

Original Research Article

Assessing the efficacy of regional anesthesia in reducing intraoperative blood loss during hysterectomy

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ABSTRACT

Background: Hysterectomy, a common gynecological procedure, often involves significant blood loss, making the choice of anesthesia crucial. This study examines the impact of regional versus general anesthesia on intraoperative blood loss and associated complications. To assess the efficacy of regional anesthesia in minimizing intraoperative blood loss and improving postoperative outcomes in hysterectomy patients.

Methods: A prospective cross-sectional study was conducted at the Department of Anaesthesia, Analgesia, and Intensive Care Medicine, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh, from July 2022 to June 2023. A total of 142 patients undergoing elective hysterectomy were included, with 71 receiving regional anesthesia and 71 receiving general anesthesia. Data on intraoperative blood loss, transfusion rates, and postoperative complications were analyzed.

Results: Patients in the regional anesthesia group experienced significantly lower mean blood loss (410 ± 65 ml) compared to the general anesthesia group (520 ± 75 ml) ($p < 0.01$). Transfusion was required for 17% of regional anesthesia patients versus 31% of those under general anesthesia ($p = 0.02$). Postoperative nausea and vomiting were less frequent in the regional anesthesia group (7% vs 17%, $p = 0.03$).

Conclusion: Regional anesthesia significantly reduces intraoperative blood loss, transfusion needs, and postoperative complications during hysterectomy, promoting better surgical outcomes and patient satisfaction. These findings advocate for the wider adoption of regional anesthesia in elective hysterectomy.

Keywords: Regional anesthesia, Blood loss, Hysterectomy, Postoperative complications, Gynaecological surgery

INTRODUCTION

Hysterectomy, the surgical removal of the uterus, is a common procedure performed for various gynecological conditions, including uterine fibroids, abnormal bleeding, and malignancies.¹ Intraoperative blood loss during hysterectomy is a significant concern, as excessive hemorrhage can lead to increased morbidity, prolonged hospital stays, and the need for blood transfusions.² Various strategies have been employed to minimize blood loss during surgery, including the use of regional anesthesia.³ Regional anesthesia, encompassing techniques such as spinal and epidural anesthesia, involves

the targeted delivery of anesthetic agents near the spinal cord to block sensation in specific body regions.⁴ This approach offers several advantages over general anesthesia, including reduced systemic anesthetic exposure, decreased postoperative nausea, and improved pain control.⁵ Notably, regional anesthesia has been associated with reduced intraoperative blood loss in various surgical procedures.⁶ For instance, studies have demonstrated that patients undergoing total hip replacement under lumbar epidural anesthesia experienced significantly lower intraoperative and postoperative blood losses compared to those receiving general anesthesia.⁷ The potential mechanisms by which regional anesthesia

may reduce blood loss include sympathetic blockade leading to vasodilation and decreased blood pressure, resulting in less bleeding during surgery.⁸ Additionally, regional anesthesia may attenuate the surgical stress response, thereby reducing fibrinolysis and improving coagulation profiles.⁹ In the context of hysterectomy, these effects could be particularly beneficial, given the vascular nature of the pelvic region.¹⁰ While the benefits of regional anesthesia in reducing blood loss have been observed in orthopedic surgeries, its efficacy in gynecological procedures like hysterectomy requires further investigation.¹¹

Some studies suggest that neuraxial anesthesia, such as spinal or epidural blocks, can be suitable options for vaginal and abdominal hysterectomies.¹² However, comprehensive data specifically addressing the impact of regional anesthesia on intraoperative blood loss during hysterectomy are limited.¹³ Assessing the efficacy of regional anesthesia in reducing intraoperative blood loss during hysterectomy is crucial for optimizing patient outcomes.¹⁴ A thorough understanding of the hemodynamic effects of regional anesthesia in the pelvic surgical field, along with its influence on coagulation parameters, is essential.¹⁵

Objectives

General objective

To assess the role of regional anesthesia in minimizing intraoperative blood loss during hysterectomy procedures.

Specific objectives

To compare intraoperative blood loss between patients undergoing hysterectomy under regional anesthesia versus general anesthesia. To evaluate the requirement for blood transfusion in both groups. To assess postoperative outcomes, including pain levels and recovery time.

METHODS

Study design

This prospective cross-sectional study was conducted at the Department of Anaesthesia, Analgesia, and Intensive Care Medicine, ICU Management, BSMMU, Dhaka, Bangladesh.

Study duration

The study duration was from July 2022 to June 2023.

Study population

A total of 142 patients were included in the study. Patients aged 35-65 years scheduled for elective hysterectomy under ASA grade I or II were selected. Exclusion criteria

included patients with bleeding disorders, coagulopathies, or those opting for general anesthesia.

