated.

Results: In group S, intraoperative blood loss was 203.00±108.73 ml, while in group G it was 198.00±106.40. There were no statistically difference between the groups (p=0.884). In the duration of surgery, amount of fluid given intraoperatively, intraoperative ephedrine requirements was compared, there were no difference between the groups too (p=0.085, p=0.056 and 0.448, respectively).

Conclusion: In this study, it was shown that general and spinal anesthesia did not affect major parameters such as intraoperative bleeding in patients undergoing.

Keywords: Anesthesia; General; Spinal; Lumbar Surgery; Blood Loss.

INTRODUCTION

Lumbar spine surgeries can be performed under general anesthesia or spinal anesthesia. Although regional anesthesia has some advantages, general anesthesia is the most preferred method (1,2). General anesthesia is preferred by anesthesiologists and surgeons, as patients are more likely to prefer and more secure airway in prone position (3). In spite of this, spinal anesthesia is preferred because of rapid surgical initiation, protection from nerve damage and protection from pressure necrosis (4-6). The widespread use of spinal anesthesia, which is commonly preferred in lower abdomen and lower extremity surgeons, in lumbar disc surgery is not currently contemplated.

In different studies, spinal and general anesthetics were compared in different directions in lumbar spine surgery and different results were presented.

We aimed to compare the effects of spinal and general anesthesia on intraoperative bleeding in patients undergoing lumbar disc surgery.

MATERIAL and METHODS

Institutional ethics committee approval and written consent from the patients were obtained for the study. Fifty patients, ASA physical status I and II, scheduled to undergo elective single-level lumbar discectomy under spinal or general anesthesia, were studied.

Exclusion criteria were contraindication to neuraxial anesthesia or known allergy to bupivacaine, spinal puncture failure, or a need for additional intraoperative analgesia.

According to the patients' preference, the groups were formed as spinal and general anesthesia. All patients were expected to fast 6-8 hours before CS, and all patients were pre-medicated with 2 mg midazolam. Routine monitoring (consisting of a pulse oximeter, 3-lead ECG and a non-invasive blood pressure cuff) were applied. Baseline measurements were obtained while patients were supine position. Hemodynamic parameters (Heart rate and

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mean blood pressure) were recorded at baseline, at the beginning of surgery, at the 10th, 20th, 30th. and 40th minutes of the surgery, and at the end of surgery.

Following pre-hydration with Ringer's lactate solution 500 mL, spinal anesthesia was induced with hyperbaric bupivacaine 10-15 mg via a 25 G Quincke-tip spinal needle in the sitting position at the L3-4 or L4-5 vertebral level using median approach by an anesthesiologist with more than 5 years experience (MSU). Patients were brought into a supine position when they reached block level T6 sensory dermatomy. Oxygen (4 l.min⁻¹) was administered through a facemask. Surgery was initiated when the sensory block level reached at T4.

General anesthesia induction was carried out using propofol IV (2 mg/kg) and fentanyl IV (2 µg/kg). Endotracheal intubation was facilitated with rocuronium IV (0.6 mg/kg). Once the patients were intubated with appropriate size endotracheal tube, they were placed in a prone position on a standard operating frame. Maintenance anesthesia consisted of oxygen 100% with sevoflurane %2 and remifentanyl (0,1-0,2 µg/kg/dk). Anesthetics were modified to maintain hemodynamic variables within 10% of the baseline values. At the end of the surgery, the anesthetics agents were discontinued, and the patients breathed 100% O₂. Patients were then rolled to a supine position onto a surgical bed and, when appropriate, their tracheas were extubated and they were transported to the PACU.

Intraoperative liquid management was performed to keep the baseline mean blood pressure at ±20%.

For the general anesthesia group, 2 mg / kg tramadol and 10 mg methoclopramide iv were administered for postoperative analgesia and postoperative nausea and vomiting prophylaxis at the end of the surgery.

Patients' demographic data (age, weight, height, BMI and ASA physical status), duration of surgery, amount of fluid given intraoperatively, intraoperative hemodynamic data, intraoperative blood loss, intraoperative/postoperative ephedrine requirements, postoperative nausea and vomiting and the duration of stay in PACU were also noted.

The amount of blood loss was calculated by subtracting the wash solutions from the amount in the aspirator reservoir and evaluating bleeding in the gauze used throughout the operation. The time between the first incision and the final suture was evaluated as the surgical time.

Our study was designed to have an 80% power at the 95% significance level to detect a 30% change in the blood loss when the patients under spinal anesthesia used as reported by Demirel et al. (7). On the basis of a preliminary study evaluating blood loss under general anesthesia, we calculated that 23 patients for each groups and for the possible dropouts total 50 patients were required.

Statistical analyzes were performed with SPSS 15.0 software (SPSS Institute, Chicago, IL, USA). In comparison between the groups, parametric data were presented

as mean and standard deviation by Student's t test. Categorical data were analyzed by chi-square test and given as number (%). A value of P <0.05 was considered statistically significant.

