



Efficient Pain Management After MBS: Investigating the Efficacy of Laparoscopic-Assisted Transversus Abdominis Plane Block Technique

A Single-Blind, Randomized Controlled Study on the Efficacy of Laparoscopically Assisted Transversus Abdominis Plane Block for Post-Bariatric Pain Relief

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Background: Perioperative Pain Management in Bariatric Surgery

01. Clinical Significance of Pain Control

Post-operative pain remains a challenging issue for bariatric surgery

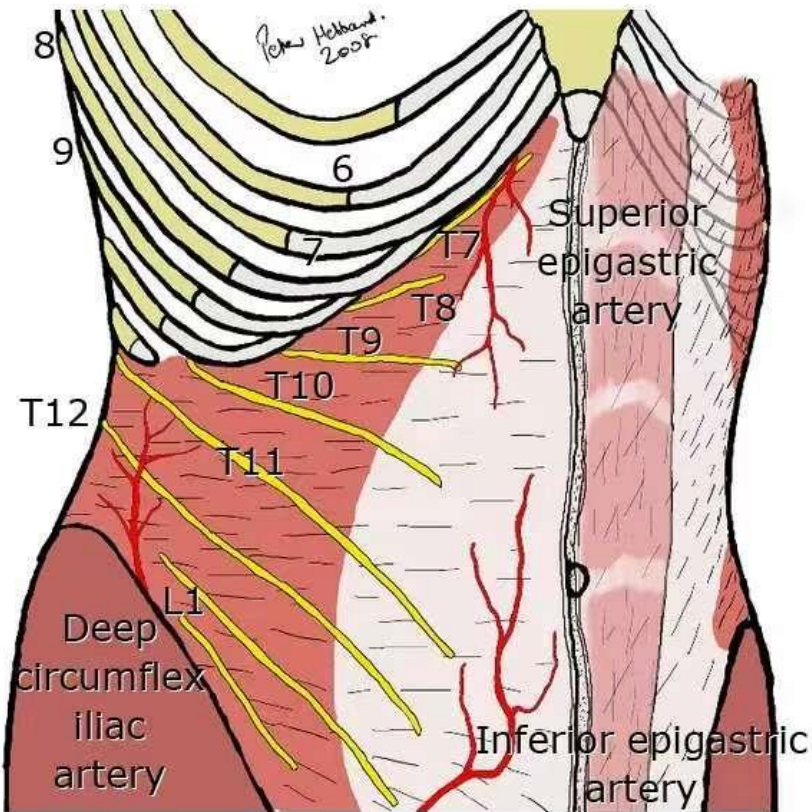
Optimal analgesia not only alleviates discomfort but also accelerates postoperative recovery, reduces pulmonary complications, and shortens hospital stay

02. U-TAP: A Standard Analgesic Technique

Ultrasound-guided Transversus Abdominis Plane (U-TAP) block is a widely used method for abdominal wall surgery.

It targets the fascial plane between the internal oblique and transversus abdominis muscles, delivering local anesthetics

Anatomical Basis: Transversus Abdominis Plane (TAP)



Abdominal Wall Anatomy Schematic

Figure 1. Cross-sectional view illustrating the TAP as the potential space between the internal oblique (IO) and transversus abdominis (TA) muscles, the key target for abdominal wall analgesia.

01. Definition

TAP is a distinct fascial plane situated between internal oblique muscle and transversus abdominis muscle, extending bilaterally from the midaxillary line to the rectus sheath.

