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CASE REPORT

Bad Lung Down Phenomenon During Spinal Positioning for Hip Hemiarthroplasty: A Case Report

I Made Prema Putra✉, Putu Herdita Sudiantara, Anak Agung Ngurah Aryawangsa, Nyoman Bendhesa Wirananggala, Anak Agung Gde Agung Adistaya, Tjokorda Gde Agung Senapathi

Department of Anesthesiology and Intensive Care, Faculty of Medicine, Universitas Udayana, Denpasar, Indonesia

✉Correspondence: premaputra@unud.ac.id

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ABSTRACT

Background: Position-dependent hypoxemia during spinal anesthesia positioning is uncommon but may pose safety concerns in older patients with unilateral lung disease.

Case: An 84-year-old woman (ASA III) with a proximal femoral fracture and clinical-radiographic features consistent with left-sided pneumonia was scheduled for bipolar hip hemiarthroplasty. Fracture-related pain and positioning limitations precluded the sitting position and right lateral decubitus, making the left lateral decubitus (LLD) position the only feasible option for spinal anesthesia. During LLD positioning with oxygen via nasal cannula, oxygen saturation dropped to 84-88% without dyspnea and promptly improved after returning to the supine position. Ancillary evaluation revealed preserved biventricular systolic function (left ventricular ejection fraction 60%, TAPSE 19 mm). Lung ultrasound showed no sonographic evidence of pulmonary edema. Spinal anesthesia was performed in the LLD position using 7.5 mg of 0.5% hyperbaric bupivacaine with 50 mcg intrathecal morphine. The surgery then proceeded with a supine-position modification, and hemodynamic and respiratory status remained stable without intraoperative complications.

Discussion: In unilateral pneumonia, placing the diseased lung dependent can worsen ventilation-perfusion (V/Q) mismatch through the bad lung down phenomenon, leading to reversible position-dependent hypoxemia. In this case, desaturation occurred before intrathecal injection and before administration of sedatives or systemic opioids, making drug-induced hypoventilation unlikely. The absence of hypercapnic symptoms, preserved cardiac function, and lack of ultrasound evidence of pulmonary edema supported a predominantly pulmonary V/Q mechanism and illustrated silent hypoxemia in an older adult.

Conclusion: Positioning should be regarded as a critical step in neuraxial anesthesia, particularly in frail or elderly patients with unilateral lung disease. In such patients, early detection of position-dependent desaturation and prompt correction of posture can allow surgery to proceed safely under regional anesthesia without the need to convert to general anesthesia.

Keywords: hypoxia; octogenarians; patient positioning; pneumonia; spinal anesthesia

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INTRODUCTION

Hip hemiarthroplasty is a common definitive treatment for displaced femoral neck fractures in older adults, and regional anesthesia is often favored to facilitate early recovery and reduce systemic drug exposure.[1,2] Recent guidelines indicate that either spinal or general anesthesia is acceptable for hip fracture surgery in this population, emphasizing that anesthetic choice and perioperative management should be individualized according to comorbidities and physiological reserve.[1,3] Because spinal anesthesia typically requires sitting or lateral decubitus positioning, patient comfort and tolerance during positioning become critical steps in frail older adults.[4]

In patients with unilateral pneumonia, lateral positioning can substantially alter ventilation-perfusion (V/Q) relationships.[5,6,7] Oxygenation is generally improved when the healthier lung is dependent, whereas placing the diseased lung in the dependent position may worsen gas exchange through increased V/Q mismatch and functional shunt. Older adults with pneumonia may also present with atypical or subtle respiratory symptoms, and clinically significant hypoxemia can occur without overt dyspnea.[8,9] This case report describes an octogenarian with left-sided pneumonia who developed silent, reversible position-dependent desaturation during left lateral decubitus (LLD) positioning for spinal anesthesia before hip hemiarthroplasty and highlights a simple positional strategy modification to maintain intraoperative safety. To our knowledge, position-dependent hypoxemia during spinal anesthesia positioning in a spontaneously breathing patient with unilateral pneumonia has been reported only rarely. This rarity makes the present case relevant for anesthesiologists, as it illustrates how a routine positioning step can unmask significant gas-exchange abnormalities and influence perioperative management and safety. Therefore, this case report aims to describe position-dependent hypoxemia related to the bad lung down phenomenon during spinal positioning for hip hemiarthroplasty in an octogenarian with unilateral pneumonia and to discuss its practical implications for regional anesthesia practice.

