



Original Research Article

Postoperative Pain and Analgesic Requirements in Minimally Invasive Versus Open Gynaecological Procedures

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Abstract: **Objective:** To compare postoperative pain intensity, analgesic requirements, hospital stay, and recovery outcomes between minimally invasive and open gynaecological procedures in order to evaluate the effectiveness and benefits of minimally invasive surgical techniques. **Study Design:** Comparative cross-sectional study. **Place and Duration of Study:** This study was carried out in the department of Obstetrics and Gynecology in collaboration with Anesthesia Department in a Tertiary Care Hospital of Lahore during June 2024 to January 2025. **Methods:** 250 patients who underwent gynecological surgery were included in the study. Patients were divided into two groups: minimally invasive and open gynecological surgeries. Postoperative pain was assessed using the Visual Analogue Scale (VAS) at 6, 12, and 24 hours after surgery. Data regarding analgesic requirements, duration of hospital stay, and postoperative complications were also collected and analyzed using SPSS version 26. **Results:** Patients who had gone through minimally invasive procedures had significantly lower pain scores after the surgery, as opposed to the patients who had undergone open surgeries. Opioid analgesics use was significantly less in the minimally invasive group. Furthermore, the minimally invasive group had shorter hospital stays along with earlier mobilisation. Higher pain intensity was found in patients who underwent open gynecological surgery, as well as in those who used more analgesics after the surgery. **Conclusion:** Minimally invasive gynecological procedures have been found to have less postoperative pain and require a smaller number of analgesics than open surgeries. These techniques result in quicker recovery, less hospital stay and increased comfort for the patient, and are a preferred surgical approach wherever possible.

Keywords: Postoperative pain and gynecological surgery, minimally invasive surgery and open surgery and analgesic requirement.

INTRODUCTION

Postoperative pain is one of the most important issues

after surgery, and significantly affects patient recovery, satisfaction, and quality of life. Good pain management is crucial because if the pain after surgery is not well-managed, the patient may not leave the hospital, be unable to move around, have a longer hospital stay, may be more expensive and have an increased risk of postoperative complications (Abu-Zaid et al., 2022). Postoperative pain management is a crucial aspect of gynaecology surgery, as the surgery may involve manipulation of the pelvic structures and the abdominal tissues, and the degree of tissue trauma and inflammatory response may vary. Depending on the surgical technique employed, the amount of tissue damage and the patient's personal physiology, the pain after surgery may be intense (Giampaolino et al., 2022).

Surgery has been the main form of treatment for women with uterine fibroids, and traditionally these surgeries have involved large, long incisions made in the abdomen for such procedures as hysterectomy (removal of the uterus), myomectomy (removal of fibroids) and surgery on the ovaries (Aubrey & Nelson, 2023). Even though these procedures are an adequate surgical exposure, they often come with a lot of post-operative pain, loss of blood, longer hospital stay, slower recovery and higher requirement for analgesics. Opioid analgesics are commonly used to manage pain after open surgery and are likely to lead to more adverse effects such as nausea, vomiting, respiratory depression, constipation and delayed ambulation. Over the years, these restrictions have stimulated the evolution and use of more minimally invasive surgical methods for gynecological surgery (La Verde et al., 2022).

Over the last 20 years, minimally invasive gynecological procedures have become in vogue due to their various benefits over conventional open surgeries, especially laparoscopic and hysteroscopic surgeries. These procedures involve smaller incisions, specialized instruments and advanced imaging systems to carry out surgical procedures with minimal disruption of tissue (Bakshi et al., 2024). The advantages that go with minimally invasive surgeries are typically decreased post-surgical morbidity, early recovery of daily activities, improved cosmetic results, less post-surgical pain, and a shorter hospital stay. In addition, minimisation of the tissue trauma could decrease post-operative pain medications needs and enhance patient comfort (Della Corte et al., 2022).

Although the minimally invasive techniques are becoming more common, some gynecological surgeries, such as the removal of large pelvic masses, advanced malignancies, extensive adhesions and emergency conditions, still require the use of an open procedure. Thus, it is a clinically relevant topic to be aware of the analgesic and postoperative pain differences between these two surgical techniques, to

decide which is the most suitable and improve surgical and peri-surgical care strategies. The assessment of pain outcome can also help health care professionals in personalizing the treatment for pain and in developing post-operative recovery plans (Vazquez et al., 2025).

