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

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Abstract

Background: One of the frequent problems after gynaecological surgery is postoperative pain which can have a significant impact on the patient's recovery, hospital stay and overall satisfaction. The use of minimally invasive gynaecological procedures such as Laparoscopic Surgery is growing in popularity as they have a smaller incision, less tissue trauma and quicker recovery time when compared to traditional open surgery. But, there are clinically significant differences between the two surgical techniques in terms of intensity of postoperative pain and the amount of analgesics needed to manage it effectively for patient care and better postoperative outcomes.

Objectives: 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.

Methods: Comparative cross-sectional study conducted in the Department of Gynecology and Obstetrics at a tertiary care centre over six months. 250 patients were included who underwent gynecological surgery. Patients were split into two groups: minimally invasive and open gynecological surgeries. Samples were calculated based on the formula recommended by WHO. Visual Analogue Scale (VAS) was used to determine the postoperative pain at 6, 12 and 24 hours. Other data such as analgesics requirements, length of hospital stay and postoperative complications were also collected and analyzed in 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.

Conclusions: 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; gynecological surgery; minimally invasive surgery; open surgery; analgesic requirement

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1. 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 [1]. 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 [2].

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 [3]. 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 [4].

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 [5]. 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 [6].

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 [7].

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 [8]. 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 [9].

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 [10].

1.1 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.

2. Methods

2.1 Study design and setting

The study is comparative in nature with cross sectional design and was carried out in the Department of Gynecology and obstetrics of tertiary care hospital within 6 months. 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.

2.2 Participants

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.

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.

2.3 Variables and measurement

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.

2.4 Sample size

A World Health Organization-recommended sample-size formula was used. The specific formula, assumptions, and calculation parameters were not provided in the source manuscript.

2.5 Statistical 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.

2.6 Ethical considerations

The source manuscript states that patients were included after approval from an institutional ethical review committee and that all participants provided written informed consent before study entry. The committee name, reference number, and approval date were not provided.

3. 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.

3.1 Participant characteristics

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. Participant characteristics are summarised in Table 1.

3.2 Postoperative pain

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. Pain scores at 6, 12, and 24 hours are presented in Table 2.

3.3 Analgesic requirements

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. Analgesic requirements are presented in Table 3.

3.4 Recovery outcomes

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. Recovery outcomes are summarised in Table 4.

3.5 Postoperative complications

Those patients who underwent open gyn ecologic 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. Postoperative complications are shown in Table 5.

4. 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 [11]. 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 [12].

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 [13]. 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 [14].

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 [15]. 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 [16].

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 [17]. 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 [18].

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 [19].

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 [20].

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 [21].

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 [22].

4.1 Strengths and limitations

The study provides local comparative evidence on postoperative pain, analgesic use, recovery, and complications in minimally invasive and open gynaecological procedures. As stated in the source manuscript, its main limitations are the single-centre design and short-term follow-up; multicentre studies with larger samples and longer follow-up were recommended [22].

4.2 Implications

The findings support consideration of minimally invasive approaches when clinically appropriate, while recognising that advanced pelvic malignancies, large uterine masses, severe adhesions, emergency surgery, surgeon experience, and available healthcare resources may necessitate or influence the choice of open surgery [21].

5. Conclusions

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.

Declarations

Ethics approval and consent to participate

The source manuscript states that institutional ethical review committee approval was obtained and that all participants provided written informed consent. The committee name, reference number, and approval date were not provided.

Consent for publication

Not stated in the source manuscript.

Availability of data and materials

Not stated in the source manuscript.

Competing interests

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Authors' contributions

The source manuscript identifies Adeel Asghar as the sole author; specific CRediT contribution roles were not provided.

Use of generative artificial intelligence

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Tables

Table 1. Demographic characteristics of patients.

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

Values are mean ± SD or n (%), as reported in the source manuscript. BMI, body mass index.

Table 2. Postoperative pain scores measured using the Visual Analogue Scale (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

Values are mean ± SD. VAS, Visual Analogue Scale.

Table 3. Analgesic requirements during the postoperative period.

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

Values are n (%) or mean ± SD, as applicable and as reported in the source manuscript.

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

Values are n (%) or mean ± SD, as applicable and as reported in the source manuscript.

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%)

Values are n (%) or mean ± SD, as applicable and as reported in the source manuscript.

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