

The impact of quadratus lumborum block versus pericapsular nerve group (PENG) with lateral femoral cutaneous nerve blocks for analgesia after hip arthroplasty: a prospective, randomized clinical trial

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BACKGROUND

- Total hip arthroplasty (THA) improves quality of life. Demand is projected to increase.
- Early ambulation may reduce hospital length of stay and improve health-related quality of life.
- Multimodal analgesic plans including regional anesthesia are an important area of interest
- QL block (QLB) and pericapsular nerve group (PENG) block provide effective analgesia & minimal impact on motor function.
- Purpose: Compare QLB and PENG + LFC in patients undergoing primary THA.

METHODS

- Design: Prospective, randomized, double-blinded trial: QLB vs PENG + LFC block.
- Time: February 2023 – November 2023
- Primary Outcome: Postoperative cumulative opioid consumption (in IV MME) at 72 hours
- Data Collection: Demographics, opioid consumption, pain rating using the visual analog scale (VAS), time to first ambulation, PACU duration, time to discharge, functional and mobility outcomes
- Power: 48 subjects per group provided 80% power to detect a difference in cumulative MMEs consumed. 53 enrolled per group to allow 10% attrition.
- Statistics:
 - Primary: Linear mixed models
 - Secondary: Wilcoxon rank sum tests, Fisher's exact test, linear mixed model, logistic regression approach.
 - Analyses conducted in SAS v. 9.4

- Enrollment (**Figure 1**)
 - 106 consented & randomized.
 - 101 analyzed: PENG (n=50), QLB (n=51).
 - Group characteristics did not differ. (**Table 1**)
- Primary Outcome: Mean (95% CI) opioid consumption (IV MME) in 72 hours did not differ (p=0.065). (**Figure 2**)
 - PENG [112.9 (93.4, 132.4)]
 - QL [89.3 (71.1, 107.9)]
- Secondary Outcomes (**Figures 3-4; Table 2**)
 - Worst pain scores were on average 7 points higher in PENG vs QL (p=0.032)
 - No difference in average pain scores, time to ambulation, distance ambulated, motor function assessments, rate of same day discharge, or hospital LOS.
 - No difference in functional outcome measures (HOOS & PROMIS scores).

