

Comparison of Ultrasound-guided and Landmark-guided Transverse Abdominis Plane (TAP) Catheters Placed

for Postoperative Analgesia in ERAS Patients Undergoing Open Abdominal Surgery

Thuy Duong Le, BA¹; Madeline Moore, BA¹; Nathaniel Kim, BA¹; Michael Hoole, MD²; Brian Vickers, MD²; Divya Cherukupalli, MD²

¹Albany Medical College, ²Albany Medical Center

Background

Enhanced Recovery After Surgery (ERAS) is a perioperative protocol aimed at improving patient outcomes following abdominal surgery by optimizing pain management.

- Non-opioid oral or IV analgesics
- Opioid oral or IV analgesics
- Single injection nerve block
- Continuous infusion nerve blocks such as transversus abdominis plane (TAP) analgesic catheters or epidural catheters

TAP catheters can be placed by two techniques:

- Surgeons use the landmark-guided method to place catheters before surgical closing of the open abdominal incision.
- Anesthesiologists use the ultrasound-guided method to insert the catheter after surgical closing.

A comparison of patient outcomes and pain management between landmark-guided and ultrasound-guided methods has not been studied in the past.

Hypothesis

This study hypothesizes that TAP catheters placed via landmark-guided technique are equivalent or non-inferior and will have similar postoperative outcomes compared to ultrasound-guided technique.

Objectives

To compare patient outcomes between the landmark-guided and ultrasound-guided methods.

- Length (days) of TAP catheter placement.
- Length (days) of post-op hospital stay.
- Pain intensity (VAS Scale) in the PACU and at 24, 48, and 72 hours postoperatively.
- Oral morphine equivalent (OME) in the OR, PACU, and at 24, and 72 hours postoperatively.

Methods

- Open-abdominal surgery cases (colorectal, oncology, urology) identified at a single center between January 2018 and December 2023.
- Preliminary chart review included 127 cases (Ultrasound n = 79, Landmark n = 48).
- Exclusion criteria: under age 18, non-ERAS protocol, chronic pain patient with current opiate use.
- Retrospective chart review of patient demographics, surgical details, and post-surgical outcomes such as post-operative stay length, duration of catheter placement, Pain Visual Analog Scale score postoperatively, and opioid requirements.

