Comparing Ultrasound and Laparoscopic-Guided Transversus Abdominis Plane (TAP) Blocks in Sleeve Gastrectomy Patients

William C. Baumgartner, DO; Fielding M. Richards, DO; Brandon J. Arnsberger, DO; Deirdre N. Sheets, DO; John Powell Jr., MD

UPMC LIFE CHANGING MEDICINE

INTRODUCTION

- Bariatric surgery, particularly laparoscopic sleeve gastrectomy (LSG), is an effective weight loss intervention but presents challenges in postoperative pain management.
- This study compares the effectiveness of ultrasound-guided transversus abdominis plane (UTAP) blocks, laparoscopic guided transversus abdominis plane (LTAP) blocks, and no regional anesthesia on overall opioid use and postoperative outcomes in LSG patients.

METHODS

- This retrospective cohort study included 1,239 obese patients who underwent LSG at a single hospital from January 2019 to June 2023.
- Patients were categorized into the following three groups: UTAP, LTAP, and no TAP.
- The primary outcome was the total morphine milligram equivalents (MME) used within the first 24 h and 48 h, and the average amount of MME during the hospital stay (all reported in median interquartile ranges).
- Secondary outcomes included total anesthesia time, postoperative pain scores, length of stay (LOS), 30-day readmission, and emergency room visit rates.
- Statistical analyses included chi-square tests, Fisher's exact test, independent t-tests, Mann-Whitney U tests, and multiple linear regression.

RESULTS

- The UTAP group had significantly lower median MME within the first 24 h (63 MME) compared to the LTAP group (98.8 MME, p<0.0001) and throughout the hospital stay (93 MME vs. 120 MME, p=0.0004).
- Both UTAP and LTAP groups had significantly lower total MME compared to the no TAP group (p<0.0001 for both).
- Total anesthesia time was longer for UTAP (98.5 min) compared to LTAP (92.5 min, p=0.0472).
- LOS was significantly longer in the UTAP group (1.59 days) compared to LTAP (1.18 days, p=0.0061).
- There were no significant differences in pain scores at various time points or in 30-day readmission and emergency room visit rates between the UTAP and LTAP groups.

Patient demographics	Ultrasound TAP (n=88)		Laparoscopic TAP (n=172)		No TAP (n=979)		p-Value		
	Mean (SD)	Range	Mean (SD)	Range	Mean (SD)	Range	UTAP vs. LTAP	UTAP vs. no TAP	LTAP vs. no TAP
Age (years)	57.7 (12.3)	32-81	47.5 (12.4)	19-76	47.1 (11.9)	20-77	<0.0001	<0.0001	0.6999
BMI	47.0 (7.7)	35.8-78.2	46.2 (7.3)	30.4-77.0	46.7 (7.4)	31.1-80.4	0.4319	0.7636	0.3950
Gender	Number	Percentage	Number	Percentage	Number	Percentage			
Male	24	27.27%	35	20.35%	194	19.82%	0.2072	0.0955	0.8669
Female	64	72.73%	137	79.65%	786	80.29%			
ASA rating	Number	Percentage	Number	Percentage	Number	Percentage			
Incapacitating (ASA IV)	52	59.09%	28	16.28%	100	10.21%	<0.0001	<0.0001	0.0191
Severe systemic (ASA III)	34	38.64%	137	79.65%	793	81.00%			
Mild systemic (ASA II)	2	2.27%	7	4.07%	86	8.78%			

TABLE 1: Clinical characteristics and demographics of patients undergoing UTAP, LTAP, and no TAP. Data are presented as mean±SD and range for continuous variables (age and BMI) and as number and percentage for categorical variables (gender and ASA physical status rating). The American Society of Anesthesiologists Physical Status Classification System categorizes patients as ASA IV for incapacitating conditions, ASA III for severe systemic conditions, and ASA II for mild systemic conditions. P-values indicate statistical comparisons across groups (UTAP vs. LTAP, UTAP vs. no TAP, and LTAP vs. no TAP), with values

Primary outcomes	Ultrasound TAP		Laparoscopic TAP		p-Value
	Median	Interquartile range	Median	Interquartile range	
Total amount of milligrams of morphine equivalents (MME) within the first 24 h	63	30-95	98.8	75-130	<0.0001
Total amount of milligrams of morphine equivalents (MME) 2nd day	30	15-45	23	15-45	0.6595
Total amount of milligrams of morphine equivalents (MME) during the entire stay	93	45-140	120	84-165	0.0004
Secondary outcomes					
Total anesthesia time	98.5	86-117	92.5	83-104.5	0.0472
	Pain score mean (SD)	Pain score range	Pain score mean (SD)	Pain score range	
Pain score entering PACU	2.48 (3.7)	0-10	2.35 (3.4)	0-10	0.7818
Pain score 1 h into PACU	5.31 (3.4)	0-10	5.44 (2.5)	0-10	0.7554
Pain score postoperative day 1	4.07 (2.5)	0-10	4.52 (2.7)	0-10	0.2096
Pain score at discharge	3.94 (2.7)	0-10	4.05 (2.1)	0-9	0.7408
Length of stay	Mean (SD)	Range	Mean (SD)	Range	0.0061
	1.59 (1.3)	0-10	1.18 (0.8)	0-5	
Readmission rates	Number	Percentage	Number	Percentage	p-Value
30-day readmission	3	3.41%	3	1.74%	0.4099
30-day emergency room visit	6	6.82%	13	7.56%	0.8283