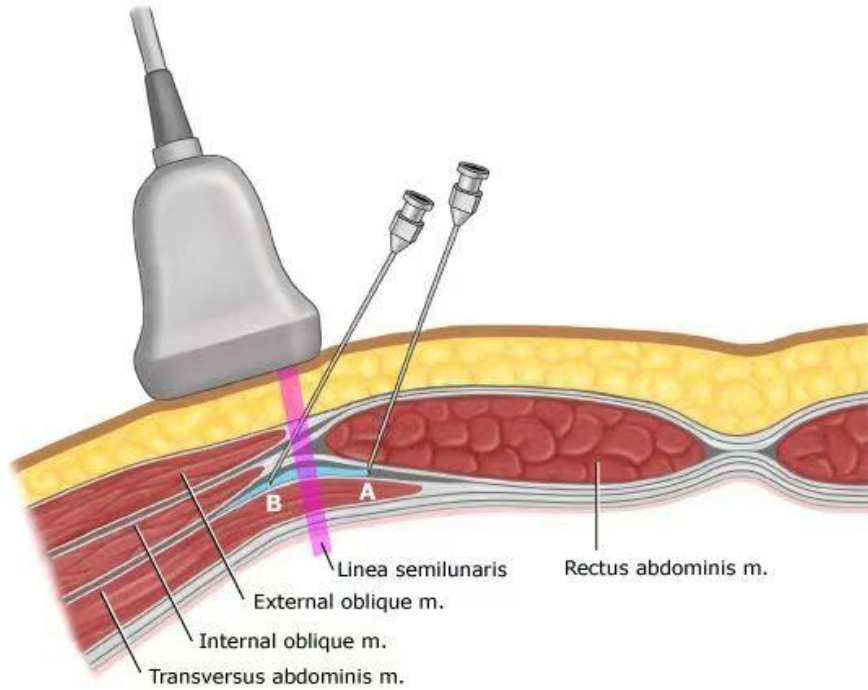
02. Key Physiological Roles

- ⚙️ **Neural Passage:** Contains the anterior rami of T7-L1 spinal nerves, which innervate the somatic sensation of the anterior and lateral abdominal wall.
- 📌 **Analgesic Target:** Local anesthetic injection here blocks afferent nociceptive signals, providing effective analgesia for abdominal surgery

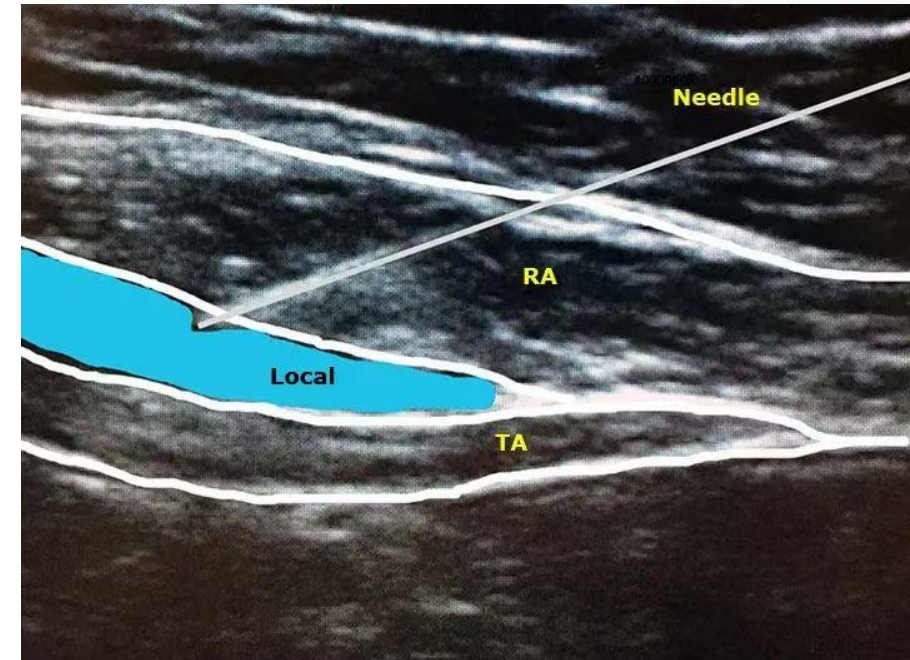
[1] Rafi AN. Abdominal field block: a new approach via the lumbar triangle. *Anaesthesia*. 2001;56(10):1024–1026.

[2] Hebbard P, et al. Ultrasound-guided transversus abdominis plane block: a cadaveric and radiological evaluation. *Reg Anesth Pain Med*. 2006;31(1):91–95.

Traditional Technique: Ultrasound-Guided TAP (U-TAP)



• **Localization:** A linear ultrasound probe is used to visualize TAP



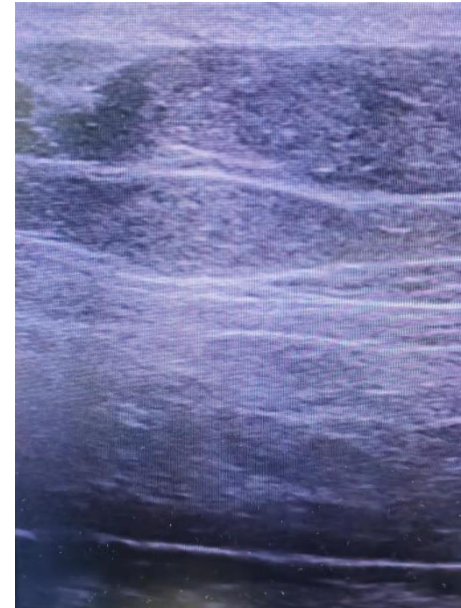
Injection: An needle insertion is performed to deliver local anesthetic directly into the identified TAP, ensuring spread across the abdominal wall

Critical Limitation of U-TAP in Obese Patients

- ✓ In obese individuals, excessive subcutaneous fat thickens the abdominal wall, making muscle layers indistinct under ultrasound.
- ✓ significantly increasing technical difficulty, prolonging procedure time, and reducing the accuracy of needle placement in the application of U-TAP.