RESULTS

A total of 50 patients completed the study. Patients' demographics are summarized in Table 1 and there were no significant differences between the two groups regarding age, weight, height, body mass index (BMI) and ASA physical status (p=0.926, NA, p=0.225, p=0.534, p=0.389 and 0.527, respectively).

Comparison of intraoperative clinical data between the groups are summarized in Table 2. When the duration of surgery, amount of fluid given intraoperatively, intraoperative blood loss, intraoperative ephedrine requirements was compared, there was no difference between the groups too (p=0.085, p=0.056, p=0.884 and 0.448, respectively). In group S, the duration of surgery was 62.50±13.32 min, while in group G it was 55.95±9.84. In group S, amount of fluid given intraoperatively was 352.50±100.06 ml, while in group G it was 397.50±160.16. In group S, intraoperative blood loss was 203.00±108.73ml, while in group G it was 198.00±106.40. In Group S, intraoperative ephedrine requirements were in 5 patients whereas in Group G only 3 patients required intraoperative ephedrine.

Table 1. Patients' demographics

	Group S (n=25)	Group G (n=25)	P
Age, year	48.40±12.72	48.00±14.30	0.926
Gender, M/F	12 (%48) / 13 (%52)	12 (%48) / 13 (%52)	-
Weight, kg	72.71±10.45	77.20±4.6	0.225
Height, cm	167.24±7.6	168.65±6.0	0.534
BMI, kg/m ²	26.04±3.93	27.10±3.47	0.389
ASA Physical Status, I/II	15 (%60) / 10 (%40)	13 (%52) / 12 (%48)	0.527

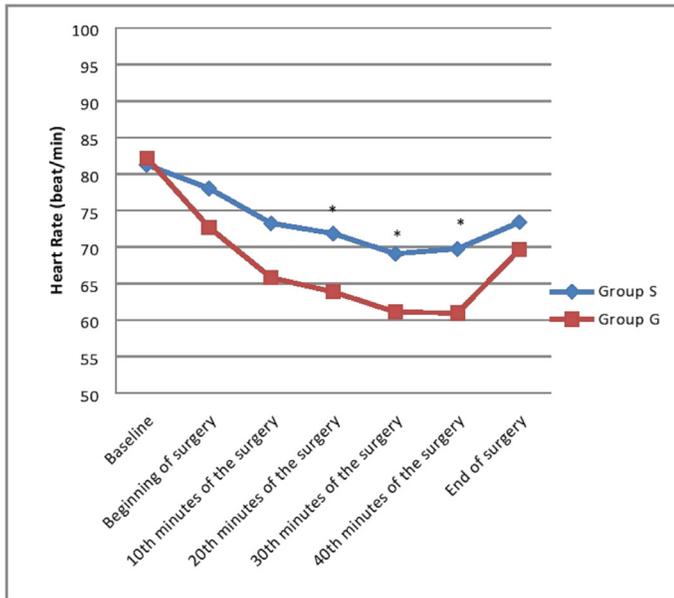
BMI: Body mass index; ASA: American Society of Anesthesiologists. Values are expressed as mean ± standard deviation and number (%)

Table 2. Intraoperative Clinical Data

	Group S (n=25)	Group G (n=25)	P
Duration of surgery, min	62.50±13.32	55.95±9.84	0.085
Amount of fluid given intraoperatively, ml	352.50±100.06	397.50±160.16	0.056
Intraoperative blood loss, ml	203.00±108.73	198.00±106.40	0.884
Intraoperative ephedrine requirements, n	5 (%20)	3 (%12)	0.448

Values are expressed as mean ± standard deviation and number (%)

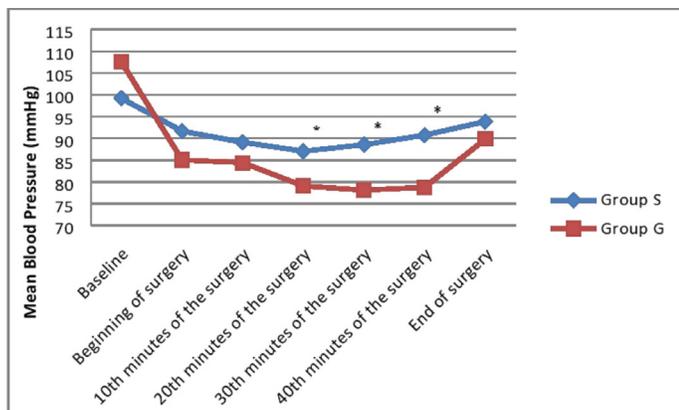
Comparison of heart rates among groups was shown in Figure 1. There was no statistical difference in the comparison of heart rates between groups at baseline, at the beginning of surgery, at the 10th of the surgery, and at the end of surgery (p=0.985, p=0.152, p=0.084 and 0.645, respectively). Heart rate values are statistically significantly lower in Group G at the 20th, 30th and 40th minutes of the surgery (p=0.025, p=0.026 and 0.018, respectively).