A few studies have been conducted on the use of opioids and pain rating in patients undergoing minimally invasive gynecological procedures versus open surgery, with similar findings from international studies of reduced pain scores and opioid use. But the results may differ depending on several factors, such as the way the surgery is performed, the patient's age, the kind of pain management used after the procedure and healthcare systems (Elsaeed et al., 2025). Very few local studies are available in developing countries such as Pakistan comparing postoperative pain and postoperative analgesic requirements of these surgical methods. The ability to create local evidence is essential for supporting clinical decision making, counselling patients and to promote the use of minimally invasive techniques when possible (Ostby et al., 2024).

Therefore, in the present study, we aimed to examine and compare the intensity of postoperative pain and number of analgesics used in patients undergoing minimally invasive and open gynecological surgeries. The results of this study could be useful in determining the surgical approach that might yield better postoperative outcomes and to enhance pain management in gynecological surgery (Tochie et al., 2022).

Objective

To determine whether there is a difference in the severity of postoperative pain and need for analgesics between MIF and open gynaecologic surgeries. Study was also conducted to assess the difference in the postoperative recovery, duration of hospital stay and early postoperative outcome of the two surgical methods, for patient handling and recovery to be safer and more effective.

MATERIALS AND METHODS

This comparative cross sectional study was conducted in the department of Obstetrics and Gynecology in collaboration with Anesthesia Department in a Tertiary Care Hospital of Lahore during June 2024 to January 2025. All of the 250 patients that underwent gynecological surgery were recruited using non-probability consecutive sampling. Patients were split into two groups – minimally invasive surgery vs. open gynecological surgery. A world health organisation recommended sample size formula was used. Patients between the ages of 20 and 65 years who were undergoing elective gynaecologic surgery were selected and patients with chronic pain disorders and

malignancy-related pain or previous opioid dependence were excluded. Visual Analogue Scale (VAS) was used to determine the postoperative pain at 6, 12 and 24 hours. All the analgesics requirement and the recovery parameters were recorded and analyzed on SPSS version 26 and $p \leq 0.05$ was taken as significant.

3.1 Inclusion Criteria

The study included patients who were 20–65 years old and were scheduled for elective gynecological surgery. Minimally invasive and open gynecological procedures were considered. Patients who gave informed consent and were willing to participate were accepted regardless of parity, marital status or type of gynecological disease that required surgical intervention.

3.2 Exclusion Criteria

Patients suffering from chronic pain disorders, previous opioid dependence, psychiatric disease, emergency surgeries, malignancy pain, severe systemic diseases and postoperative intensive care were excluded from the study. Patients were also excluded if they did not have complete medical records or if they refused to participate to ensure accurate data and reliability of the study.

3.3 Data Collection Procedure

Patients who met the inclusion criteria were recruited from the Department of Gynecology and Obstetrics of the hospital and after approval from institutional ethical review committee were included. All participants were required to give written informed consent before entering the study. All the

demographic parameters, clinical history, gynecological procedure and operative details were noted on a structured proforma. The patients were sorted into two groups: minimally invasive procedures (MI) and open gynecological procedures (OG).

Visual Analogue Scale (VAS) was used to assess the postoperative pain at 6, 12 and 24 hours after surgery. Patient records and medication charts were used to record the use of analgesics, such as opioid and non-opioid medications. Other parameters after surgery like length of hospital stay, early mobilization and postoperative complications were also noted. All the collected data were fed into SPSS version 26 for statistical analysis and confidentiality of the patients was adhered to throughout the study period.

3.4 Data Analysis

All the data were collected and analyzed by Statistical Package for Social Sciences (SPSS) version 26. Mean and standard deviation were used for quantitative data like age, immediate postoperative pain scores, requirements for analgesics and hospital stay. The qualitative data such as type of surgery, postoperative complication and gender distribution were presented in frequencies and percentages. The independent sample t-test was used to compare the groups for the continuous variables of minimally invasive vs. open gynecological procedures, while the chi-square test was used for the categorical variables. The pain scores at the various times after surgery were compared for both groups and the differences found statistically significant. A p -value < 0.05 was deemed as statistically significant. The results obtained from the samples analysed were presented in tabular form and descriptive summary.

