

# Unique Considerations for Management of Programmed Intermittent Bolus Peripheral Nerve Catheters

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## Background

- Peripheral nerve blocks (PNBs) are essential tools for anesthesiologists, allowing for targeted and precise pain management, improving recovery and increasing patient satisfaction. The use of nerve block catheters offers prolonged pain relief that can be adjusted as needed.<sup>1</sup>
- Infusion technology now allows for programmed intermittent bolus (PIB) infusions which may improve analgesia when compared to continuous infusions.<sup>2</sup>
- However, managing these intermittent bolus catheters can present many unique challenges. This report highlights three unique cases of patients with PIB catheters, emphasizing the issues encountered and strategies used to resolve them.

## Case Reports

### Case 1:

A 16 year old 42kg (BMI 19) female with a high-grade angiosarcoma of the right breast presented for a radical resection of the right breast with en bloc resection of her right pectoral muscle. A preoperative right paravertebral PIB catheter was placed for pain control. However, the catheter tended to leak during bolus events, likely due to the patient’s low BMI and the high pressures associated with the boluses. The infusion was changed to a continuous mode, which resolved the issue, and no further complications were noted before discharge.

### Case 2:

A 54-year-old female sustained multiple fractures in a motor vehicle accident, including bilateral rib fractures and spinal injuries. A thoracic epidural was initially considered, but the patient declined due to fears of spinal access. Instead, bilateral erector spinae plane (ESP) PIB catheters were placed, programmed to deliver 10mL boluses every 3 hours on alternating sides. This approach effectively managed her rib pain while minimizing the risk of local anesthetic toxicity that could theoretically occur if bilateral boluses were administered concurrently.

### Case 3:

A 45-year-old, 112kg male suffering significant left lower extremity injuries with degloving to his left foot and multiple fractures after a motorcycle crash presented as a trauma case. A left popliteal sciatic nerve block catheter was placed for continued foot and ankle pain after multiple surgeries. The catheter settings were initially 2 mL/hr with 8 mL boluses of ropivacaine 0.2%, but occlusion errors occurred during bolus events. Adjusting to a continuous infusion circumvented the error, although analgesia became inadequate. Manual boluses were added (along with multiple catheter replacements) to achieve successful analgesia for his prolonged inpatient stay.

## A stepwise approach can be utilized to manage issues with programmed intermittent bolus peripheral nerve block catheters

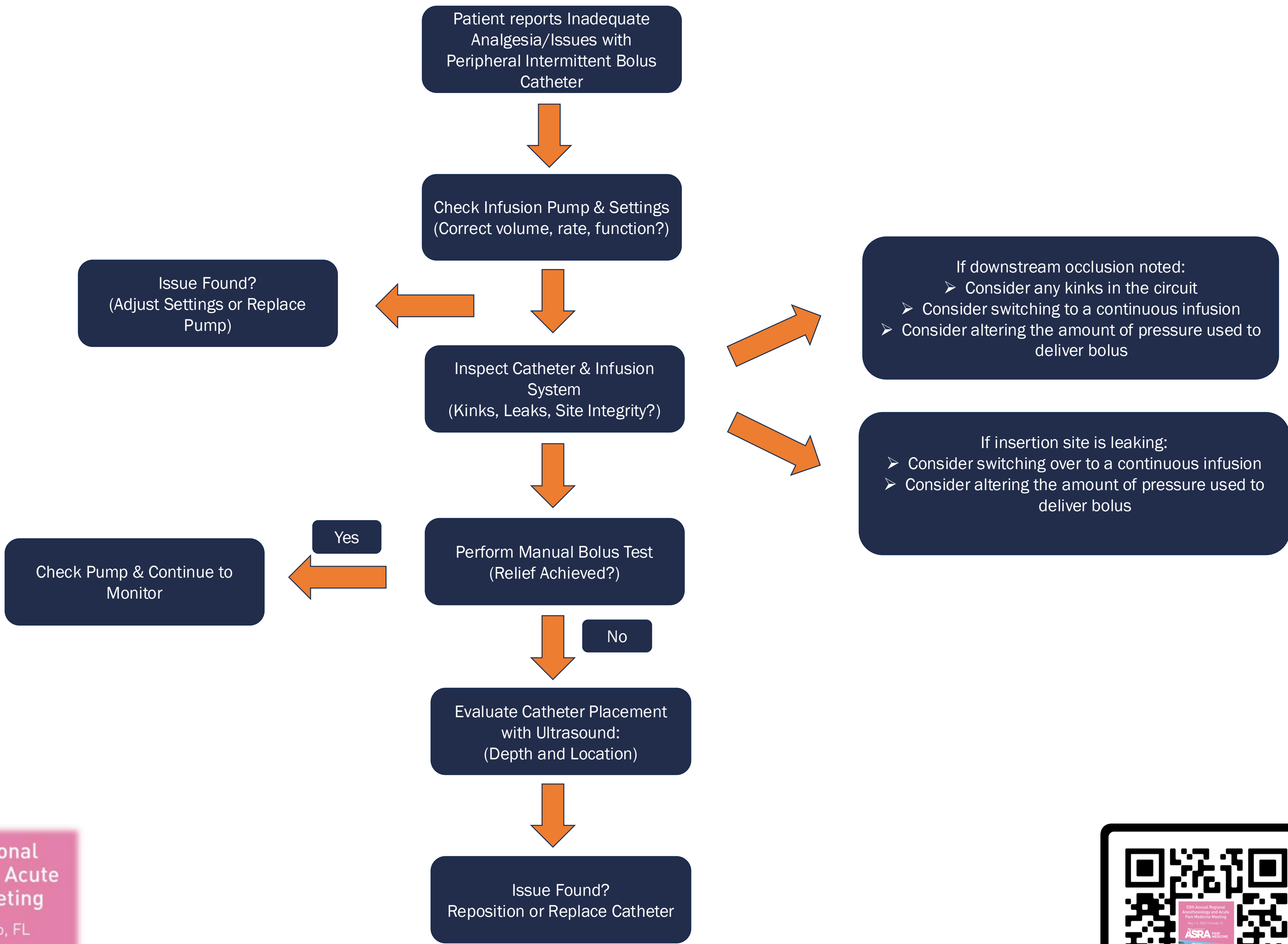


Figure 1. A stepwise approach to troubleshooting intermittent bolus peripheral nerve block catheters

## Discussion

- Peripheral nerve blocks, particularly via PIB catheter infusions, provide effective and longer-lasting pain management.
- Several considerations must be addressed with the use of PIB catheters, including patient body habitus, the potential for catheter leakage (especially in patients with low BMI), and the risk of local anesthetic toxicity with bilateral blocks.
- Intermittent occlusions may also occur, necessitating adjustments to the infusion methods.
- Switching to continuous infusions can sometimes help avoid pressure-related issues and improve efficacy. Careful monitoring and titration of dosages are essential to avoid complications and ensure optimal pain control.
- In this report, we advise a stepwise approach to troubleshoot intermittent bolus peripheral nerve block catheters.

## References

1)Deiling, B., Mullen, K., & Shilling, A.M. (2022). Continuous Catheter Techniques. *Clinics in Sports Medicine*, 41(2), 317-328.  
2)Hillegass, M.G, et. al. (2013). The efficacy of automated intermittent boluses for continuous femoral nerve block: a prospective, randomized comparison to continuous infusions. *Journal of Clinical Anesthesia*, 25(4), 281-288