* p<0.05, Comparison between groups.

Figure 1. CONSORT flowchart detailing patient recruitment

Comparison of mean blood pressure among groups were shown in Figure 2. There was no statistical difference in the comparison of mean blood pressure between groups at baseline, at the beginning of surgery, at the 10th of the surgery, and at the end of surgery (p=0.095, p=0.102, p=0.586 and 0.746, respectively). Mean blood pressure values are statistically significantly lower in Group G at the 20th, 30th, and 40th minutes of the surgery (p=0.043, p=0.002 and 0.001, respectively).



* p<0.05, Comparison between groups.

Figure 2. Skin puncture pain VAS values

Comparison of postoperative clinical data among the groups was summarized in Table 3. When the

postoperative nausea and vomiting, postoperative ephedrine requirements and duration of stay in PACU was compared, there was no difference between the groups too (p=0.485, p=0.656 and 0.402, respectively). In Group S, postoperative ephedrine requirements were in 2 patients whereas in Group G 3 patients required postoperative ephedrine. Nausea and vomiting were observed in one patient in Group S and in two patients in Group G. In group S, duration of stay in PACU was 47.50±8.81 ml, while in group G it was 49.80±8.33.

	Group S (n=25)	Group G (n=25)	P
Postoperative nausea and vomiting, n	1 (%4)	2 (%8)	0.485
Postoperative ephedrine requirements, n	2 (%8)	3 (%12)	0.656
Duration of stay in PACU, min	47.50±8.81	49.80±8.33	0.402

PACU: Post-anesthesia care unit.
Values are expressed as mean ± standard deviation and number (%)

DISCUSSION

In this study, it has been shown that there is no superiority between general and spinal anesthesia in terms of intraoperative blood loss, duration of surgery and duration of stay in PACU in lumbar disc surgery.

Whether it is in lumbar disc surgery or other lumbar surgeons, there are studies in which various parameters are evaluated in terms of superiority of general anesthesia and spinal anesthesia. Among these, the most commonly evaluated parameters include intraoperative blood loss, duration of surgery, duration of stay in PACU and cost.

There are studies in lumbar surgeons that spinal anesthesia has shorter duration of surgery than general anesthesia (8-10) similar to our results, there are studies showing that spinal anesthesia and general anesthesia have no effect on the surgical duration (11,12).

In this study, intraoperative bleeding was similar in general anesthesia and spinal anesthesia groups. Although it is widely stated in the literature that the intraoperative blood loss in lumbar surgeries is not affected by the type of anesthesia (11,12), unlike the results of our study, Jellish et al. stated that spinal anesthesia significantly decreased the intraoperative blood loss in lumbar surgeries compared to general anesthesia (9).

Similar to the results of this study, it was shown that the amount of fluid given during general anesthesia and spinal anesthesia in lumbar surgeries did not change with anesthesia type (9,12).

Kahveci et al. reported that there was no difference in spinal anesthesia among the general anesthesia groups in terms of intraoperative ephedrine requirement in patients undergoing spinal surgery (9). Similar results have been presented in this study.

There are differences between the groups in the comparison of intraoperative hemodynamic data in this study. In the general anesthesia group towards the middle of the surgery period, there is a decrease in both HR and MBP values. Although hemodynamic changes in patients under general anesthesia are statistically significant, they are not clinically valuable. Walcott et al. stated that spinal anesthesia in lumbar discectomy operations could be safely chosen without causing any change in hemodynamic parameters (13). In studies comparing general anesthesia with spinal anesthesia, it has been shown that similar hemodynamic changes occur in both groups and there is no difference between general and spinal anesthesia (10,14). In contrast to these results, it has been reported that HR and MBP values in the spinal anesthesia group are lower at the end of surgery and on arrival to the PACU in a study conducted in single-level spinal surgery patients (11).

The number of patients with nausea and vomiting during the evaluation of PACU was similar in our study with general anesthesia and spinal anesthesia groups. Although similar studies with our results are mentioned in the literature (11), there are studies that include different results from the present study (9,12).

Similar to our results, there are studies indicate that the duration of stay in the PACU does not differ between spinal and general anesthesia groups in lumbar surgeries (9,11,12). However, McLain et al. stated that patients who underwent lumbar surgery under general anesthesia had a shorter duration of stay in the PACU against spinal anesthesia (10).

CONCLUSION

In conclusion, we believe that spinal and general anesthesia can be safely chosen without affecting major parameters such as duration of surgery, intraoperative blood loss and duration of stay in PACU in patients undergoing lumbar surgery.

Competing interests: The authors declare that they have no competing interest.

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Ethical approval: Institutional ethics committee approval (2016/408) and written consent from the patients were obtained for the study

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