



Managing Hip Arthroplasty with Regional Anesthesia in Patient with Severe Sarcoidosis and Cardiac Dysfunction

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Introduction

- Patients with **left ventricular ejection fraction (LVEF) < 30%** and **pulmonary hypertension (RVSP > 50 mmHg)** are at **high perioperative risk** due to limited cardiopulmonary reserve and poor tolerance to anesthetic-induced hypotension (2, 3).
- General anesthesia (GA)** can precipitate **hemodynamic collapse, right-heart failure, or postoperative respiratory failure** (2, 3).
- Single-shot spinal anesthesia** provides rapid, dense blockade but carries risk of **abrupt sympathectomy and hypotension**, which may be poorly tolerated in patients with compromised ventricular function (3).
- Continuous spinal anesthesia (CSA)** allows **graded, titratable intrathecal dosing**, offering **greater control of sympathetic blockade and hemodynamic stability** compared with single-shot techniques (1).
- Regional adjuncts** such as the **pericapsular nerve group (PENG) block** enhance analgesia and reduce systemic opioid use, thereby **avoiding respiratory depression** in patients with pulmonary disease (2, 3).
- Combined **CSA with a PENG block** provides a **balanced anesthetic: stable, opioid-sparing, and tailored for high-risk orthopedic patients** (1–3).

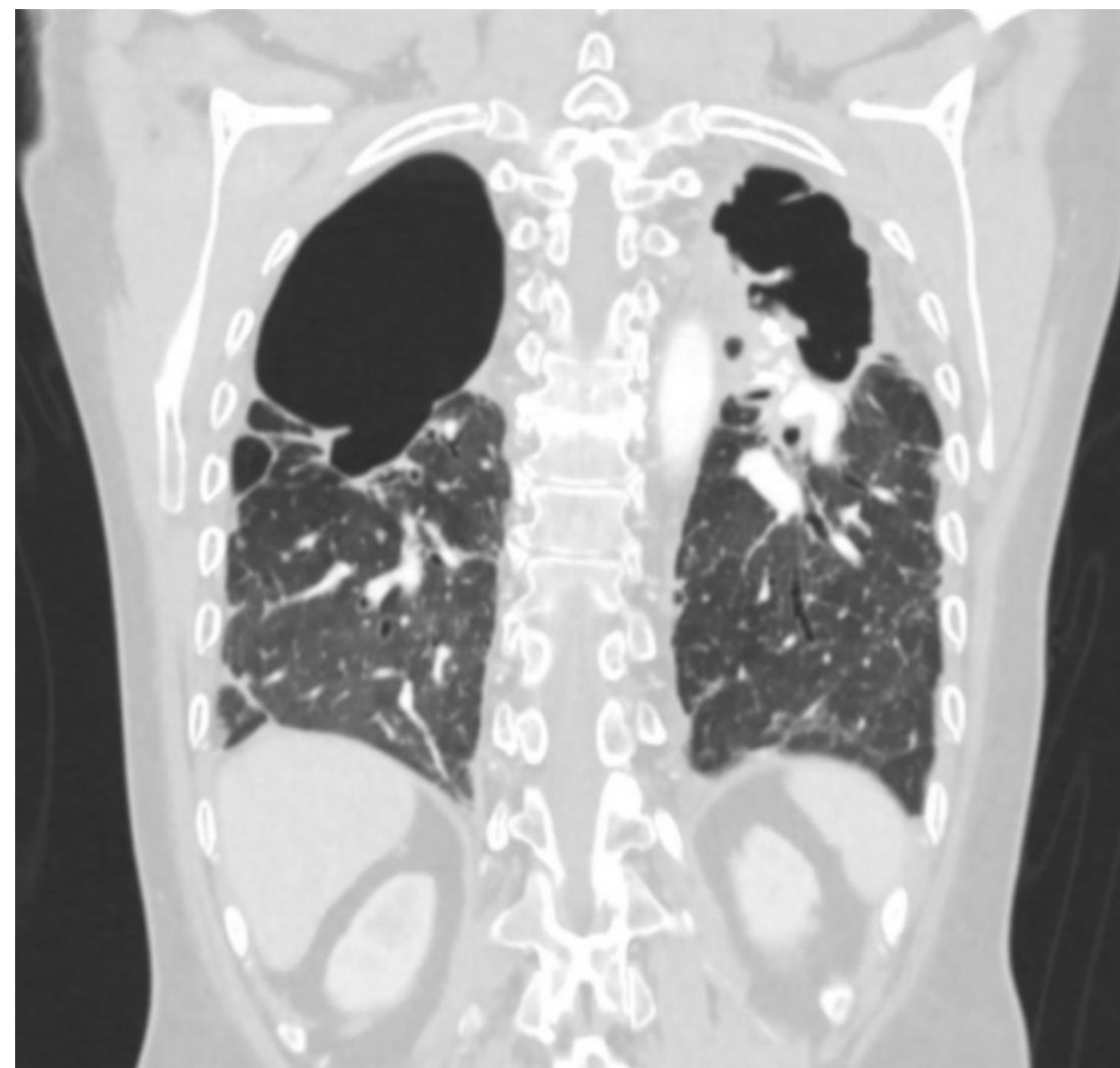
Materials and Methods

- As this is a Case Report devoid of patient identifiers, no IRB approval was required per UMMC policy.
- Informed consent was obtained from the patient for this presentation.

