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From Femoral Endoprosthesis Surgery to Lobectomy: A Rare Case of Pulmonary Infarction Secondary to Cement Embolism Post-Orthopedic Surgery

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Abstract **Case Report**

Pulmonary cement embolism (PCE) is a rare but potentially life-threatening complication of orthopedic procedures involving bone cement, most commonly reported after vertebroplasty or kyphoplasty, with femoral surgeries being exceptionally uncommon. While most cases are asymptomatic or respond to anticoagulation, progression to pulmonary infarction requiring surgical intervention is exceedingly rare. We report a 53-year-old female patient who underwent femoral endoprosthesis surgery and was promptly diagnosed with acute PCE. However, surgical management was delayed as the patient remained indecisive for several days, during which the embolism progressed to pulmonary infarction, ultimately necessitating a left lower lobectomy. Cement emboli most frequently originate from the proximal femur or vertebrae, where intramedullary pressurization is highest, and symptomatic PCE occurs in approximately 0.1–1% of cemented orthopedic procedures. Cases requiring lobectomy are extremely rare, reported in fewer than 2% of symptomatic PCEs. Risk factors include high cement volume, pressurization technique, intramedullary hypertension, and pre-existing venous channels. This case highlights the critical importance of early recognition and timely intervention, as delays may result in infarction and the need for major surgical procedures. Awareness of PCE as a potential complication of femoral endoprosthesis surgery is essential for orthopedic and cardiothoracic teams to ensure prompt management and favorable patient outcomes.

Keywords: Pulmonary cement embolism; Femoral endoprosthesis; Pulmonary infarction; Lobectomy; Orthopedic complications; Bone cement; Postoperative embolism.

INTRODUCTION

Pulmonary cement embolism is a rare but serious complication of orthopedic procedures involving bone cement. While most reported cases occur after vertebroplasty or kyphoplasty, with incidence ranging from 2.1% to 26% depending on imaging modality and detection methods [1,2], embolization following femoral prosthesis implantation is exceptionally uncommon. The clinical course of PCE can range from asymptomatic incidental findings to severe respiratory distress and life-threatening pulmonary infarction. Risk factors include cement volume, injection technique, venous leakage, and the number and location of treated vertebrae; higher rates have been reported when cement leaks into the paravertebral venous plexus or major veins such as the azygos or inferior vena cava [3,4]. While many asymptomatic or peripheral emboli may be managed conservatively with surveillance or anticoagulation following thrombotic pulmonary embolism guidelines, central or symptomatic emboli often require more aggressive approaches, and there is no universally accepted standard for management [5]. Preventive strategies focus on careful cement handling, limiting injection volume, and meticulous technique to minimize venous intrusion. Endovascular or surgical retrieval has been described for large or symptomatic emboli, though progression to pulmonary infarction requiring lobectomy is exceedingly rare. Here, we report a rare case of PCE complicated by pulmonary infarction requiring left lower lobectomy and lingulectomy following femoral endoprosthesis surgery, highlighting the critical need for early recognition, preventive vigilance, and timely intervention to reduce morbidity and optimize outcomes

CASE REPORT

We report a rare case of a 53-year-old female with history of multiple admissions for infected cement spacers following proximal femoral plating who unfortunately develop left lung infarct due to Pulmonary Cement Embolism. She had been largely bedridden for prolonged periods. Despite having a clear understanding of her condition, the patient was initially apprehensive about surgical intervention due to perceived high operative risk, which resulted in a delay of nearly two weeks from the time of diagnosis of acute pulmonary cement embolism (PCE) to definitive management.

Following femoral endoprosthesis surgery, she developed tachycardia, tachypnea, and progressively increasing oxygen requirements by postoperative day three, reaching her maximum support on a venturi mask. Initial CT pulmonary angiography demonstrated cement emboli within the left ascending and descending pulmonary arteries, extending into multiple distal branches. She was commenced on therapeutic subcutaneous enoxaparin (Clexane) for five days; however, her respiratory status continued to deteriorate. Repeat imaging revealed areas of evolving pulmonary infarction in the left lung, indicating irreversible parenchymal compromise.