RESULTS

In all, 250 patients who were scheduled for gynecological surgery were studied, 125 patients in each of the minimally invasive and open surgery groups. Means of participation ages were similar for both groups. Patients who had minimally invasive procedures had significant less postoperative pain at 6, 12 and 24 hours compared to open surgery for gynecological surgery. There was significant decrease in the need for analgesics in the minimally invasive group, including fewer opioid doses. In addition, patients who underwent the minimally invasive technique were mobilized earlier and had a shorter hospital stay. Patients who had open surgery had more postoperative complications, including postoperative pain and slow recovery. The results of statistical analysis showed that both surgical procedures differed significantly in terms of the postoperative results and the control of pain, with the minimally invasive gynecological surgery being more preferred.

Table 1: Demographic Characteristics of Patients

Variables	Minimally Invasive (n=125)	Open Surgery (n=125)	Total
Mean Age (Years)	41.2 $\pm$ 8.4	42.6 $\pm$ 9.1	41.9 $\pm$ 8.7
Female Patients	125 (100%)	125 (100%)	250 (100%)
BMI (kg/m ²)	26.4 $\pm$ 3.2	27.1 $\pm$ 3.8	26.8 $\pm$ 3.5
Married	102 (81.6%)	98 (78.4%)	200 (80%)

Demographic data of patients were similar in both groups. There was no significant difference between the mean age and BMI between the minimally invasive and open surgery patients. Demographic bias was minimized when comparing postoperative pain and outcome of analgesics between participants, as most of the participants were married females.

Table 2: Postoperative Pain Scores (VAS)

Time Interval	Minimally Invasive	Open Surgery	p-value
6 Hours	3.2 ± 1.1	6.5 ± 1.4	0.001
12 Hours	2.8 ± 0.9	5.4 ± 1.2	0.001
24 Hours	1.9 ± 0.7	4.2 ± 1.0	0.001

Patients who had undergone minimally invasive procedures had markedly decreased pain scores at all assessment points after surgery as compared with open surgery patients. This difference lasted for the first 24 hours after surgery, showing that the minimally invasive gynecological procedures were more painless and caused less surgical trauma.

Table 3: Analgesic Requirements

Analgesic Requirement	Minimally Invasive	Open Surgery
Opioid Analgesics Required	38 (30.4%)	89 (71.2%)
Non-Opioid Analgesics Only	87 (69.6%)	36 (28.8%)
Mean Analgesic Doses	2.1 ± 0.8	4.6 ± 1.3

Patients had a much greater need for opioid analgesics during gynecological surgery, particularly after open surgeries. The surgical intervention that involved minimally invasive surgery resulted in fewer doses of analgesic medication and more patients receiving only non-opioid analgesics for pain management during the first 24 hours after surgery, suggesting overall better postsurgical comfort and less pain in patients undergoing this type of surgery.

Table 4: Postoperative Recovery Outcomes

Variables	Minimally Invasive	Open Surgery
Mean Hospital Stay (Days)	2.3 ± 0.9	5.8 ± 1.5
Early Mobilization (<24 hrs)	104 (83.2%)	58 (46.4%)
Return to Daily Activities	7.2 ± 2.1 Days	14.5 ± 3.8 Days

The minimally invasive procedures patients had showed to have quicker recovery rates after surgery, when compared to those who received open surgical procedures. The minimally invasive group showed benefits such as shorter hospital stay, earlier mobilization and faster return to daily activities, thus highlighting the clinical benefits and enhanced recovery profile of less invasive surgical techniques.

Table 5: Postoperative Complications

Complications	Minimally Invasive	Open Surgery
Wound Pain	12 (9.6%)	42 (33.6%)
Nausea/Vomiting	18 (14.4%)	31 (24.8%)
Surgical Site Infection	4 (3.2%)	16 (12.8%)
Delayed Recovery	9 (7.2%)	38 (30.4%)

Those patients who underwent open gynecologic surgery had a higher incidence of postoperative complications. The open surgery group had more wound pain, nausea, and surgical site infections, and delayed recovery. The surgical results of the minimally invasive procedures showed a lower profile of complications and better efficiency with an improved postoperative profile.

