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Original Research Article

Impact of transversus abdominis plane block on early postoperative pain following laparoscopic sleeve gastrectomy: a randomized controlled trial

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ABSTRACT

Background: Effective analgesia after laparoscopic sleeve gastrectomy is essential to facilitate early recovery. The transversus abdominis plane (TAP) block has been proposed to reduce postoperative pain, but evidence remains variable.
Methods: Authors conducted a randomized controlled trial including 71 patients undergoing laparoscopic sleeve gastrectomy. Participants were randomly allocated to receive a TAP block (n=36) or no TAP block (n=35). Baseline variables included age, sex, weight, height, body mass index, and comorbidities. Postoperative pain was assessed using a visual analog scale (VAS) at 2, 4, 6, 12, and 24 hours. Groups were compared using appropriate inferential tests according to data distribution; categorical variables were compared using chi-square/Fisher's exact test. Statistical significance was set at $p<0.05$.
Results: Baseline characteristics were comparable between groups (all $p>0.05$), including sex distribution (female: 75.0% vs 74.3%; p=1.00) and presence of comorbidities (50.0% vs 45.7%; p=0.90). Postoperative VAS scores were similar at all time points: 2 hours (median 6 (IQR 5–8) vs 6 (5–8); p=0.83), 4 hours (5 (4–6) vs 5 (3–7); p=0.97), 6 hours (4 (3–5) vs 4 (2–5.5); p=0.96), 12 hours (2 (0.75–3) vs 3 (1.5–4.5); p=0.16), and 24 hours (2 (0–2) vs 2 (0–3); p=0.50).
Conclusions: In this randomized trial, TAP block did not significantly reduce early postoperative pain within the first 24 hours after laparoscopic sleeve gastrectomy compared with no TAP block.

Keywords: Transversus abdominis plane block, Laparoscopic sleeve gastrectomy, Postoperative pain, Regional anesthesia, Randomized controlled trial

INTRODUCTION

Bariatric surgery is increasingly performed worldwide, with laparoscopic sleeve gastrectomy (LSG) becoming one of the most common procedures.[1] Although the minimally invasive approach reduces surgical trauma compared to open surgery, patients often experience significant postoperative pain, which can impair deep breathing and delay ambulation.[2] Inadequate analgesia in this population may increase the risk of pulmonary complications (e.g., atelectasis, hypoventilation) and thromboembolism due to immobility. At the same time, reliance on systemic opioids is problematic, as obese patients are more susceptible to opioid-related adverse effects, including respiratory depression, somnolence, paralytic ileus, and nausea, potentially prolonging

recovery.[3] As a result, ERAS protocols promote multimodal, opioid-sparing analgesic strategies using non-opioid drugs and regional techniques.[3] The TAP block has emerged as a promising option within this paradigm.[3] The TAP block involves injection of local anesthetic between the internal oblique and transversus abdominis muscles to anesthetize lower thoracoabdominal nerves.[4] By targeting somatic innervation of the anterior abdominal wall, TAP blocks can reduce incisional pain.[4] Over the past decade, their use has expanded in laparoscopic abdominal surgeries, with reports of improved pain control and reduced opioid needs.[5] For example, in laparoscopic cholecystectomy and ventral hernia repair, adjunct TAP blocks significantly reduced early postoperative pain and opioid use versus standard analgesia.[4,5] Given that parietal pain from trocar sites is a major contributor to post-LSG discomfort, TAP blockade could facilitate recovery in this setting. Furthermore, unlike neuraxial analgesia, TAP blocks are relatively easy to perform and avoid hemodynamic instability-particularly advantageous in morbidly obese patients.[6]

However, the clinical benefit of TAP blocks after LSG remains uncertain.[5] Some RCTs report reduced pain and opioid use in the first 24-48 hours.[2] For example, Okut et al showed that bilateral TAP blocks lowered VAS scores at 6, 12, and 24 hours, and reduced opioid consumption.[2] In contrast, other studies found little to no benefit. Saber et al, reported no significant differences in pain scores beyond the immediate postoperative period within an ERAS setting.[7] Similarly, Mongelli et al found that laparoscopic-assisted TAP blocks offered no superiority over port-site infiltration: pain scores, opioid use, antiemetic needs, and satisfaction were equivalent.[8] Given these mixed findings, the clinical utility of TAP blocks in LSG remains debated. Authors therefore aimed to evaluate their impact in a controlled setting using a standardized multimodal analgesia protocol, to clarify their role in bariatric perioperative care.