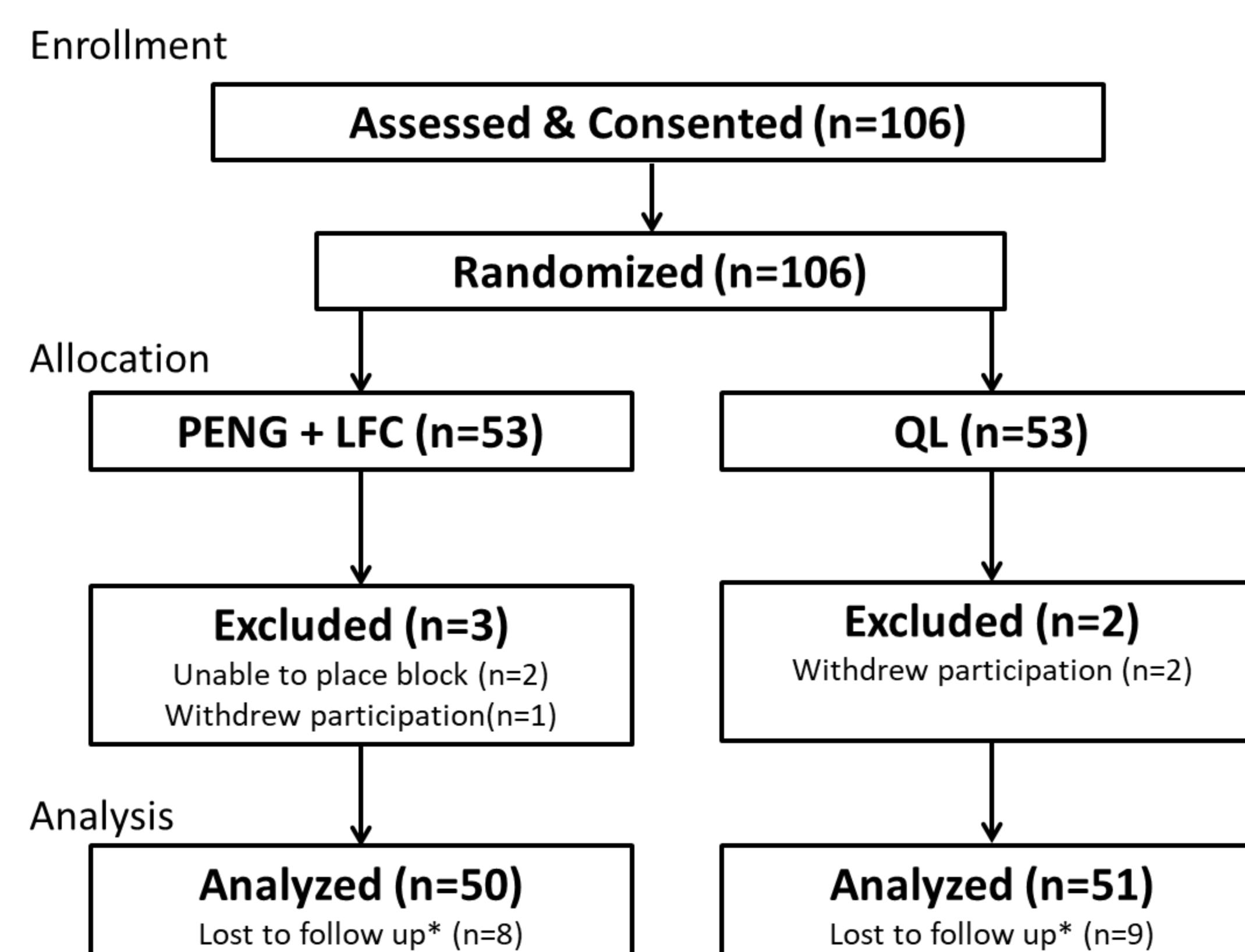


Figure 1. Patient Enrollment

Table 1. Patient Characteristics

	PENG (N = 50)	QL (N = 51)	P
Age (years), mean ± SD	62.8 ± 12.7	65.8 ± 9.77	0.198
Sex (male), n (%)	28 (56.0)	22 (44.0)	0.196
Race (white), n (%)	34 (68.0)	42 (55.3)	0.095
Avg Pain with movement in last week, mean ± SD	67.1 ± 23.7	66.7 ± 18.9	0.923
Average Pain at rest in the last week, mean (SD)	43.9 ± 30.3	44.3 ± 25.4	0.941
Total OR time (mins), median (IQR)	160 (42)	153 (32)	0.007