DISCUSSION

Postoperative pain management is a key part of any surgery that can cause pain if not adequately managed, which can negatively impact patient recovery, length of hospital stays, patient mobilization and satisfaction with the healthcare experience. The present study aimed to compare the intensity of postoperative pain and the number of analgesics needed after minimally invasive gynecological surgery and open gynecological surgery (Huang et al., 2023). Results showed that postoperative pain scores were significantly lower in the patients who had undergone minimally invasive procedures, as were the amounts

of postoperative analgesics needed, hospital stay and the speed of recovery, when compared with those who had had open gynecological surgery (Luo et al., 2025). These advantages of less pain after minimally invasive surgery are most likely due to smaller surgical incisions, a more limited handling of tissue and less inflammatory reaction (Wang et al., 2025). Open gynecological surgeries, on the other hand, are more traumatic due to larger incisions made on the abdomen, and hence, more nociceptive stimulation and increased pain perception. Previous international studies have found similar results with laparoscopic gynecological surgeries resulting in a reduction of pain

intensity and an enhanced comfort level after surgery when compared to conventional laparotomy surgical procedures (Malik & Verma, 2024).

The level of postoperative pain measured with the Visual Analogue Scale (VAS) was found to be significantly lower in the minimally invasive group at 6, 12 and 24 hours after surgery in the present study (Choi et al., 2023). These results are clinically relevant since the early postoperative pain has a great impact on patient's mobility, respiratory function, quality of sleep, and emotional state. Decreased pain intensity makes it possible to get the patient out of bed earlier, which decreases the risk for postoperative complications, including deep vein thrombosis, pulmonary complications, and extended periods of bed rest (Payne et al., 2022).

The study also showed that a significant amount of opioid analgesic use was decreased for patients who underwent minimally invasive procedures. In this group, most patients were treated effectively with non-opioid analgesics and the patients who had undergone open surgery used much more opioid (Restaino et al., 2025). High doses of opioids can cause side effects such as nausea, vomiting, constipation, sedation, and depression of breathing. Thus, lower reliance on opioids during MI procedures is a significant benefit during the post-operative care and safety of patients (Manici et al., 2024).

The other significant discovery of this study was that those having minimally invasive procedures were admitted to the hospital for significantly shorter periods of time. This group was seen more often to be moving early and faster to return to normal activities. A better experience for patients and lower health system burden and cost is also achieved through shorter hospital stays. However, women who are having gynecological surgery particularly benefit from faster recovery as they will be able to resume family duties, return to work and normal social life earlier (Fuica et al., 2023).

There were also less postoperative complications in the minimally invasive group. Patients who had undergone an open gynecological procedure experienced greater pain at the wound site, wound infection, slow recovery and discomfort after the procedure. Minimally invasive surgery involves smaller incisions that help to minimize the risk of complications that could occur from the incisions and increase the cosmetic appeal. The findings further reinforce the trend in contemporary gynecological practice towards less invasive means (Atsumi et al., 2023).

Despite these benefits, certain complex clinical conditions like advanced pelvic malignancies, large uterine mass, severe adhesions and emergency surgery

still require open gynecologic surgery. Surgical approach selection should always be individualized based on the patient's condition, surgeon's experience and healthcare resources available. But, if possible, minimally invasive surgery should be recommended due to its good postoperative outcomes (Akyol & Özcan, 2024).

In the present study, valuable local evidence of the postoperative pain and analgesic outcomes related to gynecological surgery were obtained. There are however some limitations that should be pointed out: First, it is a single-centre study and, second, it is a short-term study. Given the small number of centres and a limited number of patients, more multicentre trials with more patients and longer follow-up are recommended for increased generalizability (Otake et al., 2022).

CONCLUSION

The present study found that minimally invasive gynecological procedures are significantly correlated with less postoperative pain and less analgesic use than are open gynecological procedures. Patients who had minimally invasive procedures had improved recovery, patient mobilization, shorter hospital stay, and fewer complications following the surgical procedure. Open procedures were correlated with higher pain intensity, higher opioid consumption and delayed recovery, on the other hand. The results indicate the advantages of minimally invasive surgical methods, both in terms of clinical outcomes and patient experience. When clinically possible, therefore, minimally invasive gynecological interventions should be considered to improve surgical recovery, minimize burden on healthcare systems and increase patients' comfort and satisfaction after surgery.

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