

Impact of Anesthetic Protocols on Surgical Outcomes in Laparoscopic Gynecological Procedures Performed by General Surgeons

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Abstract: The general surgeon has performed more laparoscopic gynecological surgeries in recent times, especially where there has been a lack of gynecological services. Choice of anesthesia can affect postoperative pain, recovery, and safety during the operation. This present paper will investigate three modes of anesthesia in terms of the surgical results in the laparoscopic gynecological operation performed by general surgeons.

This cross-sectional study was conducted among 111 female patients, and assigned the patients to standard general anesthesia (GA; n = 42), GA with ultrasound-guided transversus abdominis plane (TAP) block (n = 39), or multimodal opioid sparing total intravenous anesthesia (TIVA; n = 30). The main outcome was postoperative pain (measured using VAS) at 2, 6, and 24 hours. The secondary outcomes were include surgical time, blood loss, conversion to open surgery, complication rate, postoperative nausea and vomiting (PONV), need for pain relief, ambulation time, and length of hospital stay.

The outcomes of the study indicated that pain levels were lower in TAP block and TIVA than in standard GA, at 2 hours (3.6 ± 1.0 in TAP and TIVA vs 5.8 ± 1.4 in standard GA), as well as at other follow-up times (6 hours and 24 hours). The use of rescue analgesics was reported in 59.5% of patients in the standard GA group and only in 30.8% and 33.3% in the case of TAP block and TIVA, respectively. PONV occurred least frequently in patients on TIVA (6.7 vs 33.3 in the case of standard GA). Open conversions were observed in 14.3%, 10.3%, and 0% of examined patients, respectively.

Thus, the findings suggest that the use of regional anesthetic techniques, like TAP block, is more effective than modes of general anesthesia (like TIVA) and that it can keep patients free of the need in rescue analgesics.

Keywords: Laparoscopy, Gynecological Surgery, Anesthesia Techniques, Postoperative Pain, and PONV.

Introduction

Minimally invasive surgery is now the standard of treatment for several benign gynecological conditions like ovarian cysts, ectopic pregnancy, pelvic adhesions, and some hysterectomies. Laparoscopic surgery causes less postoperative pain, lower risks of complications, shorter recovery periods, and quicker return

to normal life as compared to conventional surgery [1], [2].

In addition, in places where there are few specialists in gynecology or in emergencies, these procedures are conducted by general surgeons who have sufficient experience in minimally invasive surgery [3].

While laparoscopic surgery decreased physical trauma, patients suffer from pain post-operatively due to the incisions, pneumoperitoneum, stretching of the peritoneum, and shoulder pain [4]. Post-operative nausea and giving rise to vomiting are among the leading causes of delayed releases of patients [5]. Anesthesia protocol plays an important role in determining the quality of post-operative recovery as well as surgical outcomes and conditions that prevail during surgery [6].

Various methods are utilized in modern usage today. One example of a method that is popular among anesthesiologists is standard balanced anesthesia, which involves the use of expensive anesthetic gasses and dangerous opioids. In order for anesthesiologists to overcome the challenges posed by opioid-related problems, they resort to regional techniques such as the TAP block that provide the effect of pain relief in the abdominal wall [7].

According to studies of multimodal, opioid-sparing total intravenous anesthesia (TIVA) that routinely involves using propofol along with various adjuncts, including lidocaine, ketamine, dexmedetomidine, and non-opioid analgesics, they have been shown to help achieve less incidence of PONV as well as quicker recovery [8].

Methods

The study was a cross-sectional type undertaken in hospitals located in different hospitals in Iraq between the months of June 2025 and June 2026. Both elective and emergency laparoscopic surgeries were included in this study. These surgeries included diagnostic laparoscopy, ovarian cystectomy, and salpingectomy for ectopic pregnancies, adhesiolysis, and laparoscopic hysterectomies. Patients who had ASA IV classification or above and patients who were in their third trimesters of pregnancy and were allergic to agents used in the study were left out of the study. Thus, 111 patients took part in the study.

