



# Anesthetic Management of Patients with Diabetic Foot Ulcers Using Femoral and Popliteal Nerve Blocks

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## KEYWORDS

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## ABSTRACT:

This case series presents the successful utilization of femoral and popliteal nerve blocks as an alternative anesthesia technique in patients with diabetic foot ulcers undergoing lower extremity surgery. Five cases are discussed, each highlighting the efficacy and safety of regional anesthesia in managing complex medical conditions and optimizing perioperative outcomes.

## Introduction:

Diabetic foot ulcers (DFUs) are a common complication of diabetes mellitus that often require surgical intervention to prevent further complications such as infection and limb loss. However, selecting the appropriate anesthesia technique for these patients can be challenging due to the presence of comorbidities that may increase surgical risk. This case series explores the use of femoral and popliteal nerve blocks as an effective anesthesia option in patients with DFUs who have contraindications to spinal anesthesia or general anesthesia.

## Objective:

The objective of the case series is to illustrate the successful utilization of femoral and popliteal nerve blocks as an alternative anesthesia technique in patients with diabetic foot ulcers and various comorbidities, including severe peripheral neuropathy, cardiovascular disease, chronic kidney disease, chronic obstructive pulmonary disease, and a history of stroke. The series aims to highlight the effectiveness and safety of regional anesthesia in these complex patients, emphasizing individualized anesthesia management tailored to specific medical histories and perioperative needs.

## Case Reports:

**Case 1: Anesthetic Management of a Patient with Diabetic Foot Ulcer and Severe Peripheral**

## Neuropathy Undergoing Surgery with Femoral and Popliteal Nerve Blocks

A 65-year-old female with a history of poorly controlled diabetes mellitus presented to the hospital with a non-healing diabetic foot ulcer on her right foot. The ulcer was complicated by severe peripheral neuropathy, making the patient ineligible for spinal anesthesia. Therefore, the decision was made to proceed with surgical debridement and wound closure under regional anesthesia with femoral and popliteal nerve blocks.

**Anesthetic Management:** After obtaining informed consent, the patient was positioned supine on the operating table, and standard monitors were applied. Ultrasound-guided femoral and popliteal nerve blocks were performed using a nerve stimulator technique. A combination of local anesthetics (e.g., bupivacaine and lidocaine) was injected under ultrasound guidance to achieve sensory and motor blockade of the lower extremities.

**Intraoperative Course:** The surgical procedure proceeded uneventfully under regional anesthesia with femoral and popliteal nerve blocks. The patient remained hemodynamically stable throughout the procedure, and no intraoperative complications were encountered.

**Postoperative Course:** Following surgery, the patient was transferred to the recovery area for monitoring and pain assessment. The sensory blockade provided adequate



pain control, and additional analgesia with oral medications was initiated as needed. The patient tolerated the procedure well and was discharged home on the same day with instructions for postoperative wound care and follow-up.

### **Case 2: Femoral and Popliteal Block for Diabetic Foot Ulcer Debridement in High-Risk Patient**

A 65-year-old male with a history of type 2 diabetes mellitus (DM) for 20 years, coronary artery disease (CAD) with prior percutaneous coronary intervention (PCI), chronic obstructive pulmonary disease (COPD), hyperlipidemia, peripheral artery disease (PAD) presented with a non-healing DFU on his right foot.

Considerations for Spinal Anesthesia:

CAD: Spinal anesthesia can cause hypotension, potentially compromising blood flow to the already ischemic limb.

COPD: Spinal anesthesia can lead to respiratory depression in patients with compromised lung function. Therefore, regional anesthesia with a femoral and popliteal nerve block was deemed the most suitable option.

Anesthetic Technique: Pre-operative optimization: Blood sugar control was ensured, and COPD medications were continued.

Monitoring: Standard monitoring including ECG, pulse oximetry, non-invasive blood pressure, and capnography was established.

Ultrasound-guided nerve block: With sterile technique, the femoral and popliteal nerves were identified using ultrasound. A local anesthetic mixture (e.g., bupivacaine and lidocaine) was injected around each nerve to achieve adequate sensory and motor block of the lower extremity.