TABLE 2 : Comparison of primary and secondary outcomes of UTAP blocks vs. LTAP blocks in postoperative pain management. Primary outcomes include total MME administered during the first 24 h, second postoperative day, and entire hospital stay, presented as the median and IQR. Secondary outcomes include total anesthesia time (median, IQR), pain scores (based on a pain scale ranging from 0 {no pain} to 10 {worst possible pain}, used to assess patients' subjective pain levels) at various postoperative time points (mean±SD, and range), length of hospital stay (mean±SD, range), and incidence of 30-day readmission and emergency room visits (number, percentage). P-values indicate statistical comparisons between UTAP and LTAP groups, with significance considered at p

CONCLUSION

- UTAP blocks demonstrated reduced opioid use compared to LTAP and no TAP, likely due to enhanced accuracy with ultrasound guidance.
- Further prospective studies are warranted to confirm these findings and refine pain management strategies for bariatric surgery patients.

REFERENCES

1. Petcka NL, Alter-Troilo K, Hetzel E, et al.: Transversus abdominis plane blocks for complex abdominal wall reconstruction decrease hospital length of stay compared to epidurals. Surg Endosc. 2022, 36:7722-30. 10.1007/s00464-022-09095-z
2. Prevalence of obesity and severe obesity among adults: United States, 2017-2018 . (2020). Accessed:February 20, 2024: https://www.cdc.gov/nchs/products/databriefs/db360.htm.
3. Kleipool SC, Nijland LM, de Castro SM, et al.: Same-day discharge after laparoscopic Roux-en-Y gastric bypass: a cohort of 500 consecutive patients. Obes Surg. 2023, 33:706-13. 10.1007/s11695-023-06464-y
4. Saber AA, Lee YC, Chandrasekaran A, Olivia N, Asarian A, Al-Ayoubi S, DiGregorio R: Efficacy of transversus abdominis plane (TAP) block in pain management after laparoscopic sleeve gastrectomy (LSG):a double-blind randomized controlled trial. Am J Surg. 2019, 217:126-32. 10.1016/j.amjsurg.2018.07.010
5. Bazurro S, Ball L, Pelosi P: Perioperative management of obese patient. Curr Opin Crit Care. 2018, 24:560-7. 10.1097/MCC.0000000000000555
6. Schug SA, Raymann A: Postoperative pain management of the obese patient . Best Pract Res Clin Anaesthesiol. 2011, 25:73-81. 10.1016/j.bpa.2010.12.001
7. Cullen DJ: Obstructive sleep apnea and postoperative analgesia - a potentially dangerous combination . J Clin Anesth. 2001, 13:83-5. 10.1016/s0952-8180(01)00261-6
8. Iamaroon A, Tangwiwat S, Nivatpumin P, Lertwacha T, Rungmongkolsab P, Pangthipampai P: Risk factors for moderate to severe pain during the first 24 hours after laparoscopic bariatric surgery while receiving intravenous patient-controlled analgesia. Anesthesiol Res Pract. 2019, 2019: 10.1155/2019/6593736
9. Mavarez AC, Hendrix JM, Ahmed AA: Transabdominal plane block. StatPearls [Internet]. StatPearls Publishing, Treasure Island, FL; 2023.
10. Seiler J, Chong AC, Chen S: Laparoscopic-assisted transversus abdominis plane block is superior to port site infiltration in reducing post-operative opioid use in laparoscopic surgery. Am Surg. 2022, 88:2094-9. 10.1177/00031348221087923
11. Martin SP, Etzel J, Aghazarian G, Wert Y, Answine JF, DiMarco L: Perioperative multimodal anesthetic care incorporating transversus abdominis plane block is associated with reduced narcotic use in laparoscopic sleeve gastrectomy. Am Surg. 2022, 88:242-7. 10.1177/0003134820988823
12. Zeng J, Hong A, Gu Z, Jian J, Liang X: Efficacy of transversus abdominis plane block on postoperative nausea and vomiting: a meta-analysis of randomized controlled trial. BMC Anesthesiol. 2024, 24:10.1186/s12871-024-02469-x
13. Li XT, Xue FS, Tian T: A commentary on "ultrasound-guided versus laparoscopic-guided subcostal transversus abdominis plane (TAP) block versus no TAP block in laparoscopic cholecystectomy; a randomized double-blind controlled trial" (Int. J. Surg. 2022;101:106639). Int J Surg. 2022, 102:10.1016/j.ijsu.2022.106683
14. Zaghiyan KN, Mendelson BJ, Eng MR, Ovsepyan G, Mirocha JM, Fleshner P: Randomized clinical trial comparing laparoscopic versus ultrasound-guided transversus abdominis plane block in minimally invasive colorectal surgery. Dis Colon Rectum. 2019, 62:203-10. 10.1097/DCR.0000000000001292
15. Estimate of bariatric surgery numbers, 2011-2022. (2023). Accessed: November 1, 2023: https://asmbs.org/resources/estimate-of-bariatric-surgery-numbers/.
16. Cavallaro P, Bordeianou L: Implementation of an ERAS pathway in colorectal surgery . Clin Colon Rectal Surg. 2019, 32:102-8. 10.1055/s-0038-1676474
17. Tahiri M, Sikder T, Maimon G, et al.: The impact of postoperative complications on the recovery of elderly surgical patients. Surg Endosc. 2016, 30:1762-70. 10.1007/s00464-015-4440-2