CASE

An 84-year-old woman presented with a proximal femoral fracture and was scheduled for bipolar hip hemiarthroplasty. She reported hip pain and limited mobility but denied dyspnea or chest pain. Preoperative chest radiography was consistent with left-sided pneumonia, and pelvic radiography confirmed a displaced proximal femoral fracture (Figure 1). Baseline vital signs showed mild tachycardia, stable blood pressure, and normal oxygen saturation in the supine position. She was classified as having an American Society of Anesthesiologists (ASA) physical status of III.

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Cardiopulmonary evaluation revealed preserved biventricular systolic function with a left ventricular ejection fraction of approximately 60% and tricuspid annular plane systolic excursion (TAPSE) of approximately 19 mm, mild left ventricular hypertrophy, and grade I diastolic dysfunction. Electrocardiography demonstrated sinus tachycardia with nonspecific ST–T changes, with a note of suboptimal tracing quality. Lung ultrasound showed normal pleural sliding without B-lines or sonographic evidence of pulmonary edema. Laboratory tests indicated significant chronic kidney disease with a serum creatinine of approximately 1.95 mg/dL and an estimated glomerular filtration rate of approximately 23 mL/min/1.73 m². Arterial blood gas analysis in the supine position showed metabolic acidosis with mild respiratory alkalosis and normal lactate values, while oxygenation was adequate at the time of sampling.

Because of severe fracture-related pain and mechanical limitation, the patient could not tolerate the sitting position or right lateral decubitus. Consequently, the LLD position was the only realistic option for spinal anesthesia. During LLD positioning for spinal preparation, while receiving oxygen via nasal cannula at 2 L/min, oxygen saturation decreased to 84-88% without subjective breathlessness or overt respiratory distress. Saturation promptly improved after the patient was returned to the supine position. The desaturation pattern was reproducible when LLD was reattempted (Figure 2).

Given the clear positional component and absence of signs of acute cardiac decompensation or pulmonary edema, the episode was suspected to be related to a “bad lung down” effect due to left-sided pneumonia. After preoxygenation and careful monitoring, spinal anesthesia was performed in the LLD position using 7.5 mg of 0.5% hyperbaric bupivacaine with 50 mcg intrathecal morphine as an adjuvant. Immediately after a successful intrathecal injection, the patient was returned to the supine position, and the surgical plan was modified accordingly. The sensory block was adequate for surgery, hemodynamics remained stable, and no further significant desaturation occurred. The procedure was completed uneventfully, and the patient was transferred to the recovery area in a stable condition. The overall timeline of the clinical course is summarized in Table 1.

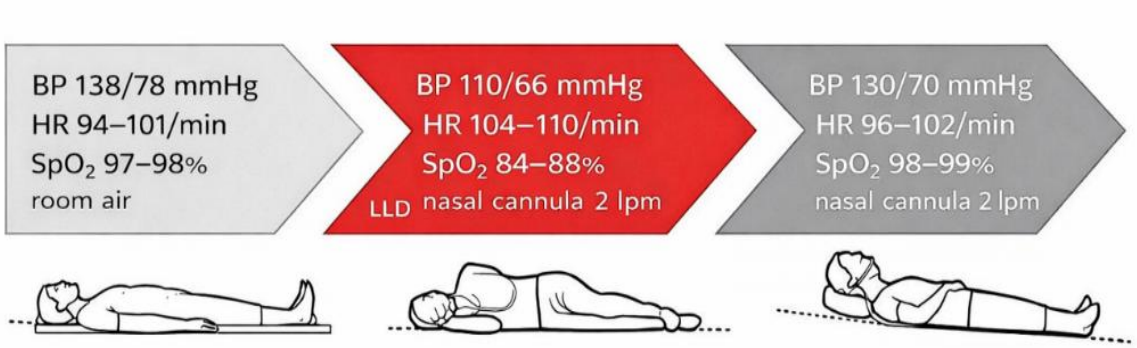


Figure 1. Bad lung down phenomenon

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Figure 2. Preoperative radiograph showing a displaced proximal femoral fracture in an 84-year-old patient scheduled for hip hemiarthroplasty.