Surgery: The surgical team performed a debridement of the DFU under successful anesthesia. The patient tolerated the procedure well without any complications.

Post-operative Course: The patient recovered uneventfully in the post-anesthesia care unit. Pain management was achieved with a combination of oral medications. He was discharged home the following day with a plan for continued wound care and diabetic management.

### **Case 3: Anesthesia Management of a Patient with Diabetic Foot Ulcer and Chronic Kidney Disease**

A 55-year-old female with a history of type 1 DM and CKD presented to our hospital with a chronic diabetic foot ulcer on her left foot. The ulcer was complicated by osteomyelitis and required surgical debridement and wound closure. Preoperative evaluation revealed severe

lumbar disc herniation with compression of the spinal cord, rendering spinal anesthesia contraindicated.

Given the patient's medical history and the need for surgery, femoral and popliteal nerve blocks were selected for anesthesia management. After obtaining informed consent, the patient was positioned supine, and ultrasound-guided nerve blocks were performed using a combination of local anesthetic agents.

The surgical procedure proceeded uneventfully, with the patient experiencing minimal discomfort. Intraoperative monitoring revealed stable vital signs, and there were no signs of local anesthetic toxicity or nerve injury. Postoperatively, the patient reported satisfactory pain control, and there were no complications during the recovery period.

### **Case 4: Anesthetic Management of a Patient with Diabetic Foot Ulcer and Chronic Obstructive Pulmonary Disease**

A 60-year-old female with poorly controlled type 2 DM and a history of COPD presented to our hospital with a chronic diabetic foot ulcer on her left foot. The ulcer was complicated by infection and required surgical debridement and wound care. Preoperative evaluation revealed severe lumbar disc herniation with compression of the spinal cord, rendering spinal anesthesia unsuitable. Given the patient's respiratory compromise and contraindication to spinal anesthesia, femoral and popliteal nerve blocks were chosen for anesthesia management. After obtaining informed consent, ultrasound-guided nerve blocks were performed using a combination of local anesthetic agents.

The surgical procedure proceeded without complications, with the patient experiencing minimal discomfort. Intraoperative monitoring showed stable oxygen saturation levels, and there were no signs of local anesthetic toxicity or nerve injury. Postoperatively, the patient reported satisfactory pain control, and there were no respiratory complications during the recovery period.

### **Case 5: Anesthesia Management of a Patient with Diabetic Foot Ulcer and History of Stroke**

A 65-year-old female with poorly controlled type 2 DM and a history of stroke presented to our hospital with a chronic diabetic foot ulcer on her left foot. The ulcer was complicated by infection and required surgical debridement and wound care. The preoperative assessment revealed prior lumbar spine surgery, making spinal anesthesia unsuitable.

Given the patient's history of stroke and contraindication to spinal anesthesia, femoral and popliteal nerve blocks



were selected for anesthesia management. After obtaining informed consent, ultrasound-guided nerve blocks were performed using a combination of local anesthetic agents.

The surgical procedure proceeded uneventfully, with the patient experiencing minimal discomfort. Intraoperative monitoring showed stable hemodynamics, and there were no signs of local anesthetic toxicity or nerve injury. Postoperatively, the patient reported satisfactory pain control, and there were no neurological complications during the recovery period.

### Discussion:

The successful application of femoral and popliteal nerve blocks in the presented case series highlights the efficacy of regional anesthesia techniques in managing patients with diabetic foot ulcers. By avoiding the potential complications associated with spinal anesthesia, such as hypotension, respiratory depression, and neurologic injury, femoral and popliteal nerve blocks offer a safe and effective alternative for lower extremity procedures. In all cases, the patients experienced minimal discomfort intraoperatively, and stable vital signs were maintained throughout the surgical procedures. This underscores the reliability of ultrasound-guided nerve blocks in achieving adequate sensory and motor blockade while minimizing the risk of local anesthetic toxicity or nerve injury.