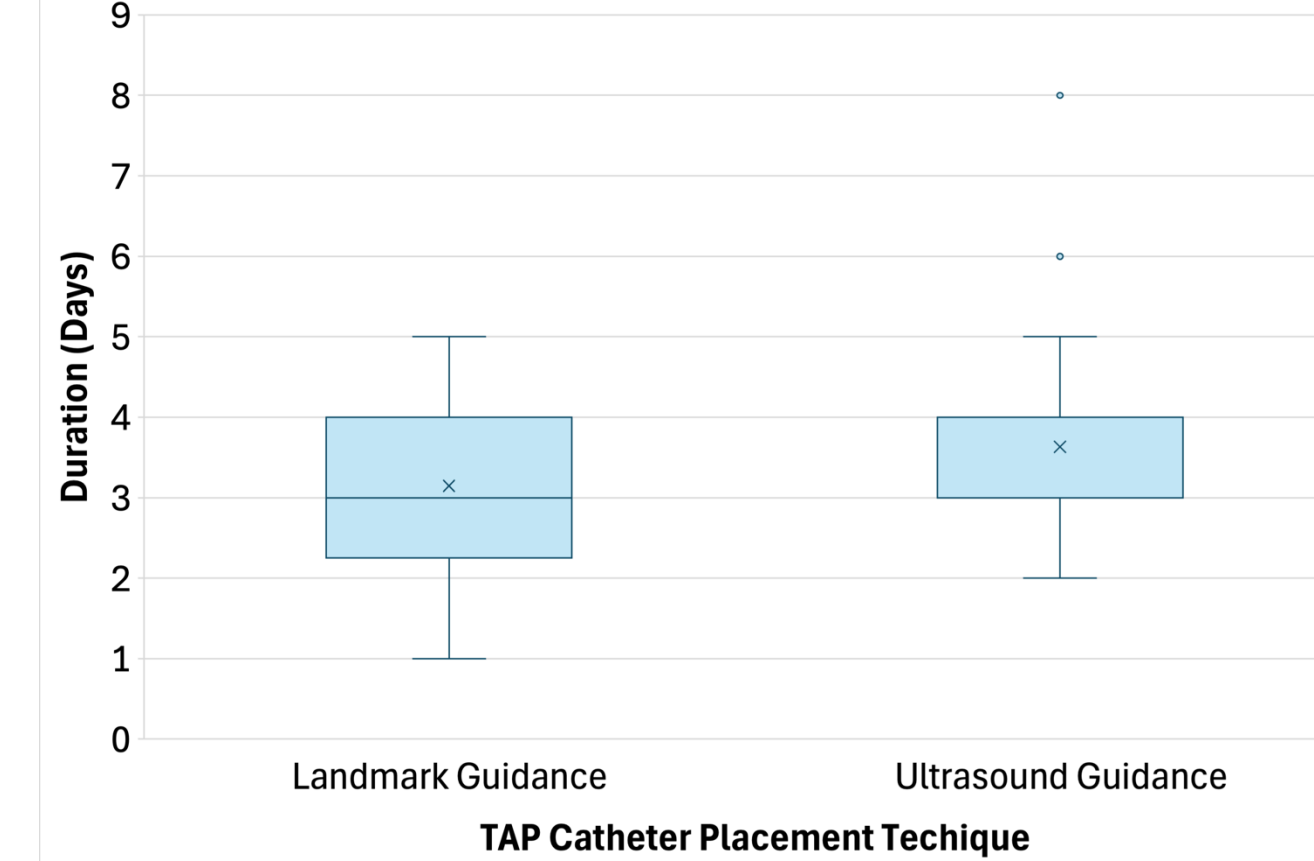
Patient Demographics

- Landmark-guided n = 48 vs. Ultrasound-guidance n = 79,
- Both groups were comparable (Landmark-guided vs. Ultrasound-guided)
 - Age (years) 60.3 vs 61.6, p = 0.623
 - Height (cm) 171.7 vs 169.1, p = 0.208
 - Weight (kg) 81.2 vs. 80.4, p = 0.848
 - BMI 27.5 vs. 28.2, p = 0.583
- Race: White 87.5%, Black or African American 8.6%, Asian <1%, Other 3.1%
- Gender: Male 41.4%, Female 58.6% (p = 0.528)