Table 1. Timeline of clinical course

Phase	Key Event
Admission	An 84-year-old woman with a proximal femoral fracture, hip pain, limited mobility, and no dyspnea.
Initial assessment	Stable vitals with mild tachycardia; SpO_2 normal supine with O_2; planned bipolar hemiarthroplasty.
Preoperative investigations	CXR: left-sided pneumonia. Echo: preserved LV/RV function. LUS: no pulmonary edema. CKD (eGFR 23 mL/min/1.73 m^2)
Positioning for spinal	Sitting and right lateral not tolerated; LLD chosen as the only feasible position.
Positional desaturation	In LLD, SpO_2 84–88% without dyspnea; promptly normal in supine; pattern reproducible.
Spinal anesthesia	Brief LLD for puncture: 7.5 mg 0.5% hyperbaric bupivacaine + 50 mcg intrathecal morphine.
Intraoperative course	Supine-position modification; adequate block; stable hemodynamics; no further desaturation.
Immediate postoperative period	Transfer to recovery stable; no early respiratory or hemodynamic complications.

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DISCUSSION

This case can be discussed under three main themes: the physiology of V/Q matching and the bad-lung-down phenomenon, silent hypoxemia in older adults, and the practical implications for regional anesthesia.

First, from a physiological standpoint, unilateral lung disease creates marked regional inhomogeneity in both ventilation and perfusion.[10] Gravitational forces tend to direct blood flow to the dependent lung, while consolidation, atelectasis, or airway obstruction in the diseased lung may limit local ventilation. When the healthier lung is placed in the dependent position, perfusion is directed to better-ventilated regions, improving V/Q matching and arterial oxygenation. In contrast, placing the diseased lung dependent, so-called bad lung down phenomenon, increases perfusion to poorly ventilated areas, thereby increasing functional shunt and worsening gas exchange.[11,12] In our patient, left-sided pneumonia combined with LLD positioning likely increased perfusion to the left lung, amplifying V/Q mismatch and producing hypoxemia that reversed rapidly when she was returned to the supine position.

Second, this case illustrates the concept of silent hypoxemia in older adults. Despite a fall in oxygen saturation to 84-88%, the patient did not report dyspnea or chest discomfort. Age-related changes in chemoreceptor sensitivity, blunted perception of breathlessness, and the distraction of acute pain or anxiety may all contribute to a limited subjective awareness of hypoxemia.[6] Importantly, the desaturation occurred before intrathecal injection and before the administration of any sedatives or systemic opioids, which makes drug-induced hypoventilation an unlikely explanation. The absence of hypercapnic symptoms, the normal lactate level, preserved biventricular systolic function, and lack of ultrasound evidence of pulmonary edema further support a predominantly pulmonary V/Q mechanism rather than acute cardiogenic pulmonary edema, low cardiac output, or central hypoventilation.

Third, there are several practical implications for regional anesthesia in similar patients. Positioning for neuraxial anesthesia is often regarded as a routine step, yet in frail older adults with unilateral lung pathology, it may be the first moment when latent V/Q mismatch becomes clinically apparent.[13,14] Continuous pulse oximetry during positioning is therefore essential, and any reproducible pattern of position-dependent desaturation should trigger immediate reassessment.[13] In our case, limiting the duration of the bad lung down phenomenon to the minimum necessary for spinal injection, promptly returning the patient to the supine position, and adapting the surgical approach to a modified supine position allowed the team to continue with spinal anesthesia safely. For anesthesiologists, this case underscores that careful attention to lateral positioning, even for a short neuraxial procedure, can prevent avoidable hypoxemic events and may obviate the need to escalate to general anesthesia or invasive airway management. Where available, bedside techniques such as electrical impedance tomography may help visualize real-time regional ventilation-perfusion changes during lateral positioning and guide corrective maneuvers.[15]

This case report has several limitations. First, we did not obtain any objective imaging or monitoring of V/Q

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distribution during the desaturation episode, such as V/Q scanning or electrical impedance tomography specifically performed in the LLD position. Second, arterial blood gas analysis was not repeated at the time of desaturation in the LLD position, limiting our ability to quantify the exact degree of hypoxemia and any concurrent changes in $PaCO_2$ at that time. Finally, as a single-patient case report, the observations are not directly generalisable to all patients with unilateral pneumonia; however, they highlight a plausible mechanism and a practical safety message that may inform management in similar clinical scenarios.

CONCLUSION

Positioning should be regarded as a critical step in neuraxial anesthesia, particularly in frail or elderly patients with unilateral lung disease. In such patients, early detection of position-dependent desaturation and prompt correction of the posture can allow surgery to proceed safely under regional anesthesia without the need to convert to general anesthesia.

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None

Conflict of Interest

Authors declare no conflicts of interest to disclose.

Declaration of Use of Artificial Intelligence (AI)

The authors used ChatGPT (OpenAI) for assistance with English-language editing, manuscript drafting, and refinement. All AI-assisted content was reviewed and verified by the authors, who take full responsibility for the accuracy, integrity, and final content of the manuscript.

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