RESULTS

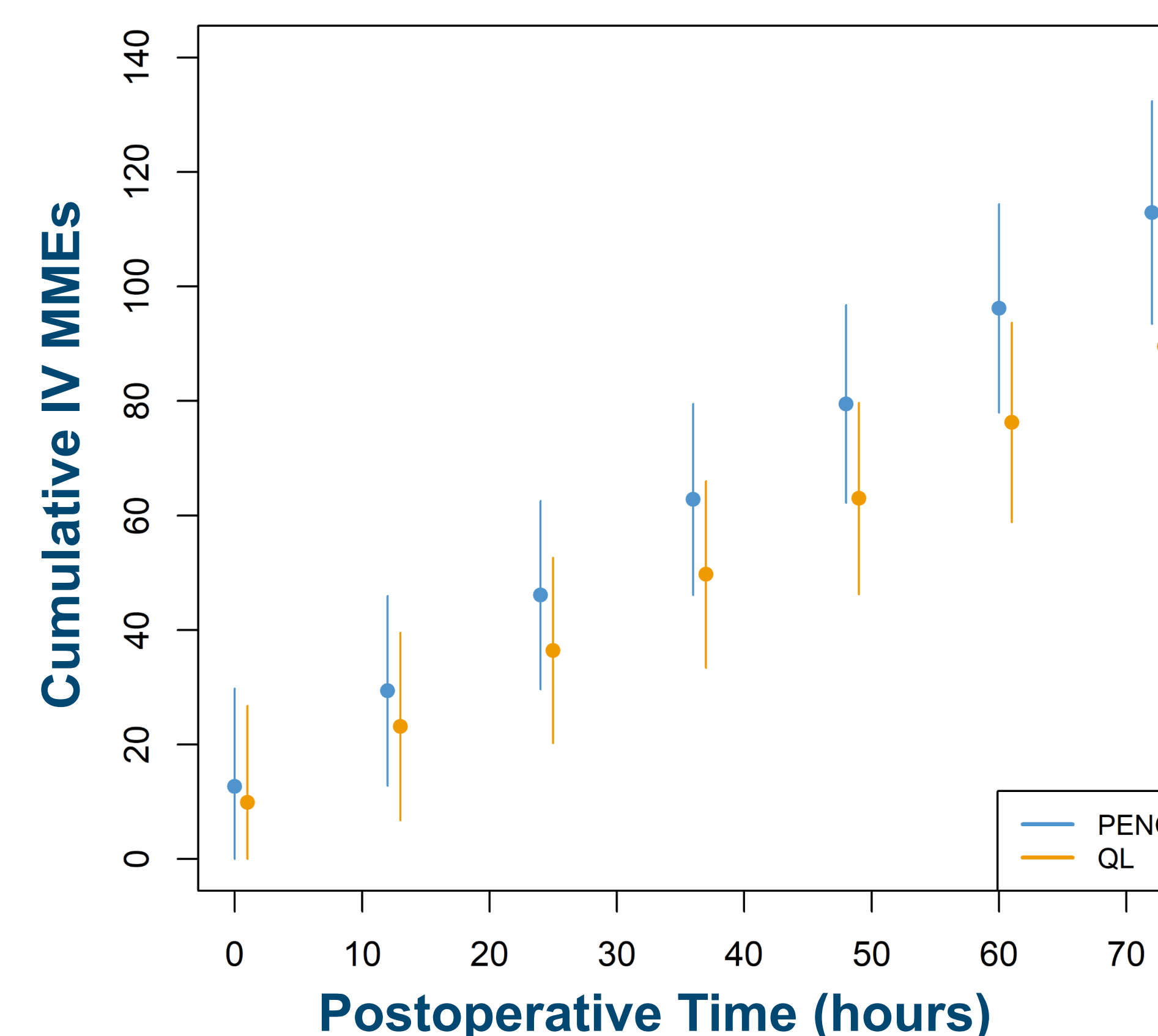


Figure 2. Cumulative Opioid Consumption

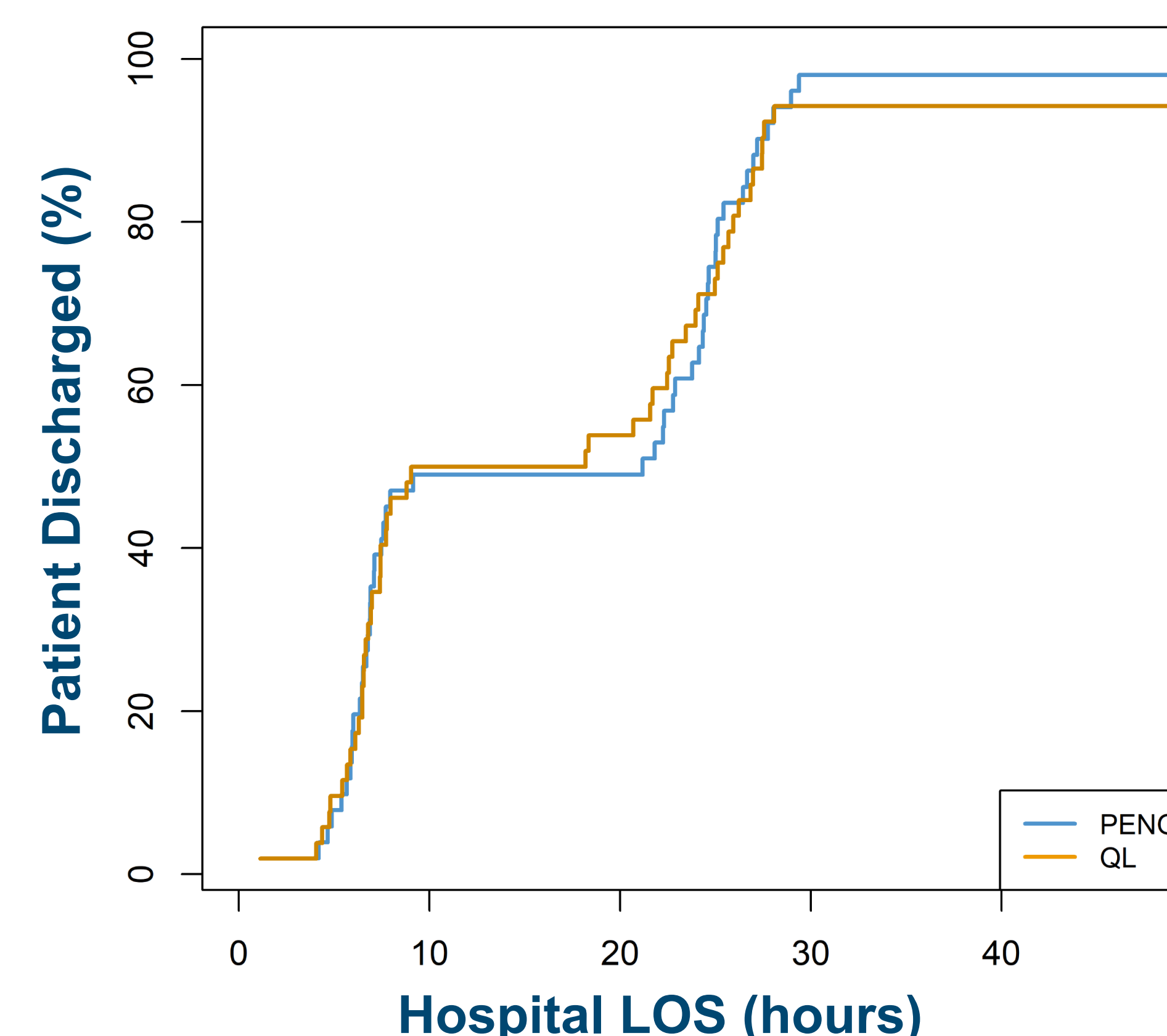


Figure 3. Patients Discharged Over Time

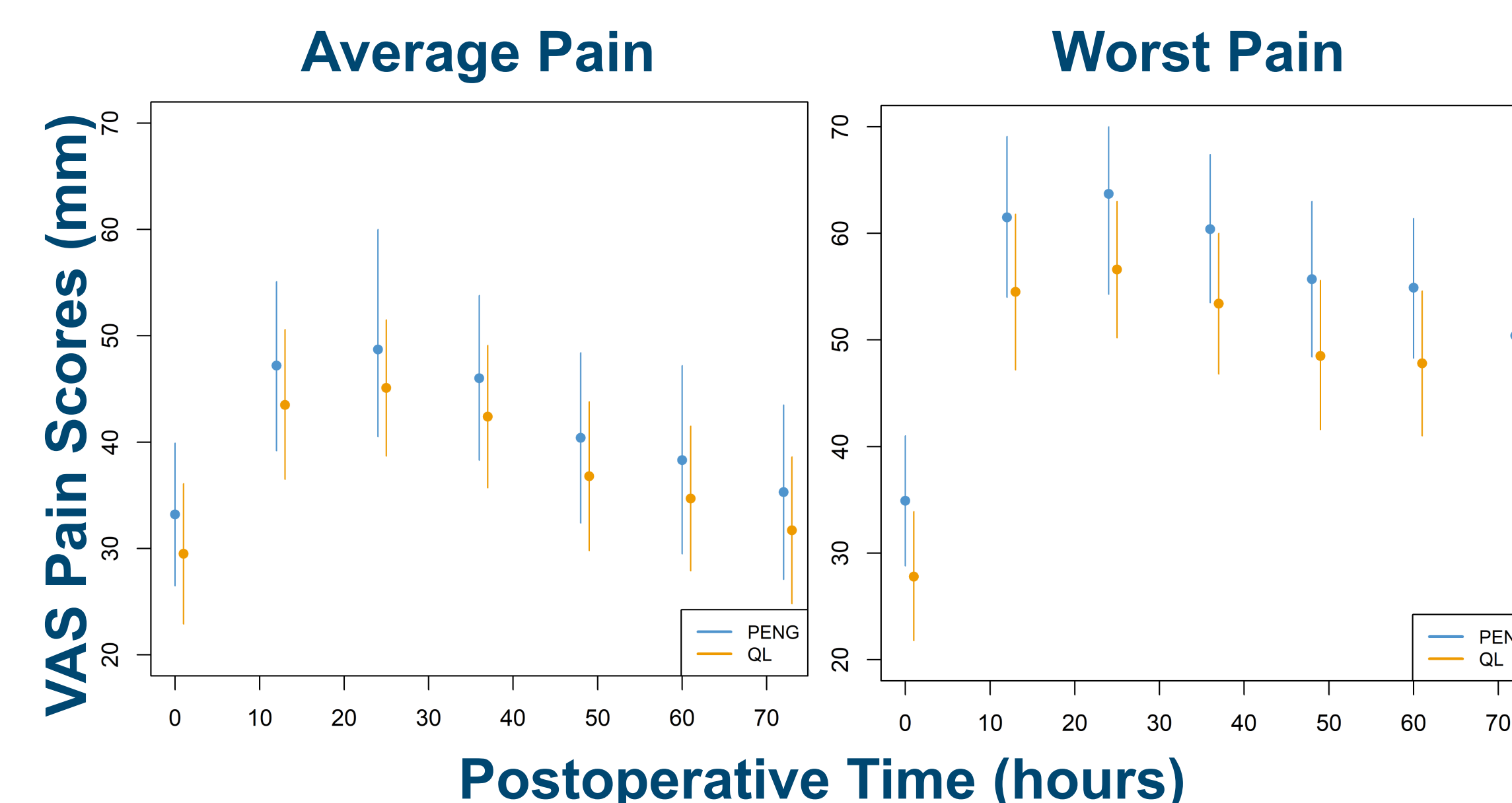


Figure 4. Pain Scores Over Time

Table 2. Secondary Outcomes

Outcome	PENG vs. QL Mean Difference (95% CI)	P
Average VAS Pain (mm)	3.62 (-4.23, 11.5)	0.362
Worst VAS Pain (mm)	7.05 (0.62, 13.5)	0.032
HOOS	-2.92 (-8.28, 2.44)	0.282
Physical Health, PROMIS	-0.35 (-2.87, 2.17)	0.785
Mental Health, PROMIS	-0.29 (-2.52, 1.95)	0.801
PACU recovery time (mins)	-19.0 (-74.0, 37.0)	0.486
Time 1st ambulation (mins)	4.0 (-27.0, 35.0)	0.792
Return to motor function (mins)	-0.5 (-28.0, 23.0)	0.820
Hospital Length of Stay (hours)	0.15 (-1.3, 2.05)	0.821