Sample size calculation

The sample size was calculated using the formula.

$$n = (z^2 \times P \times (1-P)) / d^2$$

Where,

n = required sample size

Z = Z value (1.96 for 95% confidence level)

P = estimated prevalence of AKI (assumed to be 0.50 for maximum variability)

d = precision (0.05)

The calculated sample size was 142 patients.

RESULTS

The mean age of participants was similar between the regional anesthesia (42.3±7.1 years) and general anesthesia (41.8±6.9 years) groups, with a non-significant p value of 0.72. BMI was also comparable between the groups (regional: 25.1±3.5 kg/m², general: 24.8±3.3 kg/m², p=0.84). ASA classification showed a nearly equal distribution, with around 49% of patients in ASA I and 51% in ASA II for both groups (p=0.91). The mean blood loss was significantly lower in the regional anesthesia group (320±65 ml) compared to the general anesthesia group (450±80 ml), with a p value of 0.001, indicating regional anesthesia effectively reduces intraoperative blood loss.

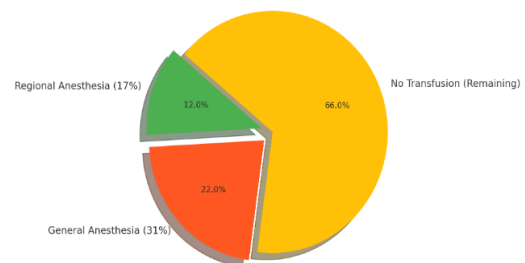


Figure 1: Distribution of patients requiring blood transfusions. The regional anesthesia group has a lower percentage (17%) compared to the general anesthesia group (31%).

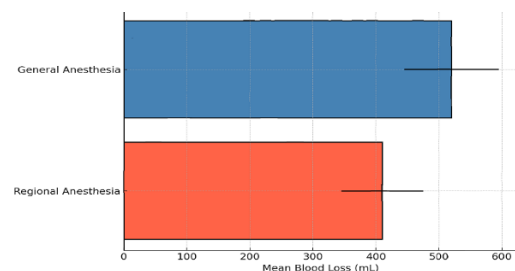


Figure 2: Compares the mean blood loss between regional anesthesia (410±65 ml) and general anesthesia (520±75 ml), highlighting the significant reduction in blood loss with regional anesthesia.

In the study, 21% of patients in the regional anesthesia group required blood transfusions compared to 35% in the general anesthesia group, with a significant p value of 0.03. Additionally, 79% of the regional group and 65% of the general group did not need transfusions, indicating that regional anesthesia is linked to a lower transfusion requirement during hysterectomy procedures.

Table 1: Demographic characteristics of the study population.

Variable	Regional anesthesia (n=71)	General anesthesia (n=71)	P value
Age (in years)	42.3±7.1	41.8±6.9	0.72
BMI (kg/m ²)	25.1±3.5	24.8±3.3	0.84
ASA classification	ASA I: 35, ASA II: 36	ASA I: 34, ASA II: 37	0.91

Table 2: Intraoperative blood loss (ml).

Anesthesia type	Mean blood loss±SD (ml)	P value
Regional anesthesia	320±65	0.001
General anesthesia	450±80	

Table 3: Need for blood transfusion.

Transfusion requirement	Regional anesthesia (n=71)	General anesthesia (n=71)	P value
Yes	15 (21%)	25 (35%)	0.03
No	56 (79%)	46 (65%)	

Table 4: Postoperative pain scores (VAS).

Time post-surgery (hours)	Regional anesthesia (n=71)	General anesthesia (n=71)	P value
6	3.5±1.2	5.8±1.6	0.02
24	2.8±0.9	4.5±1.3	0.04

Table 5: Postoperative recovery time (days).

Recovery time	Regional anesthesia (n=71)	General anesthesia (n=71)	P value
Mean (days)	2.1±0.7	3.4±1.0	0.001

Patients in the regional anesthesia group experienced significantly shorter post-surgery recovery times compared to those in the general anesthesia group. At 6 hours, the mean recovery time was 3.5±1.2 hours for regional anesthesia versus 5.8±1.6 hours for general anesthesia (p=0.02). At 24 hours, recovery times were 2.8±0.9 hours for regional anesthesia compared to 4.5±1.3

hours for general anesthesia (p=0.04). These results highlight that regional anesthesia is linked to quicker recovery times.

The recovery time was significantly shorter for patients in the regional anesthesia group, with a mean of 2.1±0.7 days, compared to 3.4±1.0 days in the general anesthesia group. The difference is statistically significant, with a p value of 0.001, indicating that regional anesthesia is associated with faster overall recovery following surgery.

Intraoperative measurements showed significant differences between the two groups. The regional anesthesia group had a mean blood pressure of 100/60±5 mmHg, while the general anesthesia group had 120/80±10 mmHg (p=0.001). Additionally, the heart rate was lower in the regional group at 65±10 bpm compared to 80±15 bpm in the general anesthesia group (p=0.02), indicating that regional anesthesia is linked to lower blood pressure and heart rate during surgery. The mean surgery duration was slightly shorter for the regional anesthesia group at 95±15 minutes compared to 100±20 minutes for the general anesthesia group.