Results

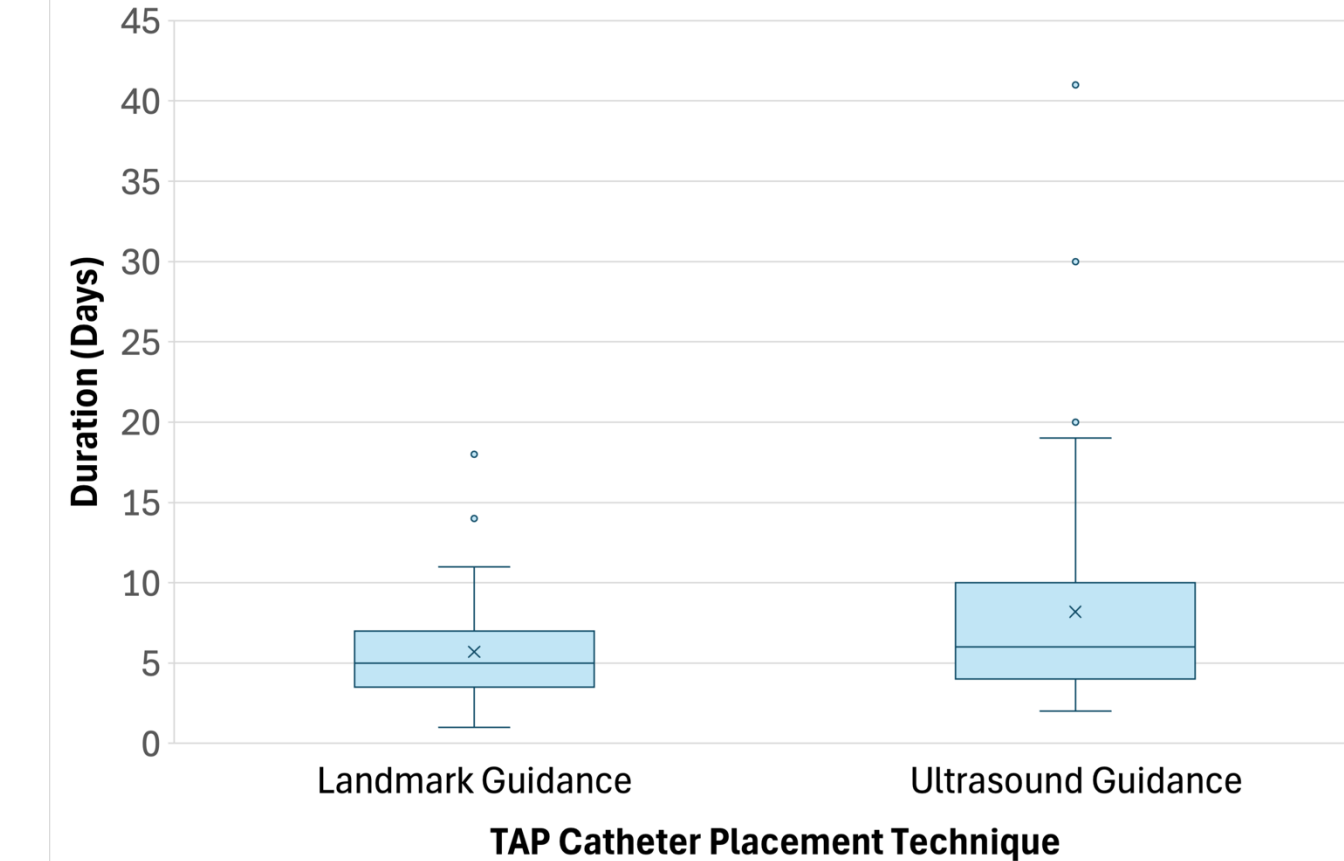
Length of TAP Catheter Placement

Fig 1 Duration of TAP Catheter Placement



Length of Postoperative Hospital Stay

Fig 2 Duration of Postoperative Hospitalization



