

Continuous Adductor Canal Block in a Morbidly Obese Hypertensive Patient Undergoing Posterior Cruciate Ligament Reconstruction: A Case Report

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ARTICLE INFO

Article history:

Received
10 May 2026

Revised
27 July 2026

Accepted
30 September 2026

Manuscript ID:
JSOCMED-10052026-59-4

Checked for Plagiarism: Yes

Language Editor:
Rebecca

Editor-Chief:
Prof. Aznan Lelo, PhD

Keywords

ABSTRACT

Introduction: Morbid obesity and uncontrolled hypertension challenge anesthetic management through respiratory complications and hemodynamic instability. Regional techniques limit airway manipulation and drug exposure. This report describes the combined spinal anesthesia and continuous adductor canal block (ACB) in a morbidly obese patient undergoing posterior cruciate ligament reconstruction.

Case Description: A 31-year-old man weighing 130 kg and with a height of 173 cm (BMI 43.4 kg/m²) was diagnosed with a right posterior cruciate ligament rupture and had a preoperative blood pressure of 168/102 mmHg; physical and laboratory examinations were otherwise unremarkable. Spinal anesthesia was performed using 15 mg of 0.5% hyperbaric bupivacaine at the L2–L3 interspace. Prior to the surgical incision, ultrasound-guided ACB was performed, and a continuous catheter was inserted. Postoperatively, a loading dose of 15 mL of 0.25% levobupivacaine was administered via the catheter, followed by continuous infusion of 0.125% levobupivacaine at 5 mL/hour for 48 hours. The three-hour surgery proceeded with stable hemodynamics and no vasopressor requirement. Postoperative pain scores ranged from NRS 1–2 without rescue opioids and without complications, and the patient was discharged on postoperative day two.

Conclusion: Combined spinal anesthesia and continuous ACB provided stability, analgesia, motor preservation, and minimized opioid use, which is suitable for morbidly obese hypertensive patients undergoing lower-limb surgery.

Adductor Canal Block, Hypertension, Morbid Obesity, Regional Anesthesia, Ligament Reconstruction

How to cite: Suandrianno Y, Tantri AR. Continuous Adductor Canal Block in a Morbidly Obese Hypertensive Patient Undergoing Posterior Cruciate Ligament Reconstruction: A Case Report. *Journal of Society Medicine*. 2026; 5 (9): 345–349. DOI: <https://doi.org/10.71197/jsocmed.v5i9.294>

INTRODUCTION

Morbid obesity is increasingly encountered in anesthetic practice and presents complex physiological challenges to the anesthesiologist. In patients with a body mass index (BMI) ≥ 40 kg/m², respiratory alterations, such as reduced functional residual capacity and increased metabolic demand, lead to decreased tolerance to apnea [1]. Obesity is associated with difficult airway management and a higher incidence of perioperative respiratory complications [2]. These risks become more significant when postoperative analgesia requires systemic opioid administration, as obese patients are more susceptible to opioid-induced respiratory depression [3].

In this case, a patient weighing 130 kg and with a height of 173 cm (BMI 43.4 kg/m²) had additional uncontrolled hypertension, further increasing the perioperative risk. Hypertension predisposes patients to hemodynamic fluctuations, particularly during anesthetic induction and surgical stimulation [4]. Therefore, an anesthetic approach that minimizes hemodynamic instability and reduces systemic drug exposure is of particular importance. In knee surgery, effective postoperative analgesia plays a crucial role in facilitating

early mobilization and reducing the risk of thromboembolic events [5]. The adductor canal block (ACB) has emerged as a motor-sparing regional analgesic technique that preserves quadriceps muscle strength while providing adequate analgesia to the anteromedial aspect of the knee [6]. Compared with femoral nerve block, ACB offers better motor preservation without compromising analgesic efficacy [7]. The use of a continuous catheter technique further enhances analgesic stability and reduces postoperative opioid requirements [8]. Considering the patient's risk profile, the combination of spinal anesthesia and continuous ACB was evaluated as an appropriate strategy in this case report.

CASE DESCRIPTION

A 31-year-old man weighing 130 kg and with a height of 173 cm (BMI 43.4 kg/m²) was scheduled for right posterior cruciate ligament (PCL) repair due to traumatic PCL rupture. The patient had comorbid morbid obesity and uncontrolled hypertension, with a preoperative blood pressure of 168/102 mmHg. There was no history of diabetes mellitus, coronary artery disease, asthma, or chronic obstructive pulmonary disease. The patient denied any history of drug allergy.