Group A involved the use of general anesthesia (GA) as an anesthetic method (n=42). Propofol was used in the induction process, and then the patient was maintained under GA procedure by using a volatile agent which was followed by the input of an opioid for post-operative application in Group A B (GA + TAP Block) (n=39). Group C also used total intravenous anesthesia for the same procedure. All procedures involved the use of antiemetic drugs for patients before the surgeries and used non-opioid analgesics after surgery.

The main objective of the study was measuring the postoperative pain levels via a visual analogue scale (VAS) ranging from zero to ten at two, six, and twenty-four hours. The secondary outcomes were the time of surgery, the estimated blood loss, conversion to open surgery, any intra or early postoperative complications, the need for rescue analgesics, and PONV, as well as the time it took for the first ambulation, the duration of hospital stay, and the prolonged stay of three days or more. To define the composite adverse surgical outcome, we considered the appearance of any complications, conversion to open surgery, or prolonged hospital stay.

Data on demographic, clinical, anesthetic, surgical, and follow-up aspects were derived from clinical files at different hospitals in Iraq. Full treatment of all consecutive individuals who satisfied the eligibility requirements was done during the set time frame of investigation, making it a sample numbered at n = 111.

Data were expressed as mean $\pm$ SD or median with interquartile range, as required. Obtaining preceding events requiring surgical intervention was made applying univariable and multivariable binary logistic regression analysis. The significance level for the calculations was set at a p-value <0.05 . Data processing was accomplished with the help of SPSS version 26.0 software.

Results

Table 1. Enrollment the demographic and basic features of 111 patients in this cross-sectional study.

Variable	All (n=111)	Standard GA (n=42)	GA + TAP block (n=39)	Multimodal TIVA (n=30)	p-value
Age, years — mean ± SD	38.4 ± 8.7	40.0 ± 8.4	36.4 ± 9.7	38.9 ± 7.5	0.166
Age, years — median (IQR)	39.1 (32.3–44.9)	41.9 (34.8–45.3)	35.7 (30.2–43.3)	40.2 (33.6–44.1)	
BMI, kg/m ² — mean ± SD	26.9 ± 3.9	27.3 ± 4.4	27.5 ± 3.1	25.4 ± 3.9	0.055
BMI, kg/m ² — median (IQR)	27.4 (24.5–29.4)	27.5 (25.0–29.9)	27.6 (25.9–29.2)	25.5 (22.8–28.5)	
ASA physical status, n (%)					
ASA I	49 (44.1%)	18 (42.9%)	14 (35.9%)	17 (56.7%)	0.222
ASA II	53 (47.7%)	19 (45.2%)	22 (56.4%)	12 (40.0%)	0.368
ASA III	9 (8.1%)	5 (11.9%)	3 (7.7%)	1 (3.3%)	0.389
Procedure type, n (%)					
Diagnostic laparoscopy	24 (21.6%)	8 (19.0%)	8 (20.5%)	8 (26.7%)	0.615
Ovarian cystectomy	31 (27.9%)	11 (26.2%)	12 (30.8%)	8 (26.7%)	
Salpingectomy/ectopic	22 (19.8%)	6 (14.3%)	10 (25.6%)	6 (20.0%)	
Adhesiolysis	14 (12.6%)	5 (11.9%)	5 (12.8%)	4 (13.3%)	
Laparoscopic hysterectomy	20 (18.0%)	12 (28.6%)	4 (10.3%)	4 (13.3%)	

Table 2. Intraoperative outcomes.

Variable	Standard GA (n=42)	GA + TAP block (n=39)	Multimodal TIVA (n=30)	p-value
Operative time, min — mean ± SD	82.1 ± 39.1	59.0 ± 26.0	61.2 ± 28.7	0.003
Operative time, min — median (IQR)	69.3 (55.0–108.7)	55.5 (38.3–67.5)	54.9 (40.3–67.3)	
Estimated blood loss, mL — mean ± SD	42.8 ± 47.2	31.7 ± 30.0	32.9 ± 33.7	0.430
Estimated blood loss, mL — median (IQR)	28.1 (13.9–45.3)	22.1 (10.4–43.2)	20.9 (12.5–34.0)	
Conversion to open surgery, n (%)	6 (14.3%)	4 (10.3%)	0 (0.0%)	0.031
Intra-/early postoperative complications, n (%)	4 (9.5%)	5 (12.8%)	2 (6.7%)	0.689
Time to first ambulation, h — mean ± SD	5.8 ± 1.8	4.9 ± 1.7	4.9 ± 1.4	0.018
Time to first ambulation, h — median (IQR)	5.4 (4.6–6.2)	4.7 (3.7–5.9)	4.6 (4.1–5.2)	

Table 3. Post-operative findings.