Case Report

- This report describes the successful use of **CSA with PENG block** in a **54-year-old woman with sarcoidosis, interstitial lung disease, pulmonary hypertension (RVSP 58 mmHg), and LVEF 25%** undergoing **total hip arthroplasty**, highlighting a **safe and effective alternative** for patients with severe cardiopulmonary compromise.
- General anesthesia was avoided** due to severe cardiopulmonary disease and risk of respiratory failure, pneumothorax, and hemodynamic instability. **Single-shot spinal anesthesia** was also **contraindicated** given potential for abrupt sympathectomy and severe hypotension.
- A continuous spinal catheter was placed preoperatively under standard monitoring, with the patient in the lateral position due to pain limitations. Preoperative placement facilitated adequate preparation time and prevented intraoperative delays, optimizing team coordination and safety. Anesthesia was provided using **titrated boluses**: an initial **5 mg dose**, followed by two additional **2.5 mg doses**, each administered while continuously monitoring the patient's response and hemodynamics.
- Following confirmation of cerebrospinal fluid return, a **single-shot ultrasound-guided PENG block** was performed for anterior hip analgesia and to minimize perioperative opioid use.
- In the OR, baseline hemodynamics were recorded; **isobaric local anesthetic** was titrated incrementally through the catheter to achieve surgical anesthesia. The patient was maintained in a **slight reverse Trendelenburg position** to limit cephalad spread and sympathetic blockade.
- Throughout the procedure, the patient remained **awake, comfortable, and hemodynamically stable** without vasopressor requirement or conversion to general anesthesia.
- The case was completed successfully with:
 - No intraoperative complications**
 - Stable oxygenation**
 - Smooth postoperative recovery**

Relevant CT Imaging



Discussion

- Patients with **severe cardiopulmonary disease**, including reduced LVEF, pulmonary hypertension, and interstitial lung disease, present major anesthetic challenges due to the risk of **hypotension and respiratory compromise** under general or single-shot spinal anesthesia (2, 3).
- Continuous spinal anesthesia (CSA)** allows **slow, titrated dosing**, minimizing abrupt sympathectomy and promoting **hemodynamic stability** in high-risk populations (1).
- Preoperative intrathecal catheter placement** optimizes workflow and enables **controlled, deliberate dosing** without delaying surgical start times (1).
- Combining CSA with a **PENG block** provides **effective surgical anesthesia and postoperative analgesia**, while minimizing **opioid use** and preserving **respiratory mechanics** (1).
- Incremental dosing** and **reverse Trendelenburg positioning** prevent excessive cephalad spread, reducing the risk of **profound sympathetic blockade** (1).
- Avoiding deep sedation and maintaining spontaneous ventilation** mitigates **hypercapnia and right ventricular strain**, which are critical concerns in **pulmonary hypertension** (2).
- Multidisciplinary coordination** among anesthesia, surgery, and perioperative nursing teams enhances **safety and hemodynamic management** (3).
- CSA with adjunctive regional anesthesia** represents a **lung-sparing, cardiac-stable alternative** to general anesthesia for complex orthopedic cases (1, 2).
- Educational resources**, including video demonstrations, can help anesthesiologists refine their **CSA technique and dosing strategies** (4).
- This case demonstrates that **major orthopedic surgery** can be safely performed **without general anesthesia** in patients with **advanced cardiopulmonary compromise** (1–3).

Conclusion and Summary

- Continuous spinal anesthesia (CSA)** offers a safe, titratable option for **patients with severe cardiopulmonary disease**, reducing risks associated with general or spinal anesthesia (1–3).
- In high-risk orthopedic surgery, **CSA provides controlled sympathetic blockade**, improving **hemodynamic stability** and minimizing hypotension (1).
- Adjunctive regional techniques**, such as the **PENG block**, enhance intraoperative comfort, postoperative analgesia, and reduce **opioid use**.
- Preoperative planning and multidisciplinary coordination** optimize workflow efficiency and patient safety.
- Incremental dosing and vigilant monitoring** are essential when managing patients with **limited cardiac or pulmonary reserve**.
- CSA should be considered a lung- and heart-sparing alternative** to general anesthesia in selected high-risk patients, with growing educational resources supporting wider use (4).

References

- Bengtson, J.P., et al. "Continuous spinal anesthesia in high-risk patients: A review of indications and outcomes." *Anesthesia & Analgesia*, 2020; 130(2): 380–390.
- Lai, H.C., et al. "Perioperative considerations for patients with severe pulmonary hypertension." *British Journal of Anaesthesia*, 2018; 120(6): 1237–1250.
- Nandwani, V., et al. "Anesthetic implications of severe left ventricular dysfunction." *Journal of Cardiothoracic and Vascular Anesthesia*, 2019; 33(2): 553–562.
- YouTube video demonstrating continuous spinal anesthesia technique: <https://www.youtube.com/watch?v=3knfs021QdI>