The patient was fully conscious and oriented during the physical examination. The heart rate was 92 beats per minute and regular, the respiratory rate was 20 breaths per minute, and the peripheral oxygen saturation was 98% on room air. Airway assessment revealed a Mallampati class II score and increased neck circumference. Cardiopulmonary examination was unremarkable, with no murmurs or adventitious lung sounds. Examination of the right lower extremity demonstrated posterior knee instability consistent with a PCL rupture. Routine preoperative laboratory investigations, including complete blood count, renal function, and electrolyte levels, were within normal limits. Electrocardiography showed a normal sinus rhythm without acute ischemic changes. The patient was scheduled to undergo spinal anesthesia combined with continuous adductor canal block (ACB) for postoperative analgesia. In the operating room, standard monitoring (electrocardiography, non-invasive blood pressure, and pulse oximetry) was applied. Spinal anesthesia was performed at the L2–L3 interspace in the sitting position using a 25G spinal needle. Clear cerebrospinal fluid was obtained at approximately 7 cm from the skin surface. Hyperbaric bupivacaine 0.5% (15 mg; 3 mL) was administered intrathecally. Sensory blockade reached the T10 dermatome level, and intraoperative hemodynamic parameters remained stable without the need for vasopressors.

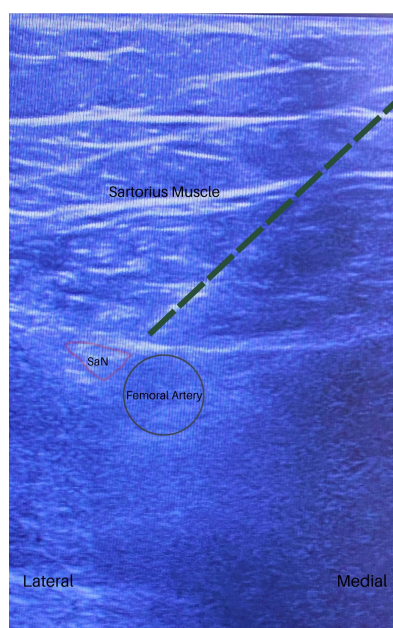


Figure 1. Ultrasound anatomy of the adductor canal (right thigh). Transverse sonographic image obtained at the mid-adductor canal level with the probe marker directed laterally. The sartorius muscle (SM) forms the roof of the adductor canal. The femoral artery (FA) was identified as a round anechoic structure within the canal. The saphenous nerve (SaN) appears as a small hyperechoic structure located anterolaterally to the femoral artery beneath the sartorius muscle.

Prior to the surgical incision, an ultrasound-guided adductor canal block was performed using a high-frequency linear transducer at the mid-thigh level. After identification of the femoral artery beneath the sartorius muscle, the needle was inserted using an in-plane technique and advanced into the adductor canal. A catheter was then threaded approximately 4 cm beyond the needle tip and secured appropriately. The surgery lasted approximately 3 hours, during which hemodynamic stability was maintained, and no intraoperative complications occurred. In the post-anesthesia care unit, a loading dose of 15 mL levobupivacaine 0.25% (37.5 mg) was administered incrementally via the ACB catheter with intermittent aspiration. Continuous infusion of levobupivacaine 0.125% was then initiated at 5 mL/hour (6.25 mg/hour) and maintained for 48 hours. Multimodal analgesia with scheduled intravenous paracetamol was provided. During hospitalization, pain scores ranged between 1–2 on the numeric rating scale (NRS) at rest and during mild mobilization. No opioid rescue was required. No adverse effects, such as hypotension, bradycardia, significant motor weakness, signs of local anesthetic systemic toxicity, or catheter-related complications, were observed. The patient was discharged on postoperative day two in a stable condition.

DISCUSSION

This case illustrates the complexity of anesthetic decision-making in patients with morbid obesity and uncontrolled hypertension. In individuals with a body mass index (BMI) ≥ 40 kg/m², significant physiological alterations directly influence the perioperative management. Reduced functional residual capacity and increased oxygen consumption limit the respiratory reserve, predisposing patients to rapid desaturation during periods of hypoventilation or apnea [1]. Moreover, morbid obesity is associated with a higher incidence of difficult ventilation and intubation and increased postoperative respiratory complications when general anesthesia is employed [2]. These considerations are even more relevant when systemic opioids are used for postoperative pain control, as obese patients are at a greater risk of opioid-induced respiratory depression [3].