Variable	All (n=111)	Standard GA (n=42)	GA + TAP block (n=39)	Multimodal TIVA (n=30)	p-value
Postoperative pain (VAS 0–10)					
Pain at 2 h — mean ± SD	4.5 ± 1.6	5.8 ± 1.4	3.6 ± 1.0	3.9 ± 1.1	<0.001
Pain at 2 h — median (IQR)	4.4 (3.3–5.4)	5.5 (5.1–6.5)	3.6 (3.0–4.3)	3.8 (3.1–4.8)	
Pain at 6 h — mean ± SD	3.8 ± 1.4	4.5 ± 1.2	3.1 ± 1.2	3.6 ± 1.4	<0.001
Pain at 6 h — median (IQR)	3.8 (2.7–4.8)	4.5 (3.6–5.4)	3.0 (2.2–4.2)	3.5 (2.6–4.4)	
Pain at 24 h — mean ± SD	2.7 ± 1.2	3.4 ± 1.1	2.1 ± 1.1	2.4 ± 1.1	<0.001
Pain at 24 h — median (IQR)	2.6 (1.9–3.5)	3.4 (2.6–4.3)	2.1 (1.4–2.7)	2.4 (1.7–3.2)	
Other postoperative outcomes					
Rescue analgesia required, n (%)	47 (42.3%)	25 (59.5%)	12 (30.8%)	10 (33.3%)	0.016
PONV, n (%)	26 (23.4%)	14 (33.3%)	10 (25.6%)	2 (6.7%)	0.029
Hospital stay, days — mean ± SD	1.9 ± 0.9	2.1 ± 1.0	1.7 ± 1.0	1.8 ± 0.8	0.066
Hospital stay, days — median (IQR)	2.0 (1.0–2.0)	2.0 (2.0–2.8)	2.0 (1.0–2.0)	2.0 (1.0–2.0)	
Prolonged stay (≥3 days), n (%)	22 (19.8%)	11 (26.2%)	5 (12.8%)	6 (20.0%)	0.321

