



Bioscientia Medicina: Journal of Biomedicine & Translational Research

Journal Homepage: www.bioscmed.com

Continuous Sciatic Popliteal Block as Postoperative Pain Management in Patient with Closed Fracture Right Ankle Undergo ORIF PS Surgery

Budi Santo^{1*}, Tjokorda Gde Agung Senapathi²

¹Resident, Department of Anesthesiology and Intensive Therapy, Faculty of Medicine, Universitas Udayana/Prof. Dr. I.G.N.G Ngoerah General Hospital, Denpasar, Indonesia

²Consultant, Department of Anesthesiology and Intensive Therapy, Faculty of Medicine, Universitas Udayana/Prof. Dr. I.G.N.G Ngoerah General Hospital, Denpasar, Indonesia

ARTICLE INFO

Keywords:

Continuous peripheral nerve block
Continuous popliteal sciatic block
Foot and ankle surgery

*Corresponding author:

Budi Santo

E-mail address:

budsan07@gmail.com

All authors have reviewed and approved the final version of the manuscript.

<https://doi.org/10.37275/bsm.v7i12.900>

ABSTRACT

Introduction: Currently, foot and ankle surgeries are on the rise, and a significant challenge in these cases is the intense post-operative pain that arises from early patient mobilization. Continuous popliteal sciatic block have emerged as a solution, effectively alleviating pain from the intra-operative to post-operative stages for patients undergoing foot and ankle surgery. According to a study conducted by Ding and colleagues, continuous blocks have proven to be more effective than a single injection in providing pain relief. **Case presentation:** A 24-year-old woman diagnosed with a closed fracture of her right ankle is scheduled for open reduction internal fixation (ORIF) with a plate and screws for her right ankle. The patient has an American Society of Anesthesiologists (ASA) physical status of III and is dealing with grade II obesity. A continuous popliteal sciatic block was performed on the patient under ultrasound guidance, with the catheter tip placed outside the perineural area. Postoperatively, the patient received pain management through a regimen of 0.1% bupivacaine, 20 ml volume, administered every 4 hours. Remarkably, the patient experienced minimal pain until the 2nd day after surgery and was discharged home. **Conclusion:** The continuous popliteal sciatic block is a regional anesthetic method that offers potent pain relief for patients undergoing foot and ankle surgery. Extensive evidence supports its effectiveness and safety during administration, making it a reliable choice for pain management in these procedures.

1. Introduction

Surgery on the foot and ankle is increasingly being performed on patients due to trauma. The main challenge in these patients is moderate to severe pain. This pain can lead to longer hospital stays and reduced patient satisfaction.¹ Research has shown that postoperative pain is a major factor in prolonged hospital stays, especially among orthopedic patients. Pain after foot and ankle surgery can last up to three days after the procedure.² One popliteal sciatic nerve block injection is not enough to treat pain effectively. Continuous popliteal sciatic nerve blocks have been developed as a potential method for pain management to address this problem. Various randomized

controlled trials have been conducted to compare the effectiveness and complications of this technique versus single-injection nerve blocks.²⁻³ A study from Ding et al. said that continuous popliteal sciatic block provides more effective results than giving patients a single injection. Apart from efficacy, the issue of safety of this procedure is still a matter of debate because there is no valid information regarding the complications and side effects of this procedure.⁴

2. Case Presentation

A 24-year-old female patient, weighing 90 kg and height 150 cm, presented with complaints of pain in the right leg after experiencing a traffic accident while

riding a motorbike. The patient said she had a single accident after having difficulty controlling the motorbike, falling to the right side on her feet and then being crushed by the motorbike. Complaints of head trauma were denied. Denied history of diabetes mellitus, hypertension, asthma, heart disease, and other systemic diseases. There was no history of food or drug allergies. There was no history of previous treatment. The patient will undergo the right ORIF PS ankle surgery. The patient is a student who, before being sick, was able to carry out activities without any complaints.