METHODS

Study design and participants

This randomized controlled trial was conducted between February 2024 and March 2025 in adult patients undergoing elective laparoscopic sleeve gastrectomy. Eligible patients were consecutively enrolled and randomly assigned to either a TAP block group or a no TAP block group. Exclusion criteria included refusal to participate, known allergy to local anesthetics or study medications, chronic opioid use, or incomplete postoperative pain assessment.

Randomization

Participants were randomly assigned in a 1:1 ratio using a simple randomization sequence. Group allocation was revealed after induction of general anesthesia.

Surgical technique

All procedures were performed using a standardized laparoscopic sleeve gastrectomy technique by the same surgical team, following institutional protocols. No local anesthetic infiltration was performed at trocar sites in either group, allowing any analgesic differences to be attributed solely to the TAP block.

TAP block technique

In the TAP group, bilateral blocks were administered before the surgical procedure using 20 ml of 0.75% ropivacaine per side, without adjuvants. The no TAP block group did not receive any regional anesthesia.

Postoperative analgesia protocol

Both groups received scheduled multimodal analgesia consisting of ketorolac, metamizole sodium (dipyrone), and morphine at fixed intervals per institutional protocol. No additional analgesics were administered.

Pain assessment

Postoperative pain was assessed using a visual analog scale (VAS) ranging from 0 (no pain) to 10 (worst imaginable pain). VAS scores were recorded at 2, 4, 6, 12, and 24 hours postoperatively by trained personnel blinded to group assignment.

Data collection

Collected variables included age, sex, weight, height, body mass index (BMI), comorbidities, and VAS pain scores at the specified time points.

Statistical analysis

Data were analyzed using standard statistical software. Normality of continuous variables was assessed with the Shapiro–Wilk test. Age, weight, height, and BMI (normally distributed) were compared using Student's t test. VAS scores (non-normally distributed) were compared using the Mann–Whitney U test. Categorical variables (sex, comorbidities) were compared using chi-square or Fisher's exact test, as appropriate. A p value <0.05 was considered statistically significant.

Ethical considerations

The study was conducted in accordance with the Declaration of Helsinki. All participants provided written informed consent before enrollment.

RESULTS

A total of 71 patients were included in the final analysis: 36 in the TAP block group and 35 in the no TAP block

group. All randomized patients completed postoperative pain assessments.

Baseline characteristics

Baseline demographic and clinical characteristics were comparable between groups (Table 1). No statistically significant differences were observed in age, sex, weight, height, body mass index (BMI), or the presence of comorbidities (all p>0.05).

Postoperative pain assessment

Postoperative visual analog scale (VAS) pain scores are presented in Table 2 and illustrated in Figure 1. No statistically significant differences were found at any evaluated time point.

At 2 hours postoperatively, median VAS scores were comparable between the TAP and no TAP groups (p=0.83), and remained similar at 4 hours (p=0.97) and 6 hours (p=0.96). Although a trend toward lower VAS scores was noted in the TAP group at 12 hours, the difference was not statistically significant (p=0.16). At 24 hours, pain scores were again similar in both groups (p=0.50). No differences were observed in the overall pain trajectory during the first 24 hours after surgery.

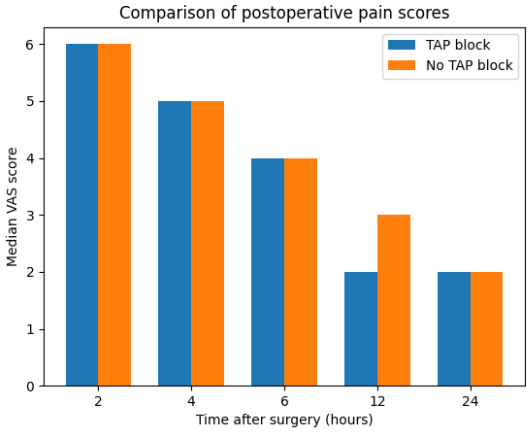

Figure 1: Comparison of postoperative pain scores between groups.

Table 1: Baseline demographic and clinical characteristics of patients undergoing laparoscopic sleeve gastrectomy.

Variable	TAP block (n=36)	No TAP block (n=35)	P value
Age (in years), mean±SD	35.7±9.4	37.3±8.9	0.46
Female sex, n (%)	27 (75.0)	26 (74.3)	1.00
Weight (kg), mean±SD	120.6±18.7	123.1±19.4	0.58
Height (m), mean±SD	1.65±0.08	1.66±0.07	0.62
Body mass index (kg/m²), mean±SD	44.2±5.8	44.6±6.1	0.78
Comorbidities, n (%)	18 (50.0)	16 (45.7)	0.90

Table 2: Comparison of postoperative pain scores measured by visual analog scale (VAS) between groups.