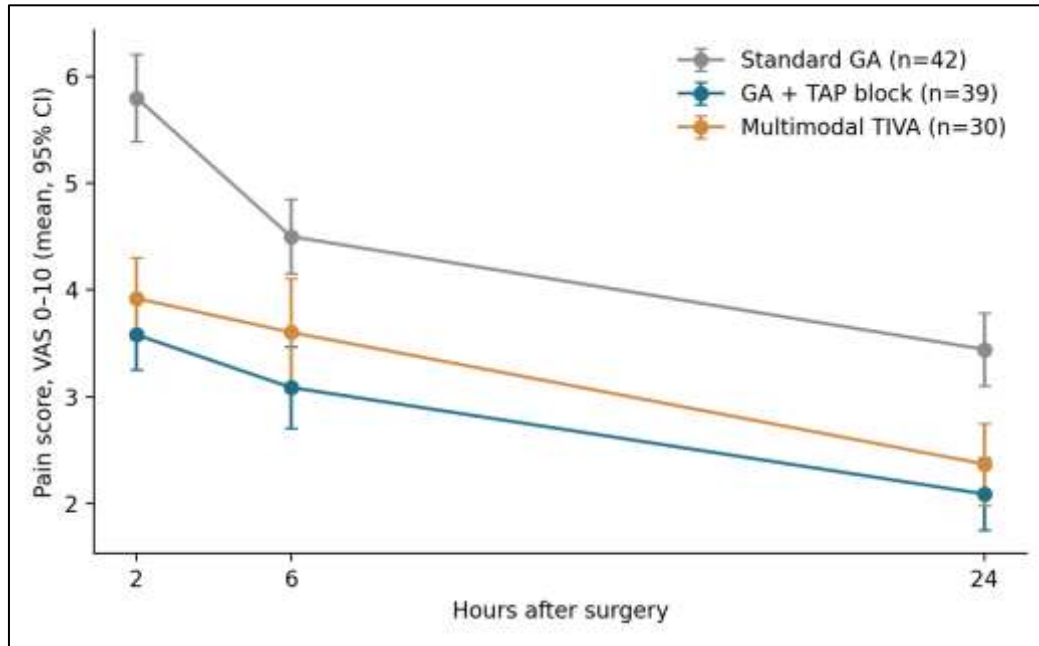


Figure 1. Outline pain scores after operative by VAS.

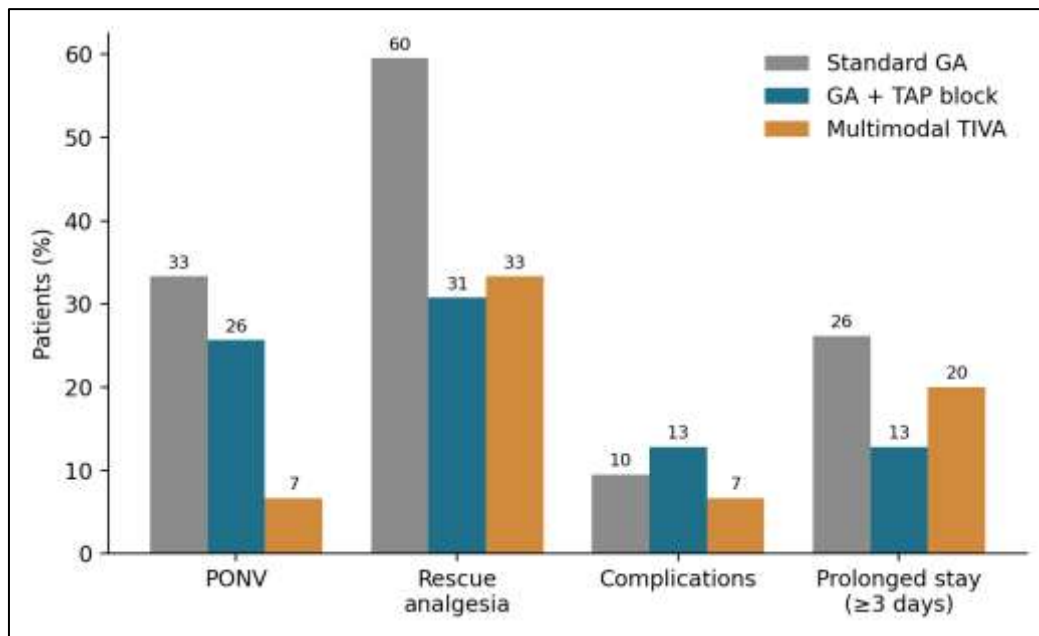


Figure 2. Postoperative anesthetic outcomes.

Table 4. A multivariable logistic regression in predicting adverse factors that caused adverse outcomes.

Predictor	Adjusted OR (95% CI)	p
Age (per year)	1.05 (1.00–1.10)	0.069
BMI (per kg/m ²)	0.94 (0.84–1.05)	0.295
ASA III vs I–II	4.53 (1.00–20.48)	0.050
Hysterectomy vs other	5.57 (0.74–41.74)	0.095
Operative time (per 10 min)	0.86 (0.68–1.10)	0.237
GA + TAP block vs Standard GA	0.69 (0.25–1.92)	0.473
Multimodal TIVA vs Standard GA	0.47 (0.15–1.44)	0.188

Discussion

The study defined 111 female candidates undergoing minimally invasive gynecological surgery performed by general surgeons, classified according to anesthesia method: conventional general anesthesia (GA, $n = 42$), combined GA with ultrasound-guided transversus abdominis plane (TAP) block ($n = 39$), and multimodal, opioid-sparing total intravenous anesthesia (TIVA; $n = 30$). The mean age was 38.4 ± 8.7 years, and BMI was 26.9 ± 3.9 kg/m². There were no differences in the groups in terms of age, BMI, ASA classification, and surgical procedures (all $p > 0.05$) [9].