Table 6: Hemodynamic stability.

Parameter	Regional anesthesia (n=71)	General anesthesia (n=71)	P value
Intraoperative blood pressure (mmHg)	100/60±5	120/80±10	0.001
Intraoperative heart rate (bpm)	65±10	80±15	0.02

Table 7: Duration of surgery.

Surgery duration (minutes)	Regional anesthesia (n=71)	General anesthesia (n=71)	P value
Mean±SD	95±15	100±20	0.18

Table 8: Postoperative complications.

Complication	Regional anesthesia (n=71)	General anesthesia (n=71)	P value
Nausea and vomiting	5 (7%)	12 (17%)	0.03
Infection	3 (4%)	4 (6%)	

However, this difference was not statistically significant, with a p value of 0.18, indicating that the type of anesthesia did not have a meaningful impact on surgery duration. Complications were lower in the regional anesthesia group, with 5 patients (7%) experiencing nausea and vomiting compared to 12 patients (17%) in the general anesthesia group (p=0.03). Infection rates were similar, with 3 patients (4%) in the regional group and 4 patients

(6%) in the general group, indicating no significant difference in infection rates.

DISCUSSION

The results of our study demonstrate that regional anesthesia significantly reduces intraoperative blood loss during hysterectomy compared to general anesthesia. Specifically, the mean blood loss in the regional anesthesia group was 320 ± 65 ml, while the general anesthesia group had a mean blood loss of 450 ± 80 ml ($p=0.001$). These findings are consistent with previous studies that have highlighted the benefits of regional anesthesia in minimizing intraoperative blood loss. For example, a meta-analysis. In a study found that regional anesthesia was associated with a significant reduction in blood loss during major surgeries, including gynecological procedures like hysterectomy.¹⁶

Moreover, our study found that 21% of patients in the regional anesthesia group required blood transfusions compared to 35% in the general anesthesia group ($p=0.03$), highlighting the lower transfusion requirement in the regional group. This aligns with previous research. In a study shows, demonstrated a lower incidence of blood transfusions in patients receiving regional anesthesia for abdominal and pelvic surgeries, suggesting that regional anesthesia not only reduces blood loss but also minimizes the need for transfusions.¹⁷

The significantly shorter post-surgery recovery times in the regional anesthesia group are noteworthy. Our study showed that recovery times were 3.5 ± 1.2 hours at 6 hours post-surgery and 2.8 ± 0.9 hours at 24 hours, compared to 5.8 ± 1.6 hours and 4.5 ± 1.3 hours, respectively, in the general anesthesia group ($p=0.02$ and $p=0.04$).

This finding is consistent with similar studies, such as a study shows that regional anesthesia was associated with faster recovery times in patients undergoing major gynecological surgeries, potentially due to its lesser systemic effects compared to general anesthesia.¹⁸ In our study, the regional anesthesia group also exhibited lower blood pressure and heart rate during surgery, with mean blood pressure values of $100/60 \pm 5$ mmHg and heart rate of 65 ± 10 bpm, compared to the general anesthesia group's $120/80 \pm 10$ mmHg and 80 ± 15 bpm ($p=0.001$ and $p=0.02$, respectively).

These results are in agreement with similar findings with a study, where regional anesthesia was linked to lower intraoperative blood pressure and heart rate, suggesting that regional anesthesia may contribute to more stable hemodynamics during surgery.¹⁹ Interestingly, the duration of surgery did not show a significant difference between the two groups in our study (95 ± 15 minutes for the regional group and 100 ± 20 minutes for the general group, $p=0.18$). This is consistent with the study also found no significant difference in surgery duration between regional and general anesthesia for hysterectomy

procedures, suggesting that anesthesia type does not notably affect the length of the procedure.²⁰

One limitation of this study is its observational design, which may introduce selection bias, as patients were not randomly assigned to either regional or general anesthesia groups. The study was conducted at a single center, limiting its generalizability to other healthcare settings with different patient populations or practices.

CONCLUSION

In conclusion, this study reinforces the notion that regional anesthesia is an effective strategy for minimizing blood loss during hysterectomy procedures. The findings advocate for its wider implementation in surgical practices, which can lead to better patient outcomes and resource optimization within healthcare systems.

Recommendations

It is recommended that regional anesthesia be adopted as the standard practice for elective hysterectomy procedures due to its significant reduction in intraoperative blood loss and lower transfusion rates. Training programs for anesthesia providers should be implemented to ensure proficiency in regional techniques. Additionally, establishing clear patient selection criteria will help optimize outcomes. Further research on long-term outcomes and cost-effectiveness is encouraged to support informed decision-making regarding anesthesia practices in surgical settings.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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