Time after surgery	TAP block (n=36)	No TAP block (n=35)	P value
2 hours, median (IQR)	6 (5–8)	6 (5–8)	0.83
4 hours, median (IQR)	5 (4–6)	5 (3–7)	0.97
6 hours, median (IQR)	4 (3–5)	4 (2–5.5)	0.96
12 hours, median (IQR)	2 (0.75–3)	3 (1.5–4.5)	0.16
24 hours, median (IQR)	2 (0–2)	2 (0–3)	0.50

DISCUSSION

In this randomized trial, the addition of a TAP block did not produce a clinically or statistically significant reduction in postoperative pain after LSG. Pain scores at all measured time points were comparable between the TAP and no TAP block groups. These findings are consistent with prior studies questioning the analgesic efficacy of TAP blocks in bariatric surgery. Saber et al. reported no sustained analgesic benefit beyond 3 hours postoperatively, and no differences in opioid use or length of stay were observed in their cohort.[7] Similarly, Mongelli et al. found that a TAP block offered no advantage over local port-site infiltration in a double-blind RCT of 113 patients.[8] The study extends these findings by showing that, even without infiltration, TAP does not enhance analgesia when systemic multimodal protocols are in place.

Several factors may explain the lack of additional benefit. All patients were managed under an ERAS protocol with scheduled non-opioid analgesics and morphine, which likely minimized any incremental gain from TAP. Saber et al also attributed their negative findings to a robust baseline analgesic regimen.[7] Furthermore, no local infiltration was performed at trocar sites in either group, emphasizing that systemic control alone was sufficient. TAP blocks primarily target somatic incisional pain, which may already be well-covered under ERAS protocols, rendering the block redundant. Another limitation of TAP is its anatomical scope. While it

anesthetizes thoracoabdominal nerves (T6–L1), it does not address visceral or referred pain components.[4] LSG pain is multifactorial incisional, visceral, and referred shoulder pain from pneumoperitoneum all contribute.[2] Thus, a block targeting only somatic pathways may not significantly affect overall pain scores. This is echoed in recent investigations into broader-coverage blocks like the quadratus lumborum (QL) block, which may extend into the paravertebral space.[9] However, even here, RCTs have shown no clear superiority of QL over TAP in LSG.[10]

While our results did not demonstrate a statistically significant benefit, they do not negate the modest improvements reported in meta-analyses. Davey et al. found a ~1-point VAS reduction at multiple timepoints across 11 RCTs.[5] Filardi et al reported an average 30 mg morphine-equivalent reduction within 24 hours.[3] However, these benefits may lack clinical impact in ERAS settings, where baseline analgesia is already optimized. Detecting sub-1 point differences would require a much larger sample size than our 71 patients. The 2021 meta-analysis found no benefit, while only recent pooled data from 2024–2025 suggest slight gains.[11] This raises valid questions about cost-effectiveness and practicality in routine use. Beyond pain scores, we did not observe differences in recovery milestones. Although not formally measured in morphine equivalents, the need for rescue analgesia appeared similar in both groups. Consistent with Mongelli et al and Saber et al no significant effects on ambulation or PONV were attributable to TAP use.[7,8] A prior meta-analysis had suggested improvements in these parameters[11] but the ERAS setting included standard PONV prophylaxis and early mobilization in all patients, potentially masking additional TAP-related benefits.[11] Similarly, while Davey et al reported higher satisfaction scores with TAP, we did not assess this formally, though both groups reported high subjective comfort.[5]

Considering the totality of evidence, the TAP block should be viewed as an optional adjunct in LSG. It remains a safe and effective tool for somatic analgesia and may benefit select patients with opioid sensitivity or inadequate systemic control. Its utility may be greater in settings where neuraxial techniques are contraindicated. However, when multimodal analgesia is properly implemented, routine TAP use may not yield additional benefit. Future research should investigate extended analgesia options, such as liposomal bupivacaine or continuous TAP infusions, and directly compare alternative blocks (QL, ESP) for both visceral and somatic pain relief.[12]

CONCLUSION

In conclusion, within an ERAS-based analgesic regimen, TAP blocks did not significantly improve early postoperative pain after LSG. These findings contribute to growing evidence that while TAP can be a helpful component of multimodal analgesia, its routine use should be tailored to institutional protocols, resource availability, and patient-specific factors.

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