Average Pain Intensity (VAS Scale) Postoperatively

Fig 3 Average Pain Intensity in PACU

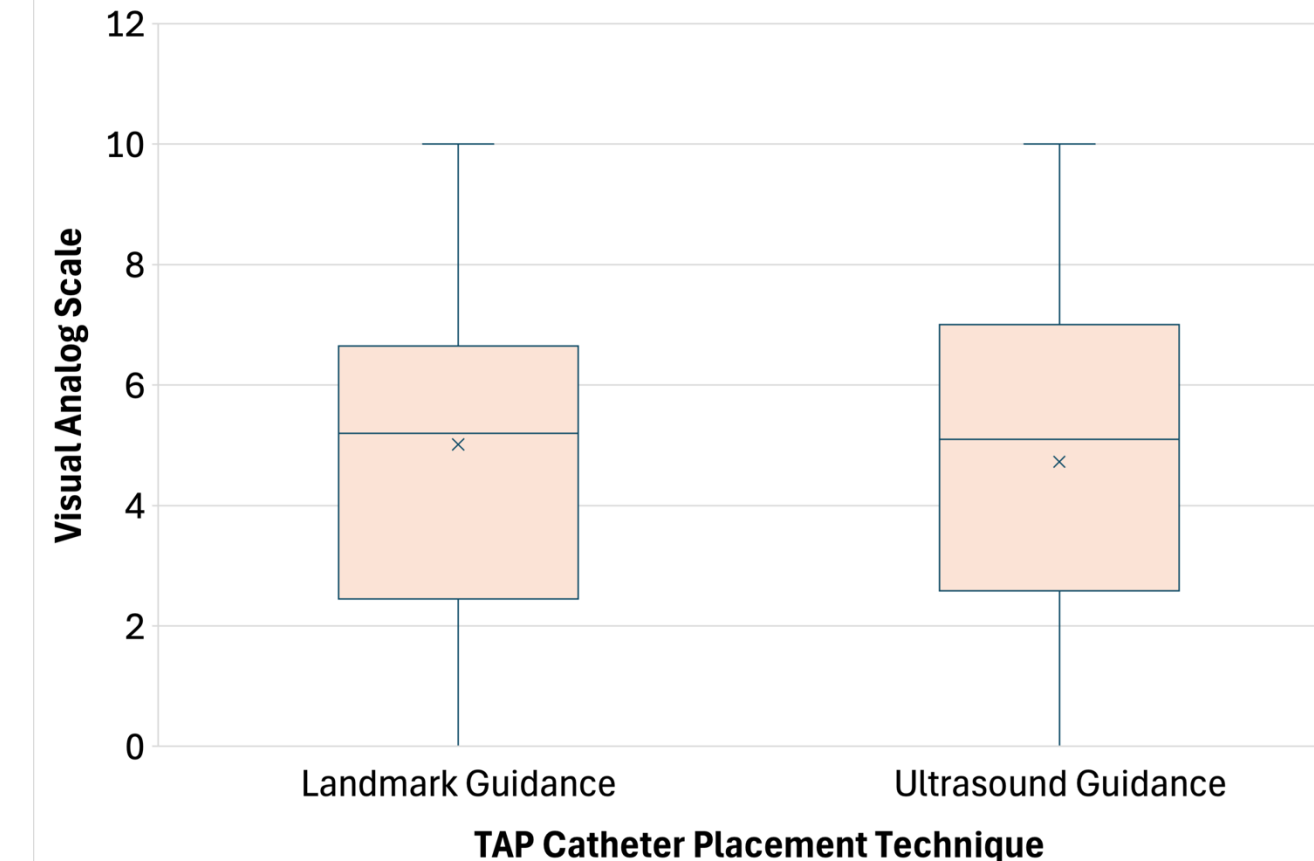


Fig 4 Average Pain Intensity 24-hours Postoperatively