Given the extent of embolization and infarction, she underwent left lower lobectomy with lingulectomy. Postoperatively, her clinical status stabilized, oxygen requirements decreased, and she regained baseline hemodynamic stability. She was subsequently transferred back to the orthopedic ward and was eventually discharged home.

This case highlights several critical aspects: the extreme rarity of PCE following femoral endoprosthesis surgery, the potentially catastrophic consequences of delayed intervention, and the challenges of managing patients with recurrent infections and limited mobility. It underscores the importance of early recognition, close monitoring, and timely surgical intervention in preventing progression to pulmonary infarction and ensuring favorable outcomes.
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Study Area & Ethical Considerations

This case was managed at the Cardiothoracic Surgery Department, Hospital Queen Elizabeth II, Kota Kinabalu, Sabah, Malaysia. The case information was obtained through review of clinical records and multidisciplinary team documentation. Written informed consent was obtained from the patient for publication of this case report and accompanying clinical data. All patient identifiers have been removed to ensure confidentiality

DISCUSSION

Pulmonary cement embolism (PCE) is an exceedingly rare but potentially fatal complication following cemented orthopedic procedures, including vertebroplasty, kyphoplasty, and femoral prosthesis implantation [2]. Cement can inadvertently enter the venous system during surgery and travel to the pulmonary arteries, lodging in the main, lobar, segmental, or subsegmental branches [2,3]. While most cases are asymptomatic or respond to anticoagulation, progression to pulmonary infarction may occur, as demonstrated in this patient [1,3].

The mechanism of PCE involves cement extravasation due to high injection pressure, low cement viscosity, cortical defects, or pre-existing venous channels. Cement may enter valveless venous plexuses such as the paravertebral, azygos, or pelvic veins, facilitating embolization [2,6]. Risk factors include high cement volume, rapid injection, prior surgeries, and limited patient mobility.

Early recognition is critical. Tachypnea, tachycardia, hypoxia, or acute deterioration in oxygenation should prompt suspicion for PCE [2,4]. Serial imaging, particularly CT pulmonary angiography, is essential for early detection, monitoring progression, and guiding timely intervention [6]. Pulmonary infarction develops when emboli obstruct arterial flow to a lung segment long enough to cause ischemic necrosis, typically within days to weeks if collateral circulation is insufficient [3].

Management depends on embolus size, location, and symptom severity. Asymptomatic or peripheral emboli may be managed conservatively with anticoagulation and supportive care [4,7]. Symptomatic central emboli causing infarction, as in this patient, may require surgical intervention such as lobectomy [4]. Other options, including endovascular retrieval or catheter-directed techniques, are limited by the solid, non-thrombotic nature of cement. Preventive measures include careful cement handling, slow low-pressure injection of high-viscosity cement, meticulous intraoperative monitoring, and preoperative planning to minimize venous intrusion [2,6]. Patients with poor postoperative mobility remain at risk for recurrent PCE. The role of inferior vena cava (IVC) filters is controversial; while they may prevent thrombotic emboli, they are not routinely indicated for cement emboli due to risks such as migration, caval thrombosis, or device fracture [3,5]. Emerging treatments remain experimental and are largely limited to case reports [7].

Key lessons from this case include: (1) always consider PCE in patients with acute respiratory compromise after cemented orthopedic procedures; (2) persistent symptoms despite anticoagulation warrant repeat imaging and early multidisciplinary consultation; (3) timely intervention, including surgical consideration,

when necessary, can prevent progression to extensive infarction; and (4) coordinated care among orthopedic, pulmonary, and cardiothoracic teams is essential for optimal outcomes.

CONCLUSION

PCE following femoral endoprosthesis is exceptionally rare but can result in severe pulmonary infarction requiring lobectomy. Early recognition, careful preventive measures, and prompt multidisciplinary management are crucial to reducing morbidity. While conservative management may be appropriate for small or peripheral emboli, extensive infarction necessitates surgical resection. This case highlights the importance of vigilance in at-risk patients and contributes valuable insight into the management of this uncommon but serious complication

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