Awareness Glasgow coma scale (GCS) E4V5M6, pupil isochore 3mm/3mm, positive light reflex in both eyes. Blood pressure 110/80 mmHg, pulse rate 98x/minute, respiratory rate 18x/minute, body temperature 36.5°C. Heart sounds I and II are single and regular, and no murmurs were found to gallop. Sounds in both lung fields were vesicular. No crackles or wheezing were found in both lung fields. On abdominal examination, there was no distension, tenderness, or normal bowel sounds, and the liver and spleen were not enlarged. The extremities are warm. There is no edema, and there is a deformity in the right leg, no cyanosis, and no jaundice. On urogenital examination, urination was spontaneous. Laboratory examination results showed Hemoglobin 13.6 g/dL, Hematocrit 41.1%, Leukocytes $8.5 \times 10^3/\mu\text{L}$, and Trombosit $341 \times 10^3/\mu\text{L}$. Hemostasis physiology

examination showed a PPT value of 9.6 seconds, APTT of 22.1 seconds, and INR of 0.87. AP/lateral right ankle photo showed a closed fracture. The patient was diagnosed with a closed fractured right ankle, and surgery will be performed on the ORIF PS right ankle. Preanesthesia assessment of physical status American Society of Anesthesiology (ASA) III with grade II obesity problems with a BMI of 40.1 kg/m^2 . The patient was planned with a block anesthesia technique sciatic popliteal continuous. The patient is explained about the planned anesthesia technique, complications, and conditions, and then written consent is obtained from the patient.

The patient was given premedication midazolam 2 mg IV and fentanyl 75 mcg IV. It is ensured that the infusion catheter is running smoothly, vital signs are measured in the reception room, and then the patient is wheeled to the operating room. The patient is positioned on her side, and a monitor is installed. Then, the sciatic nerve is identified in the popliteal area using ultrasound guidance, septic and aseptic techniques are carried out, and the field of action is narrowed using a sterile probe, inserted with Tuohy 18G needles until it reaches the perineural. Perifix® epidural catheter was inserted. After that, 20 ml of 0.5% bupivacaine was injected, which was previously aspirated to ensure that there was no intravascular insertion of the drug.

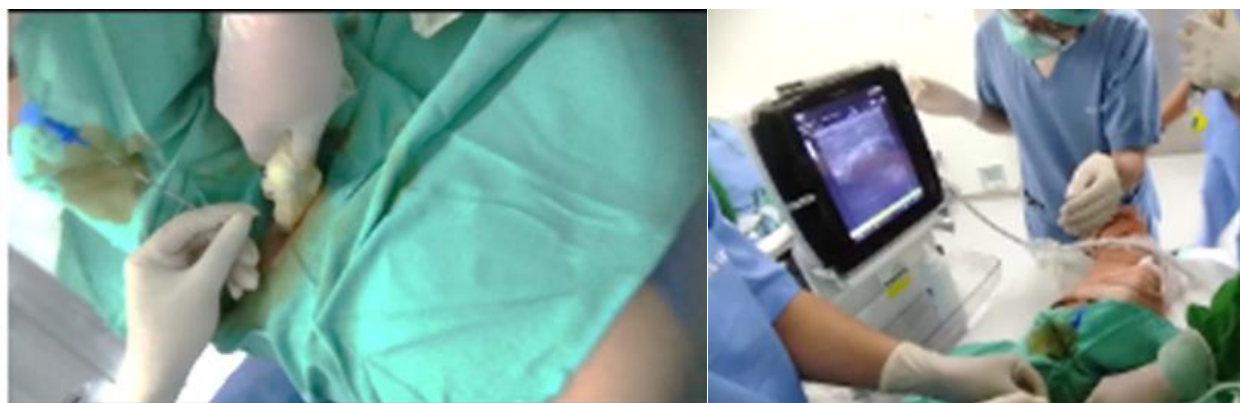


Figure 1. Patient position and technique when inserting a continuous catheter sciatic popliteal in patients.