The B-ultrasound image shows clear layering of the abdominal wall muscles. (BMI33.2)



The ultrasound image shows unclear layering of the abdominal wall muscles. (BMI42.2)

Innovative Technique: Laparoscopic-assisted TAP (L-TAP)

01. The 'Four-Point Method' Puncture Sites

A1 (Left Anterior): At left anterior axillary line, just below the subcostal margin (targeting lateral TAP).

A2 (Left Posterior): At left midaxillary line, level with the umbilicus (targeting posterior TAP).

B1 & B2 (Right Side): Mirrored puncture sites on the right hemibody for symmetric analgesia coverage.

02. Anesthetic Agent & Dosage

0.375% Ropivacaine Hydrochloride (20 mL per hemiabdomen).
This concentration balances prolonged sensory block with minimal motor impairment, optimizing postoperative recovery



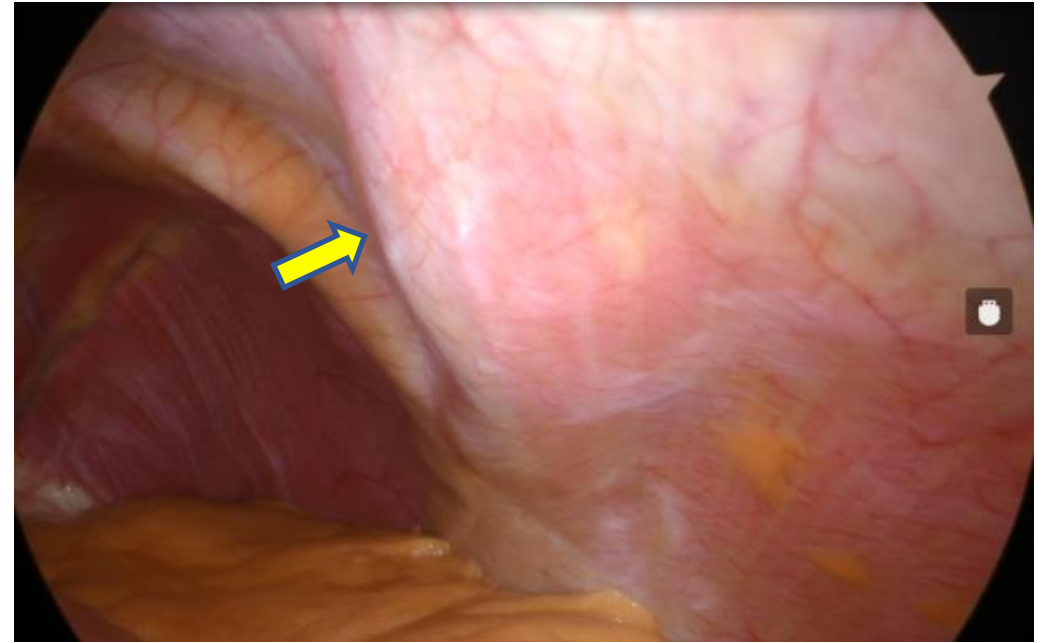
procedure of L-TAP





Peritoneal flatness before L-TAP

Laparoscopic confirmation of a flat, intact peritoneum. This step rules out adhesions and confirms the correct intraperitoneal space



Doyle Convex sign after L-TAP

Visual confirmation of peritoneal bulging post-injection, verifying proper anesthetic spread within the TAP plane for effective analgesia

Study Design

01. Trial Overview

- Type: Single-center, prospective, randomized parallel-controlled trial.
- Ethics No.: 20230018
- Reg. No.: ChiCTR2300073140