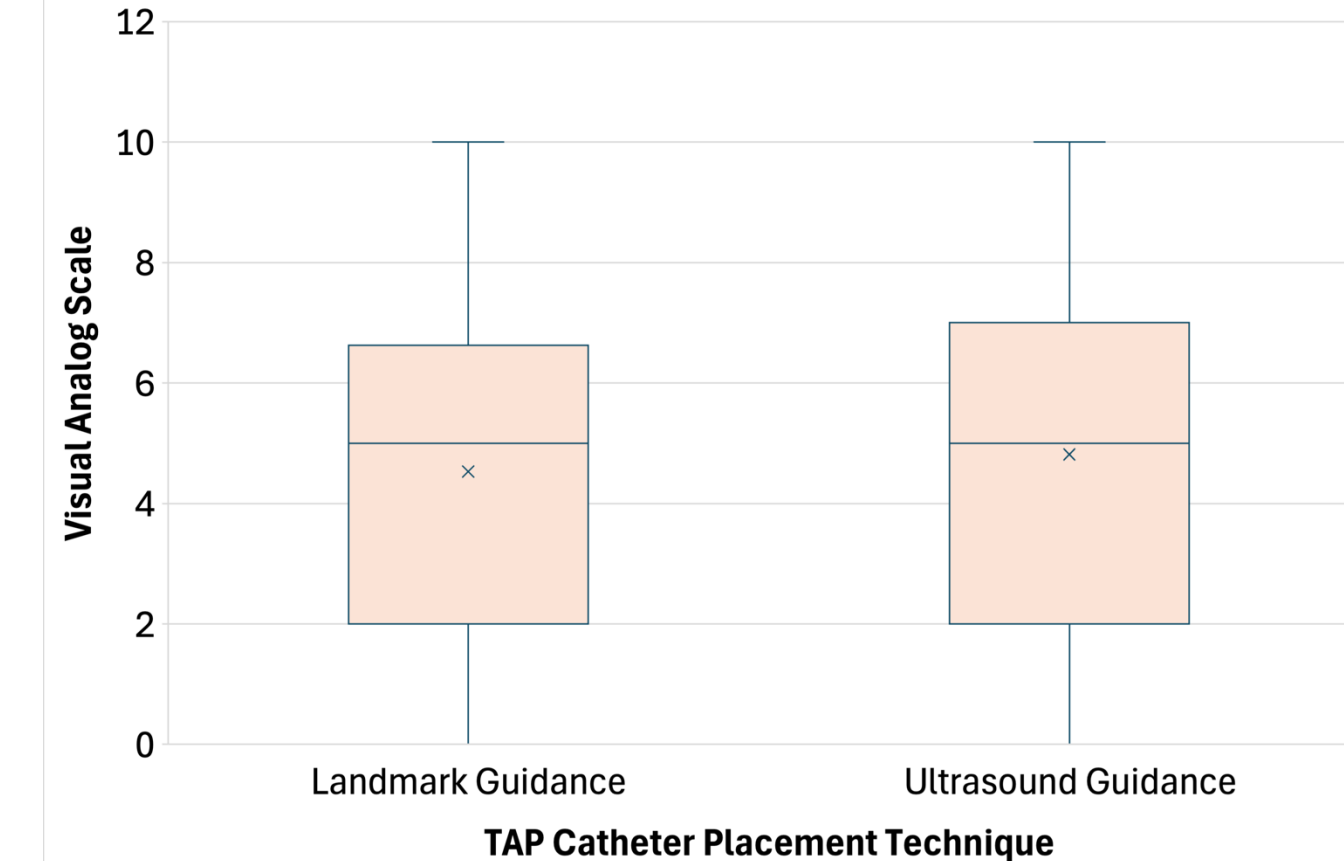


Fig 5 Average Pain Intensity 48-hours Postoperatively

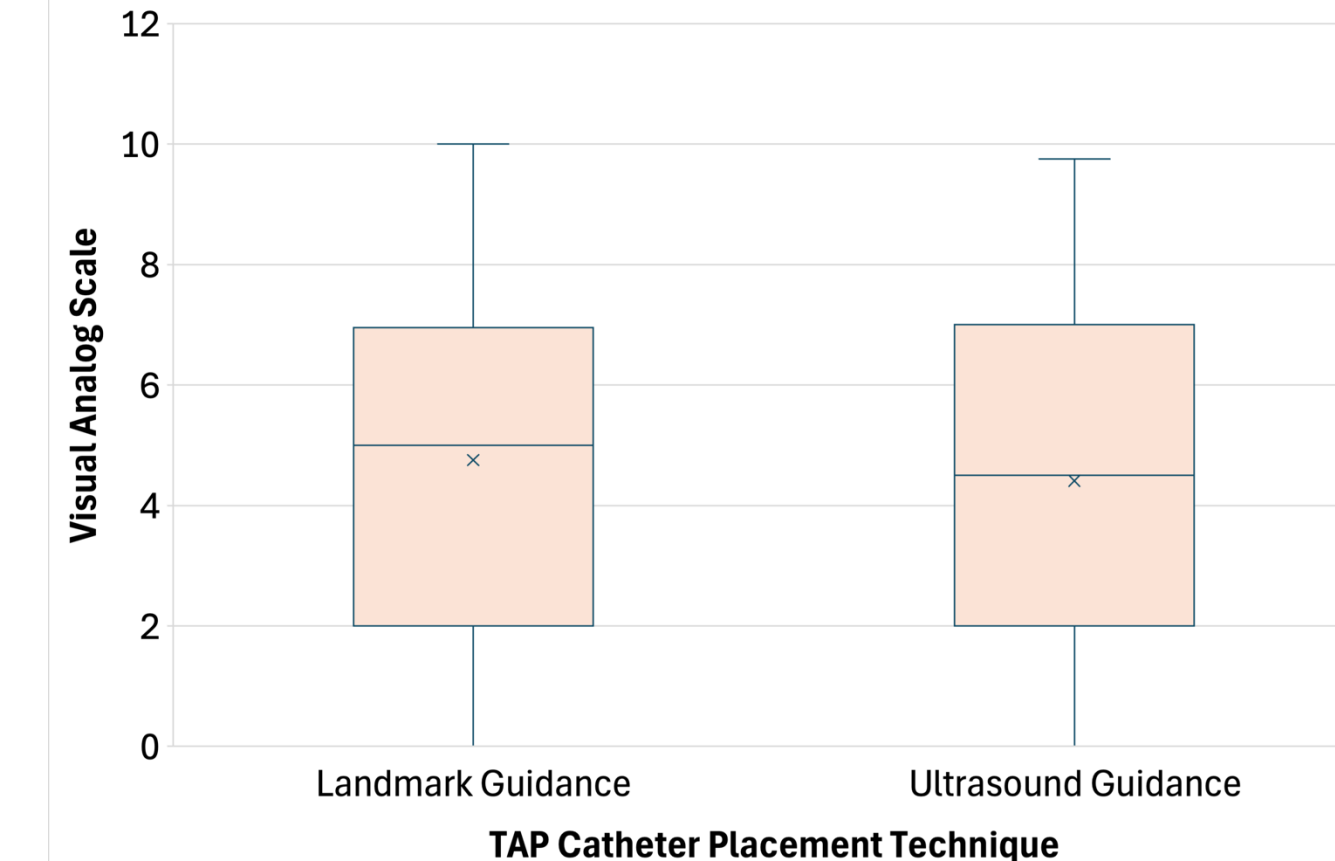
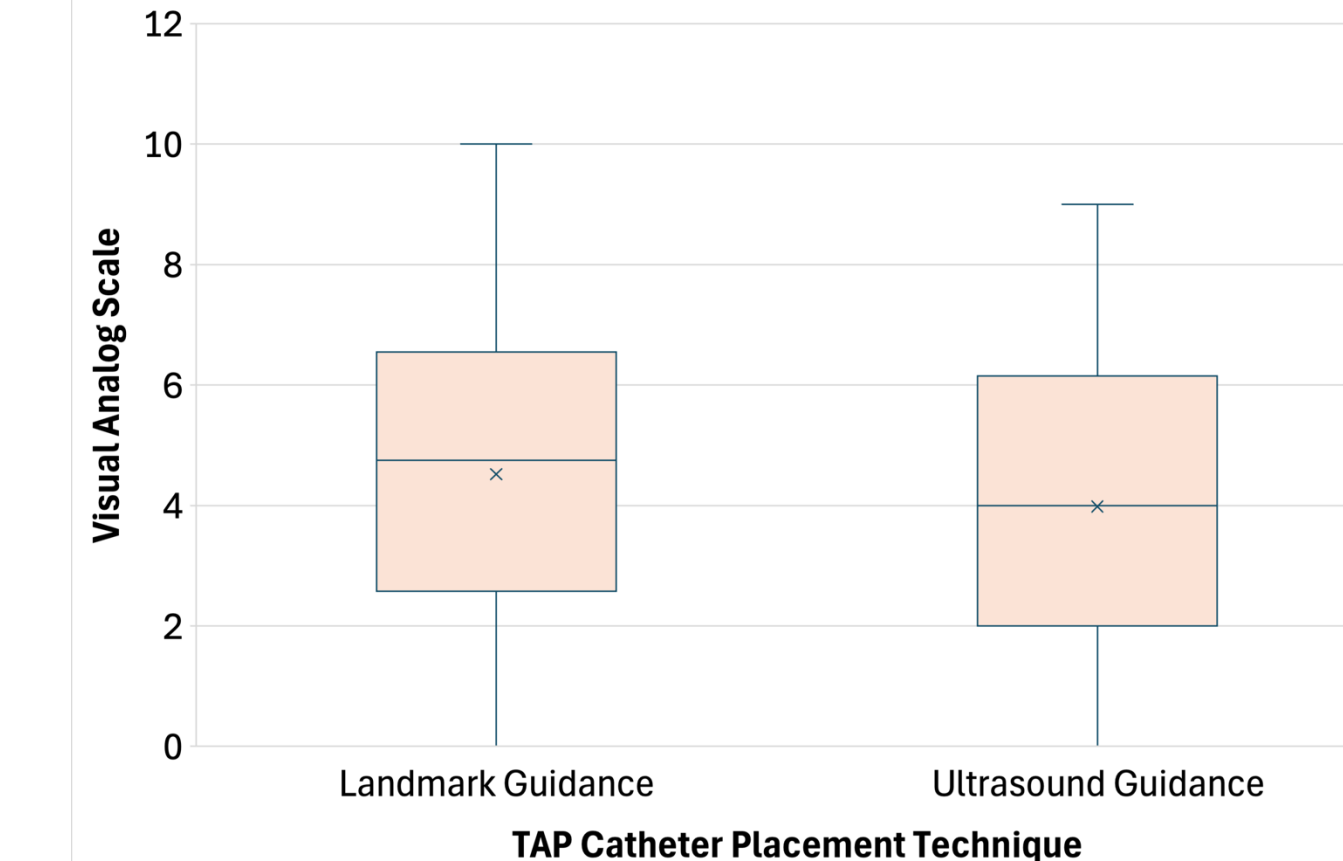