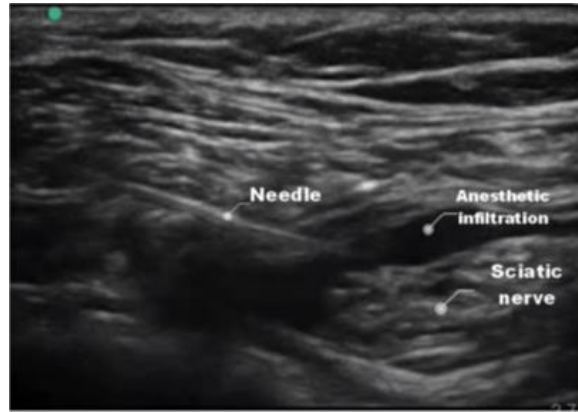


Figure 2. Visualization of the sciatic nerve on ultrasound.⁷

After surgery, the patient was treated in the inpatient room. The regimen for postoperative analgesia is 20 ml bupivacaine 0.1% every 4 hours; Dexketoprofen 25 mg every 8 hours PO; Paracetamol 500 mg every 6 hours PO. Selection of administration technique intermittent on catheters due to limited

equipment for continuous administration of peripheral nerve blocks in hospitals. The patient was followed up for 48 hours of treatment, and the data obtained were listed in Table 1. On the third day, the patient was allowed to go home, and the peripheral nerve block catheter was removed.

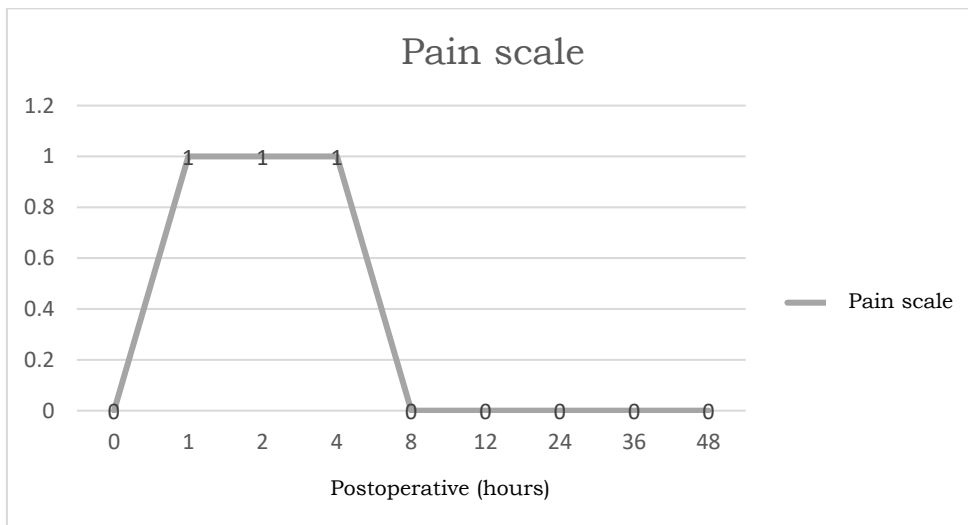


Figure 3. Postoperative patient pain scale.

3. Discussion

There are a variety of postoperative pain management options available for lower extremity surgery, including PCIA (patient-controlled intravenous analgesia), continuous epidurals, oral analgesics, and peripheral nerve blocks. Opioids such as sufentanil are commonly used in PCIA pumps and oral pain relievers. Opioid use significantly increases

the risk of postoperative nausea and vomiting (PONV). PONV not only has the potential to cause complications such as increased blood pressure, wound tearing, and infection, but in severe cases, it can also disrupt water and electrolyte balance and lead to aspiration. This can result in longer hospital stays and higher healthcare costs.⁷

Continuous peripheral nerve blocks are currently an important part of multimodal analgesia used primarily in surgery orthopedics involving the lower extremities. Studies have shown a significant reduction in postoperative pain as well as a decrease in the number of opioid requirements with continuous regional anesthesia used postoperatively.⁸ Continuous popliteal sciatic block can be used as an effective therapy in the management of acute postoperative pain in patients undergoing surgery in the foot and ankle area, according to research by Ma et al. Safety issues are a concern elsewhere regarding this regional anesthesia technique; symptoms of neuropathy, infection, and compromised catheter position are major problems with this technique.⁹

Cooper et al. stated that the use of a single sciatic nerve block is a safe and effective measure in pain management in patients with fractures of the foot and ankle and provides quite good intraoperative analgesia. Some studies have noted a more rapid analgesic effect when anesthetic drugs are injected beneath the nerve sheath, thereby requiring lower drug doses and resulting in better pain relief. However, different studies suggest that injecting drugs under the nerve sheath may increase the chance of nerve injury.¹⁰⁻¹¹

In the patient above, we got quite good results regarding the postoperative pain scale from 0 hours to 48 hours. This proves that the regional anesthesia technique with continuous popliteal sciatic block can be effectively used as a multimodal analgesia for postoperative pain management in patients undergoing foot and ankle surgery. Intermittent with bupivacaine 0.1% volume 20 ml every 4 hours provides a good analgesic effect and is safe from complications from the local anesthetic used, and this dose is a modification of the bolus dose intermittent programmed, which provides a volume of 5 ml every hour. However, for this method of administration using intermittent volume with a period of time like this, further research is still needed with a larger number of patient samples to provide accurate data on efficacy and safety.