The operative duration varied considerably from one group to another ($p = 0.003$), indicating a greater proportion of long procedures experienced in the standard GA group rather than due to anesthesia (Table 2). The blood loss was comparable among the groups ($p = 0.430$). Conversion to open surgery was witnessed in ten cases (9.0%), which was more prominent in the standard GA group ($p = 0.031$). The time until the first ambulation was least in the TAP block or TIVA groups ($p = 0.018$) [10], [11].

All of the postoperative pain scores obtained at 2, 6, and 24 hours (270) were found to be significantly lower in case of TAP and TIVA groups than in the standard GA group (all $p < 0.001$). Analgesics were required for 25 (59.5%) patients of standard GA group, which is significantly higher in comparison to only 12 (30.8%) for TAP and 10 (33.3%) for TIVA ($p = 0.016$). Post-operative nausea and vomiting was much less in the case of TIVA as compared to other anesthetic groups ($p = 0.029$) [12], [13].

An adverse surgical outcome was defined as a composite of any complication in addition to open surgery, or a prolonged hospital stay (≥ 3 days) and was observed in 38 out of 111 patients (34.2%).

The group of laparoscopic gynecological surgeries done by general surgeons stated that both TAP block and multimodal opioid-sparing TIVA strategies exhibited a marked increase in early recovery post-operatively as compared to standard general anesthesia [14]. The drop in VAS scores at 2 hours was more than two points; this threshold is generally accepted to be above the minimal clinically important difference concerning acute postoperative pain. These advantages were in conjunction with a dramatically reduced requirement for the use of rescue analgesics, a lower incidence of PONV when TIVA was used, and shorter time elapsed until the first ambulation [15].

Moreover, the remarkable pain relief attained with TAP block complies with its mechanism of action since it prevents stimulation of thoracolumbar nerves that serve the front wall of the abdomen. Hence, TAP block ameliorates soma pain, which is considerably present following laparoscopic surgery. Meanwhile, it should be taken into account that TAP block has no effect on visceral pains as well as shoulder tip pains and that the explanation for mild pain sensations in several patients can also be attributed to this point [16], [17].

Moreover, the TIVA (total intravenous anesthesia) group was associated with the lowest incidence of PONV (6.7%) in contrast to the conventional anesthesia group (33.3%). This is supported by studies which find that anesthesia that is combined with prophylaxis, as well as avoidance of volatile agents and nitrous oxide, leads to increased chances of avoiding PONV events in patients. Young females undergoing laparoscopic gynecological procedures already have a significant baseline risk; thus, even moderate reductions in absolute terms could be beneficial and allow for higher levels of patient satisfaction [18], [19].

The duration of the operation varies from one group to another, but it seems to illustrate a greater occurrence of long-term surgeries (for instance, hysterectomy and adhesiolysis) in case of general anaesthesia as the timings of the operation was not recommended by other factors determining the adverse outcomes in the multifactor model. Equally important is to cautiously interpret the lower conversion rate using TIVA anaesthesia (0% in contrast to 14.3% in case of general anaesthesia), which was achieved due to a small number of cases, leading to confounding by the severity of the cases [20].

When analyzing the multivariable model, we found that ASA class III was found to be the best predictor of composite adverse outcomes (OR adjusted 4.53; 95% CI 1.0020.485; $p = 0.050$). The anesthetic protocol did not come to significance; however, point estimates indicated that TAP block (adjusted OR 0.69) and especially TIVA (adjusted OR 0.47) were favored. The wide confidence intervals, low discrimination (AUC = 0.71), and non-significant overall model fit ($p = 0.065$) suggest that the analysis

was underpowered and needs to be seen as hypothesis-generating only.

Conclusion

The use of TAP block and a multimodal opioid-sparing form of TIVA was linked with less pain after surgery and lower use of analgesics in laparoscopic operations of women performed by general surgeons relative to conventional general anesthetics, while TIVA was probably also connected to less postoperative nausea and vomiting. There were not significant differences between the groups of patients treated according to both methods with respect to blood loss, complication rates and length of stay.

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