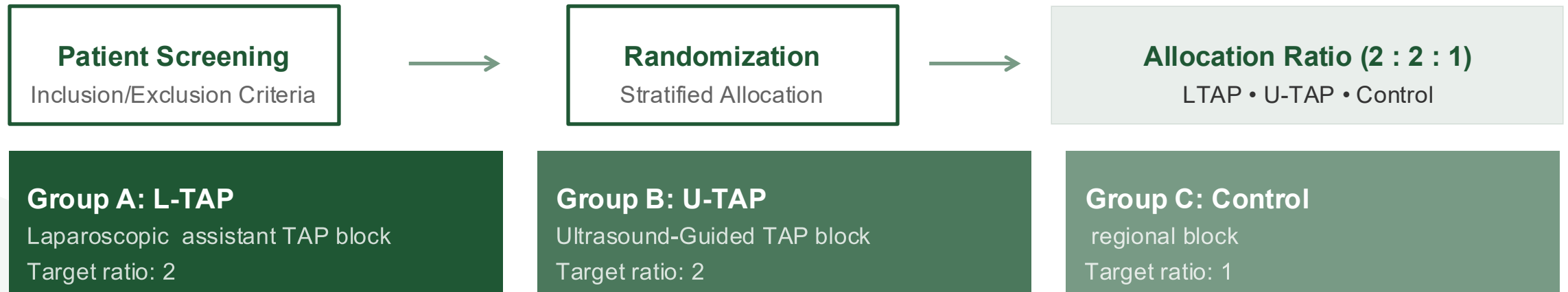
02. Primary Endpoint

- 24-hour VAS pain score (rest + activity) following sleeve gastrectomy
- evaluating immediate postoperative analgesic effectiveness

03. Secondary Endpoints

- Block procedure time & opioid consumption
- Time to ambulation & hospital LOS
- Incidence of postoperative complications

Study Flow & Randomization Allocation



Sample Size Calculation

01. Reference Baseline Data

Based on prior published literature, the U-TAP group exhibited a 24-hour Visual Analog Scale (VAS) pain score of 2.93, with a standard deviation (SD) of 1.03. This established the primary reference for our power analysis.

02. Primary Research Hypothesis

We hypothesized that the LTAP group would achieve a clinically significant reduction in postoperative pain, with the 24h VAS score projected to fall below 2.2 (SD = 0.8), indicating a meaningful improvement over the control condition.

03. Statistical Power & Parameters

A two-tailed significance level (α) of 0.025 was adopted to reduce Type I error risk. The study was powered at 80% ($1-\beta$) to ensure adequate sensitivity to detect true effects. A 20% dropout rate was incorporated to account for potential study attrition.

04. Final Sample Allocation

- **L-TAP Group: 43 participants**
- **U-TAP Group: 43 participants**
- **Control Group: 22 participants**

Reference: Mittal T, Sharma VK, Gupta R, et al. Efficacy of ultrasound-guided transversus abdominis plane block versus local anesthetic infiltration for postoperative pain after laparoscopic cholecystectomy: a randomized controlled trial. *Surg Endosc.* 2018;32(12):4985–4989.

Inclusion & Exclusion Criteria

✓ Inclusion Criteria

01. Informed Consent

Provided written informed consent for laparoscopic sleeve gastrectomy and adherence to the study protocol.

02. Demographic & ASA Status

Aged 18–65 years with American Society of Anesthesiologists (ASA) physical status ≤ 3 .

03. Bariatric Surgery Indications

BMI ≥ 32.5 kg/m², or BMI 27.5–32.5 kg/m² with diagnosed metabolic syndrome.

04. Metabolic & GI Health

Type 2 diabetes with preserved islet cell function; no history of GERD or hiatal hernia.

✗ Exclusion Criteria

01. Non-Eligibility & Demographics

Refusal to participate; age <18 or >65 years; BMI <27.5 kg/m².

02. Comorbid GI & Metabolic Issues

Active GERD, hiatal hernia; severe β -cell failure in type 2 diabetes mellitus.

03. Behavioral & Compliance Concerns

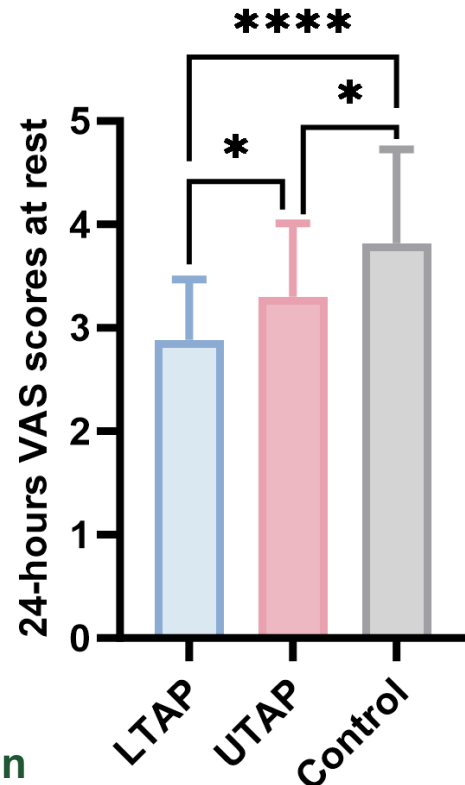
Active drug/alcohol addiction, severe psychiatric illness, or anticipated poor compliance.