Fig 6 Average Pain Intensity 72-hours Postoperatively



Oral Morphine Equivalent (OME) Intra & Postoperatively

Fig 7 Boxplot of Total OR OME

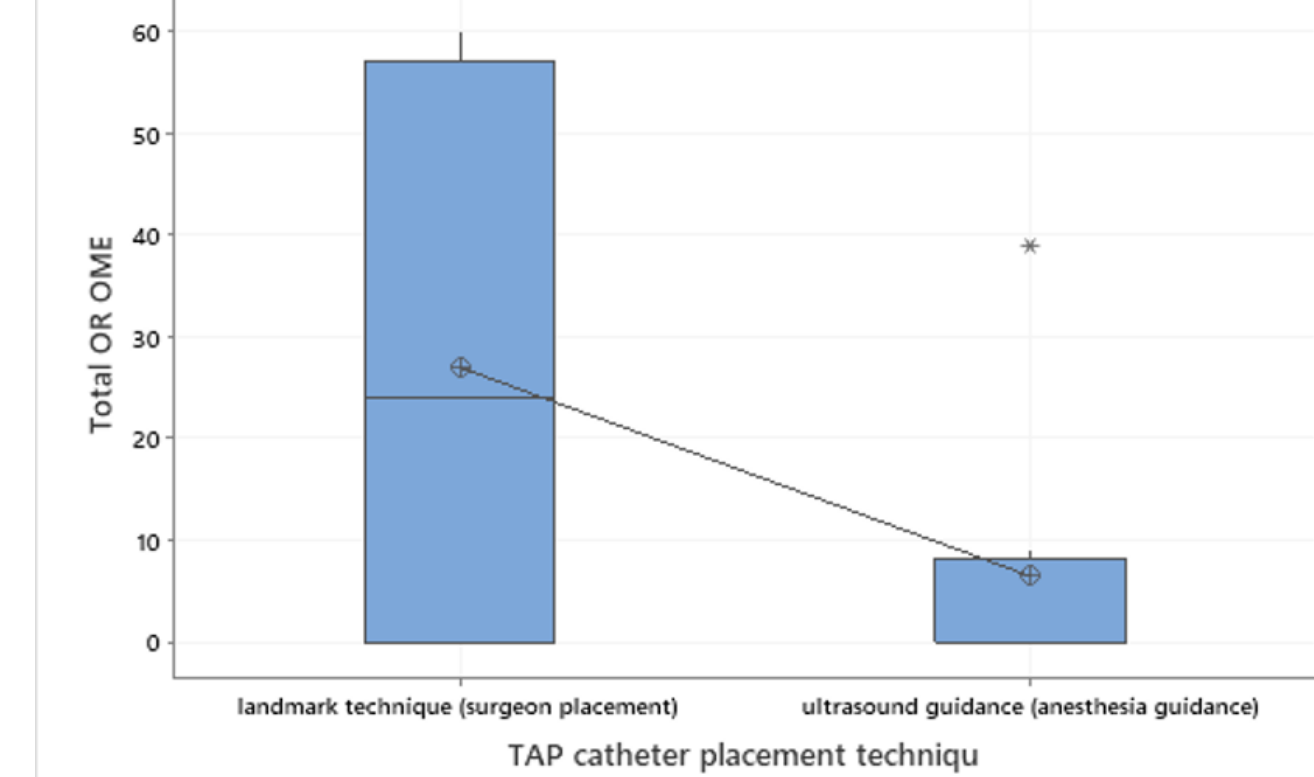


Fig 8 Boxplot of Total PACU OME

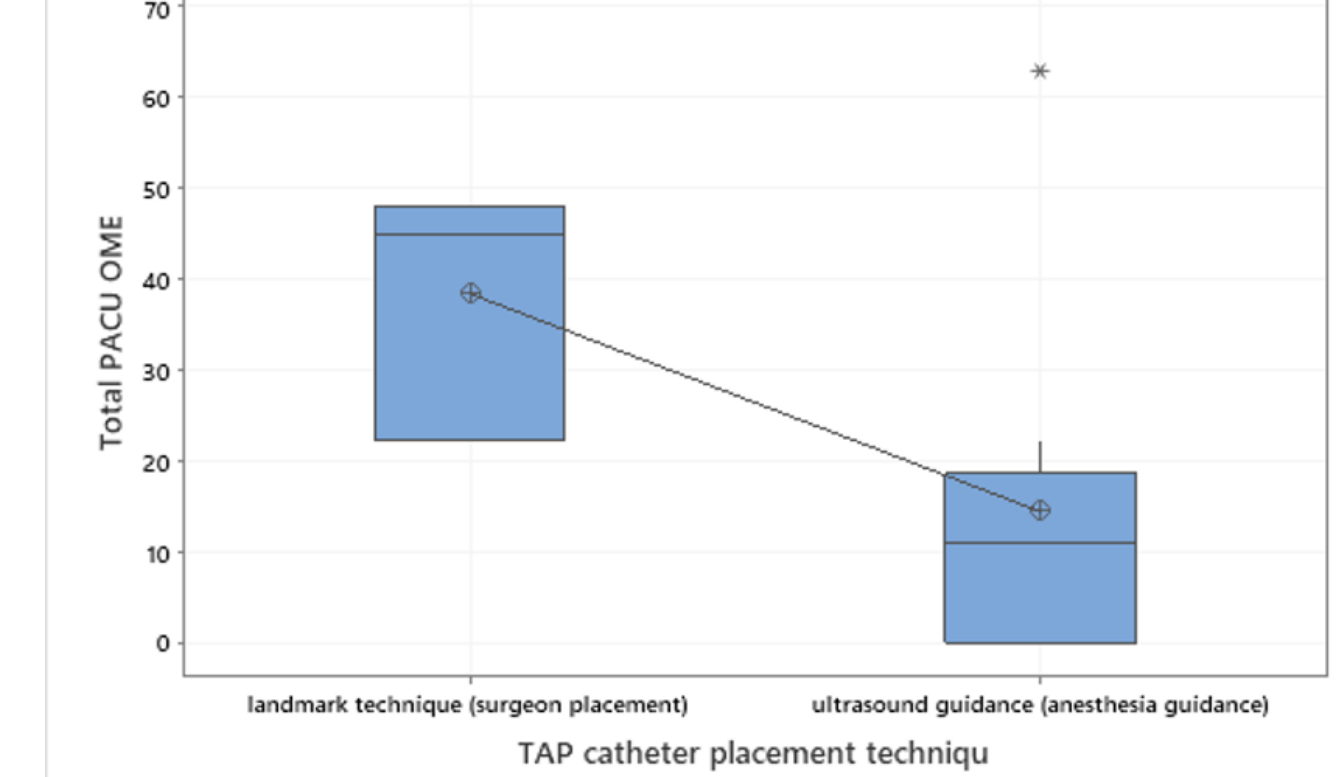


Fig 9 Boxplot of Total 24h OME use

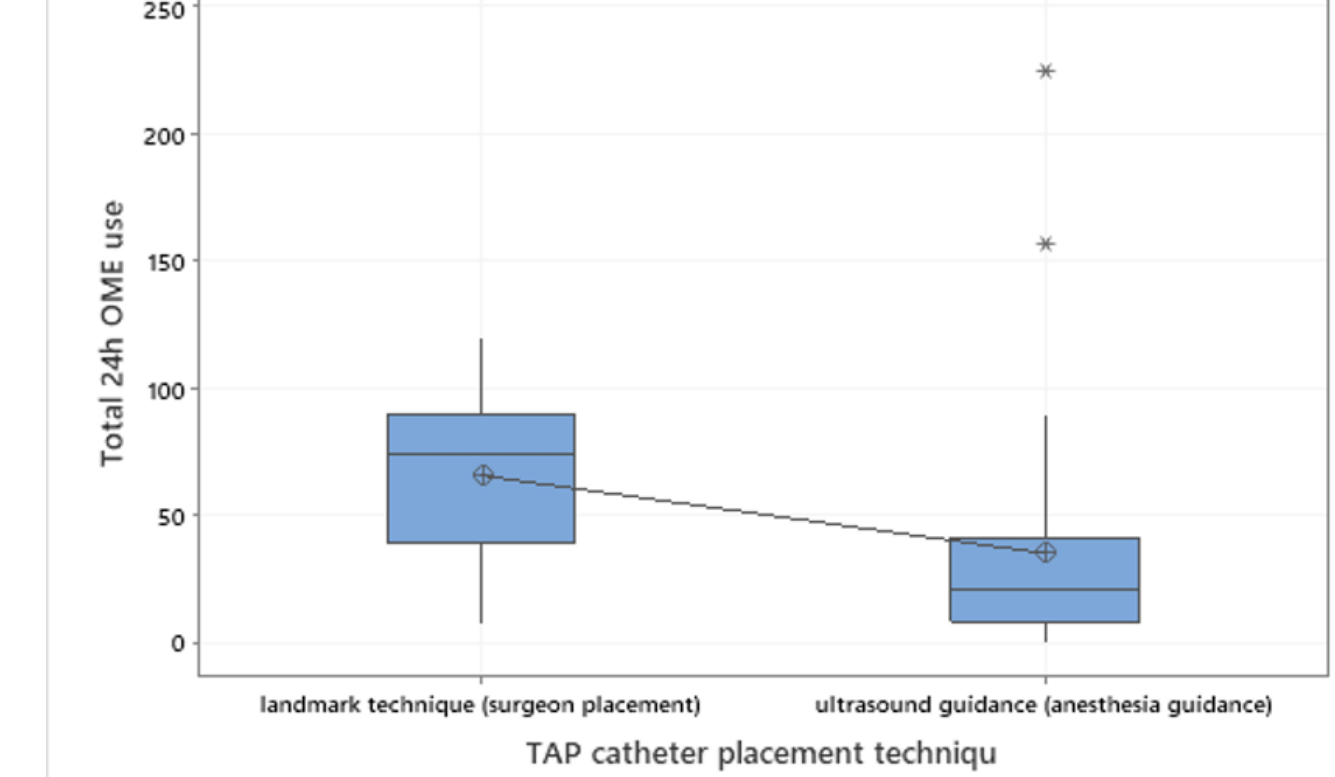
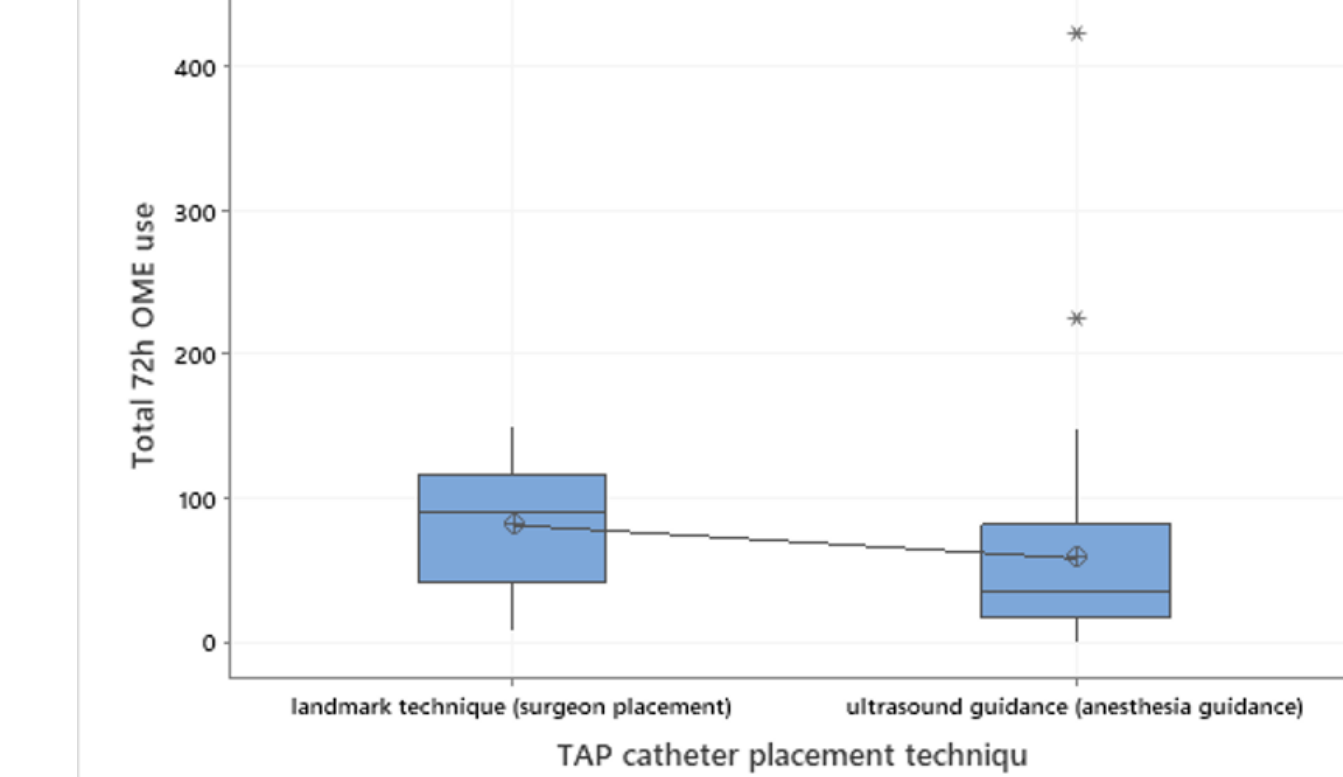


Fig 10 Boxplot of Total 72h OME use



Discussion

Duration of TAP Catheter Placement is statistically significant (p=0.013), but not clinically significant.

Duration of Postoperative Hospitalization is statistically significant (p = 0.006), may be due to outliers skewing data in Ultrasound-Guided group

No statistical difference was observed Average Pain Intensity or Oral Morphine Equivalent between the two groups in the PACU and at 24, 48, and 72-hours postoperatively.

Conclusions

Our findings support our hypothesis that the landmark-guided technique is equivalent or non-inferior to the ultrasound-guided technique. Although there are some statistically significant differences, there is no clinically significant difference to drive changes to our ERAS protocol to prefer one method of TAP catheter placement over the other. However, since the data supports that the two methods are equal, the landmark-guidance method can be used more widely.

Future Directions

Future work will aim to increase sample size and review outliers, and to reanalyze the OME between the two groups.

References

Ban, Kristen A., Julia R. Berian, and Clifford Y. Ko. "Does implementation of enhanced recovery after surgery (ERAS) protocols in colorectal surgery improve patient outcomes?" Clinics in colon and rectal surgery 32.02 (2019): 109-113.

Kadam, V. Rao, et al. "Epidural versus continuous transversus abdominis plane catheter technique for postoperative analgesia after abdominal surgery." Anesthesia and intensive care 41.4 (2013): 476-481.

Acknowledgement

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