DISCUSSION

- This RCT did not find PENG + LFC blocks to reduce postoperative opioid consumption after THA vs a lateral QLB.
- Prior studies: PENG vs QL
 - Comparisons with anterior QLB
 - None versus lateral QLB.
- Prior studies: PENG vs other PNBs
 - PENG improved analgesia after hip surgery compared to other PNBs.¹⁻⁴
 - Existing literature is inconsistent.⁵⁻⁸
 - Recent meta-analysis found no difference in analgesia with PENG versus other PNBs.⁹

CONCLUSION

- Both lateral QL and PENG blocks are effective analgesic options in patients undergoing primary THA.

REFERENCES

- Lin, D. Y., Morrison, C., Brown, B., Saies, A. A., Pawar, R., Vermeulen, M., Anderson, S. R., Lee, T. S., Doornberg, J., Kroon, H. M., & Jaarsma, R. L. (2021). Pericapsular nerve group (PENG) block provides improved short-term analgesia compared with the femoral nerve block in hip fracture surgery: a single-center double-blinded randomized comparative trial. *Regional anesthesia and pain medicine*, 46(5), 398–403.
- Mosaffa F, Taheri M, Manafi Rasi A, Samadpour H, Memary E, Mirkheshti A. Comparison of pericapsular nerve group (PENG) block with fascia iliaca compartment block (FICB) for pain control in hip fractures: A double-blind prospective randomized controlled clinical trial. *Orthop Traumatol Surg Res*. 2022 Feb;108(1):103135.
- Vamshi C, Sinha C, Kumar A, Kumar P, Kumar A, Kumar S, Arun SK. Comparison of the efficacy of pericapsular nerve group block (PENG) block versus suprainguinal fascia iliaca block (SFIB) in total hip arthroplasty: A randomized control trial. *Indian J Anaesth*. 2023 Apr;67(4):364-369.
- Wang QR, Ma T, Hu J, Yang J, Kang PD. Comparison between ultrasound-guided pericapsular nerve group block and anterior quadratus lumborum block for total hip arthroplasty: a double-blind, randomized controlled trial. *Eur Rev Med Pharmacol Sci*. 2023 Aug;27(16):7523-7532.
- Aliste, J., Layera, S., Bravo, D., Jara, A., Muñoz, G., Barrientos, C., Wulff, R., Brañez, J., Finlayson, R. J., & Tran, Q. (2021). Randomized comparison between pericapsular nerve group (PENG) block and suprainguinal fascia iliaca block for total hip arthroplasty. *Regional anesthesia and pain medicine*, 46(10), 874–878.
- El T, Korkusuz M. Comparison of the pericapsular nerve group block with the intra-articular and quadratus lumborum blocks in primary total hip arthroplasty: a randomized controlled trial. *Korean J Anesthesiol*. 2023 Dec;76(8):575-585.
- Choi YS, Park KK, Lee B, Nam WS, Kim DH. Pericapsular Nerve Group (PENG) Block versus Supra-Inguinal Fascia Iliaca Compartment Block for Total Hip Arthroplasty. *A Randomized Clinical Trial*. *J Pers Med*. 2022 Mar 6;12(3):408.
- Braun AS, Peabody Lever JE, Kalagara H, Piennette PD, Arumugam S, Mabry S, Thurston K, Naranje S, Feinstein J, Kukreja P. Comparison of Pericapsular Nerve Group (PENG) Block Versus Quadratus Lumborum (QL) Block for Analgesia After Primary Total Hip Arthroplasty Under Spinal Anesthesia: A Retrospective Study. *Cureus*. 2023 Dec 7;15(12):e50119. doi: 10.7759/cureus.50119.
- Yu L, Shen X, Liu H. The efficacy of pericapsular nerve group block for postoperative analgesia in patients undergoing hip surgery: A systematic review and meta-analysis of randomized controlled trials. *Front Med (Lausanne)*. 2023 Feb 24;10:1084532.