04. Anesthetic & Surgical Risks

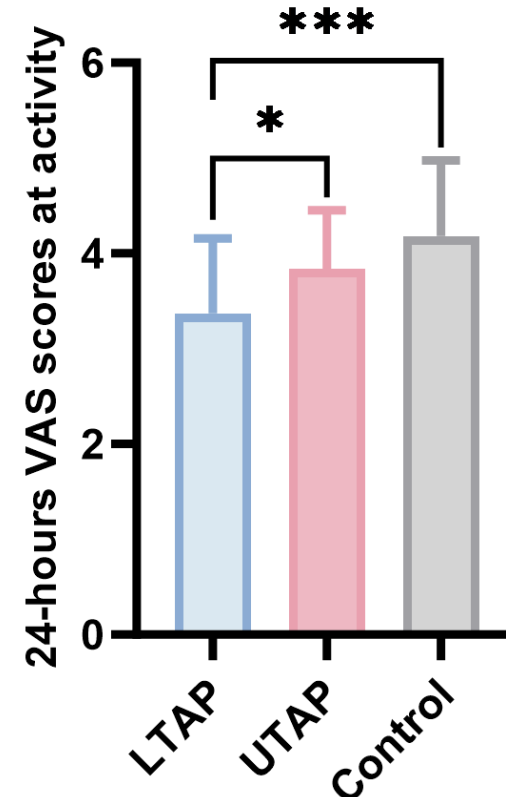
ASA physical status ≥ 4 ; inability to tolerate general anesthesia; intraoperative conversion to open surgery.

Primary Endpoint: 24h Postoperative VAS Scores

A. 24-h VAS (Rest)



B. 24-h VAS (Activity)



Key Conclusion

LTAP group demonstrated significantly lower 24-hour VAS scores in both resting and active states compared to the U-TAP and control groups (**P < 0.001), confirming superior analgesic efficacy in the immediate postoperative period.

Secondary Endpoints: Procedure, Recovery, and Analgesic Drugs



Shorter Procedure Time

LTAP block (5.19 ± 0.85 min) was significantly faster than U-TAP (9.56 ± 1.20 min)



Faster Recovery

Patients in LTAP group got out of bed earlier and had shorter hospital stay.



Reduced Opioid Use

48-hour Sufentanil consumption was markedly lower in both regional anesthesia groups



Similar Rescue Needs

No significant difference in rescue analgesia rate ($P=0.127$)

Comparative Outcome Measures: Quantitative Data Analysis

Group	Procedure Time (min)	Time to Ambulation (h)	Hospital Stay post LSG (days)	Sufentanil (µg)	Rescue Rate (%)
LTAP Group	5.19 ± 0.85^a	5.53 ± 0.91^a	2.38 ± 0.45^a	96.19 ± 22.81^a	10 (23.2%)
U-TAP Group	9.56 ± 1.20^b	6.53 ± 1.53^b	2.84 ± 0.46^b	101.63 ± 14.77^a	12 (27.9%)
Control Group	3.73 ± 0.77^c	7.60 ± 1.00^c	3.11 ± 0.49^b	116.67 ± 12.15^b	10 (45.4%)

Postoperative Adverse Reactions

Adverse Reaction	LTAP (n=43)	U-TAP (n=43)	Control (n=22)	P-value
Nausea	25 (58.1%)	27 (62.8%)	18 (81.8%)	0.084
Vomiting	22 (51.2%)	23 (53.5%)	15 (68.2%)	0.280
Respiratory Depression	3 (6.9%)	4 (9.3%)	5 (22.7%)	0.071



the incidence of nausea, vomiting and respiratory depression was similar among groups, proving LTAP does not raise safety risks

Conclusion: L-TAP



Efficient & Time-Saving

LTAP is straightforward to perform and significantly shorter in duration compared to U-TAP

streamlining intraoperative workflows and reducing overall operating time.



Superior Postoperative Analgesia

Delivers enhanced pain relief for patients undergoing laparoscopic sleeve gastrectomy,

effectively reducing postoperative discomfort and opioid consumption.



Accelerated Recovery & Mobility

Promotes early ambulation, reduces postoperative complications, and shortens hospital length of stay, enabling patients to return to daily activities faster.



Valuable ERAS Protocol Optimization

Optimizes the Enhanced Recovery After Surgery (ERAS) pathway for bariatric patients, serving as a reliable new option for abdominal wall analgesia.

thank you for attentions