4. Conclusion

The continuous popliteal sciatic block is a regional anesthetic that can provide strong analgesics for patients undergoing foot and ankle surgery. This blocking technique has also been proven to be effective and safe in terms of administration. There are several things that need to be considered if choosing to do this block technique, including selection of the type of self-coiling catheter or regular catheter that is related to the incidence rate of the catheter changing position; The position of the tip of the catheter outside or inside of the perineural is associated with the efficacy of local anesthetic drugs but is also associated with an increased risk of neuropathy in patients; And intermittent or basal-rate dose regulation is also still not a permanent guideline for its implementation.

5. References

1. Ma HH, Chou TA, Tsai SW, Chen CF, Wu PK, Chen WM. The efficacy and safety of continuous versus single-injection popliteal sciatic nerve block in outpatient foot and ankle surgery: a systematic review and meta-analysis. *BMC Musculoskelet Disord.* 2019; 20(1): 441.
2. Nickl R, Vicent O, Müller T, Osmers A, Schubert K, Koch T, et al. Impact of self-coiling catheters for continuous popliteal sciatic block on postoperative pain level and dislocation rate: a randomized controlled trial. *BMC Anesthesiol.* 2022; 22(1): 159.
3. Chelly JE, Ghisi D, Fanelli A. Continuous peripheral nerve blocks in acute pain management. *Br J Anaesth.* 2010; 105: i86–96.
4. Ding DY, Manoli A 3rd, Galos DK, Jain S, Tejwani NC. Continuous popliteal sciatic nerve block versus single injection nerve block for ankle fracture surgery: a prospective randomized comparative trial. *J Orthop Trauma.* 2015; 29(9): 393–8.
5. Hauritz RW, Pedersen EM, Linde FS, Kibak K, Børglum J, Bjoern S, et al. Displacement of popliteal sciatic nerve catheters after major foot

- and ankle surgery: a randomized controlled double-blinded magnetic resonance imaging study. *Br J Anaesth.* 2016; 117: 220–7.
6. Edward Kim T, Howard SK, Funck N, Kyle Harrison T, Walters TL, Wagner MJ, et al. A randomized comparison of long-axis and short-axis imaging for in-plane ultrasound-guided popliteal-sciatic perineural catheter insertion. *J Anesth.* 2014; 28: 854–60.
 7. Li Y, Zhang Q, Wang Y, Yin C, Guo J, Qin S, et al. Ultrasound-guided single popliteal sciatic nerve block is an effective postoperative analgesia strategy for calcaneal fracture: a randomized clinical trial. *BMC Musculoskelet Disord.* 2021; 22(1): 735.
 8. Gerbershagen HJ, Aduckathil S, van Wijck AJM, Peelen LM, Kalkman CJ, Meissner W. Pain intensity on the first day after surgery: a prospective cohort study comparing 179 surgical procedures. *Anesthesiology.* 2013; 118: 934–44.
 9. Cooper J, Benirschke S, Sangeorzan B. Sciatic nerve blockade improves early postoperative analgesia after open repair of calcaneus fractures. *J Orthop Trauma.* 2004; 18(4): 197–201.
 10. Tran DQ, Dugani S, Pham K. A randomized comparison between subepineural and conventional ultrasound-guided popliteal sciatic nerve block. *Reg Anesth Pain Med.* 2011; 36(6): 548–52.
 11. Cappelleri G, Cedrati VL, Fedele LL. Effects of the intraneural and subparaneural ultrasound-guided popliteal sciatic nerve block: a prospective, randomized, double-blind clinical and electrophysiological comparison. *Reg Anesth Pain Med.* 2016; 41(4): 430–7.