Furthermore, the postoperative courses were uneventful, with patients reporting satisfactory pain control and no significant complications during the recovery period. The ability to provide effective analgesia without systemic opioid administration is particularly advantageous in patients with multiple comorbidities, where opioid-related adverse effects may exacerbate existing medical conditions.

The successful outcomes observed in this case series emphasize the importance of individualizing anesthesia management based on each patient's unique medical history and surgical requirements. Multidisciplinary collaboration between anesthesiologists, surgeons, and other healthcare providers is essential in tailoring anesthesia strategies to optimize perioperative care and achieve favorable outcomes in patients with diabetic foot ulcers.

### Conclusion:

Femoral and popliteal nerve blocks represent a valuable alternative for anesthesia management in patients with

diabetic foot ulcers, particularly when spinal anesthesia is contraindicated or poses increased risks due to comorbidities. The cases presented in this series demonstrate the feasibility and safety of utilizing regional anesthesia techniques to provide effective perioperative pain control and optimize surgical outcomes. By incorporating femoral and popliteal nerve blocks into the anesthesia plan and leveraging ultrasound guidance for precise nerve localization, clinicians can mitigate potential complications and enhance the overall quality of care for patients undergoing lower extremity procedures for diabetic foot ulcers.

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### REFERENCES:

- [1] Armstrong, D.G.; Boulton, A.J.M.; Bus, S.A. Diabetic Foot Ulcers and Their Recurrence. *N. Engl. J. Med.* 2017, *376*, 2367–2375.
- [2] Yazdanpanah, L.; Shahbazian, H.; Nazari, I.; Arti, H.R.; Ahmadi, F.; Mohammadianejad, S.E.; Cheraghian, B.; Hesam, S. Incidence and Risk Factors of Diabetic Foot Ulcer: A Population-Based Diabetic Foot Cohort (ADFC Study)-Two-Year Follow-Up Study. *Int. J. Endocrinol.* 2018, *2018*, 7631659.
- [3] Lin, C.; Liu, J.; Sun, H. Risk factors for lower extremity amputation in patients with diabetic foot ulcers: A meta-analysis. *PloS ONE* 2020, *15*, e0239236.
- [4] Belmont, P.J., Jr.; Davey, S.; Orr, J.D.; Ochoa, L.M.; Bader, J.O.; Schoenfeld, A.J. Risk factors for 30-day postoperative complications and mortality after below-knee amputation: A study of 2911 patients from the national surgical quality improvement program. *J. Am. Coll. Surg.* 2011, *213*, 370–378.
- [5] Ploeg, A.J.; Lardenoye, J.W.; Vrancken Peeters, M.P.F.M.; Breslau, P.J. Contemporary Series of Morbidity and Mortality after Lower Limb Amputation. *Eur. J. Vasc. Endovasc. Surg.* 2005, *29*, 633–637.



- [6] Van Netten, J.J.; Fortington, L.V.; Hinchliffe, R.J.; Hijmans, J.M. Early Post-operative Mortality after Major Lower Limb Amputation: A Systematic Review of Population and Regional Based Studies. *Eur. J. Vasc. Endovasc. Surg.* 2016, 51, 248–257.
- [7] Khan, S.A.; Qianyi, R.L.; Liu, C.; Ng, E.L.; Fook-Chong, S.; Tan, M.G. Effect of anesthetic technique on mortality following major lower extremity amputation: A propensity score-matched observational study. *Anaesthesia* 2013, 68, 612–620
- [8] Moreira, C.C.; Farber, A.; Kalish, J.A.; Eslami, M.H.; Didato, S.; Rybin, D.; Doros, G.; Siracuse, J.J. The effect of anesthesia type on major lower extremity amputation in functionally impaired elderly patients. *J. Vasc. Surg.* 2016, 63, 696–701
- [9] Mann, R.A.M.; Bisset, W.I.K. Anaesthesia for lower limb amputation. *Anaesthesia* 1983, 38, 1185–1191.
- [10] Kessler, J.; Marhofer, P.; Hopkins, P.M.; Hollmann, M.W. Peripheral regional anesthesia and outcome: Lessons learned from the
- [11] last 10 years. *Br. J. Anaesth.* 2015, 114, 728–745.