In this case, uncontrolled hypertension further increased the perioperative risk. Blood pressure fluctuations during induction, laryngoscopy, and surgical stimulation may precipitate cardiovascular complications, particularly in patients with elevated baseline blood pressure [4]. Therefore, an anesthetic strategy aimed at minimizing excessive sympathetic responses and avoiding extreme hemodynamic changes was prioritized. Regional anesthesia offers advantages in this context by reducing the need for systemic anesthetic agents and limiting airway manipulation. Spinal anesthesia was selected as the primary technique because it provides rapid, predictable, and adequate sensory blockade for lower limb surgery [9]. In morbidly obese patients, increased intra-abdominal pressure and epidural venous engorgement may reduce cerebrospinal fluid volume, thereby influencing the spread of intrathecal local anesthetics [10]. This may result in a wider-than-expected distribution of spinal blocks even with standard dosing. Therefore, a dose of 15 mg hyperbaric bupivacaine was chosen to balance sufficient anesthetic duration for a procedure lasting approximately three hours while minimizing the risk of high spinal blocks and severe hypotension. The stable intraoperative hemodynamic profile observed in this patient suggests that this dosing strategy was appropriate despite the presence of uncontrolled hypertension.

Postoperative analgesia was another key consideration. Effective pain control is essential in ligament reconstruction surgery to facilitate early mobilization and reduce the risk of thromboembolic events [5]. Early mobilization is particularly important in morbidly obese patients because of their increased susceptibility to thromboembolic and respiratory complications. The adductor canal block (ACB) offers specific advantages because it is a motor-sparing technique. By primarily targeting the saphenous nerve and other sensory branches within the adductor canal, ACB provides analgesia to the anteromedial knee region without causing significant quadriceps weakness [6]. In contrast, femoral nerve block has been more frequently associated with motor impairment and an increased risk of falls [7]. The use of a continuous catheter technique further supports an opioid-sparing strategy. Several studies have demonstrated that continuous ACB provides more consistent analgesia, reduces supplemental opioid requirements, and improves functional recovery compared with single-shot techniques [8]. In the present case, low postoperative pain scores without opioid rescue corroborate these

findings. Opioid minimization is particularly critical in morbidly obese patients due to the associated reduction in respiratory depression and pulmonary complications.

Although epidural analgesia may provide extensive pain control for lower limb surgery, bilateral sympathetic blockade may result in hypotension, especially in patients with unstable blood pressure regulation [11]. In individuals with uncontrolled hypertension, both abrupt decreases and increases in blood pressure should be avoided to reduce the cardiovascular risk [4]. Furthermore, epidural analgesia may cause bilateral motor blockade, potentially delaying mobilization. In overweight and obese patients, delayed mobilization increases the risk of thromboembolic events and prolonged hospitalization. Taken together, the combination of spinal anesthesia and continuous ACB in this case provided several strategic benefits: avoidance of airway manipulation, maintenance of hemodynamic stability, preservation of motor function, and minimization of opioid requirements. This approach aligns with the enhanced recovery principles in orthopedic surgery, which emphasize effective analgesia while preserving physiological stability and functional capacity. Although limited to a single case and not generalizable to all patient populations, this report suggests that a carefully planned regional anesthesia strategy can yield favorable outcomes in high-risk patients. It underscores the importance of individualized anesthetic management tailored to patient comorbidities and supports the relevance of multimodal and opioid-sparing approaches in morbidly obese patients with hypertension.

CONCLUSION

Spinal anesthesia combined with a continuous adductor canal block is effective in morbidly obese patients with uncontrolled hypertension undergoing posterior cruciate ligament reconstruction. This approach avoids airway manipulation, maintains stability, and provides postoperative analgesia with minimal opioid requirements, while preserving motor function. Regional anesthesia may enhance safety and support recovery in high-risk populations.

DECLARATIONS

None

CONSENT FOR PUBLICATION

The Authors agree to be published in the Journal of Society Medicine.

FUNDING

None

COMPETING INTERESTS

The authors declare no conflicts of interest in this case report.

AUTHORS' CONTRIBUTIONS

Y.S. was responsible for patient management, data acquisition, and drafting the manuscript. A.R.T. contributed to clinical supervision and critical revision of the intellectual content. Both authors reviewed and approved the final manuscript version and agreed to be accountable for all aspects of the work.

ACKNOWLEDGMENTS

The authors thank the surgical and anesthesia teams of RS Keluarga Kita, Curug, for their support in the perioperative management of the patient and acknowledge the nursing staff for their assistance during postoperative monitoring.

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