# PERIOPERATIVE MANAGEMENT OF AN ELDERLY PATIENT WITH INTERTROCHANTERIC FEMUR FRACTURE COMPLICATED BY PULMONARY EMBOLISM AND ATRIAL FIBRILLATION: A CASE REPORT

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## Abstract

*To report the perioperative management of an 83-year-old male who presented with femur intertrochanteric (IT) fracture, who then developed pulmonary embolism in the background of atrial fibrillation. The patient had preoperative delirium, which was managed with haloperidol. The surgery was done under general anesthesia, with intensive hemodynamic monitoring via arterial line, vasopressor support, and a restrictive fluid strategy. Blood loss replaced by blood transfusion rather than crystalloids. Clexane 0.4 mg subcutaneously was administered as prophylactic anticoagulation for pulmonary thrombosis. For pain relief, postoperative analgesia with USG-guided femoral nerve block using 0.5% bupivacaine was given. Despite advanced age, pulmonary embolism, atrial fibrillation, anemia, and delirium, the patient recovered and became cooperative and oriented. He was shifted to the ward after two days of observation. This case enlightens us about the importance of early recognition, multidisciplinary management, restrictive fluid therapy, anticoagulation and multimodal analgesia in optimizing outcomes in high-risk geriatric surgical patients.*

**Keywords:** *Atrial Fibrillation, Cardiac rhythm control, Fluid restrictive therapy, Invasive monitoring, Nerve block (Femoral nerve block), Pulmonary embolism.*

## INTRODUCTION

Pulmonary embolism (PE) is a highly life endangering perioperative complication, especially in old aged patients with long bone fractures due to immobilization, venous stasis, and a hypercoagulable state. The presence of atrial fibrillation (AF) further increases thromboembolic risk and complicates the management.[1] Advanced age, anemia and delirium complicated the case further limiting patient cooperation and regional anesthetic options. The factors which are essential to manage high risk patients are meticulous preoperative assessment, cautious fluid management, invasive monitoring, multiple analgesic strategies and anticoagulation.[2]

The time of surgical intervention post-fracture is crucial for patient. Reduction in mortality rates and hospital stay durations have been observed due to early surgery (within 24 hours).[3] Late surgical intervention (after 48 hours) is associated with prolonged hospitalization and increased risk of complications such as pressure sores, pneumonia and venous thromboembolism.[4,5]

PE, a potentially fatal complication of VTE (venous thromboembolism) markedly affects patient survival post-surgery.[6] PE increases the risk of death.[7] Mortality rate for patients with postoperative PE is very high as compared to without PE.[8]

## Case Report

An 83-year-old male with no known comorbidities presented with an intertrochanteric femur fracture after an alleged history of fall. He was uncooperative, disoriented, delirious and was on haloperidol therapy prior to surgery.

Preoperative evaluation showed atrial fibrillation on ECG (Image 1) and a left ventricular ejection fraction (LVEF) of 55% with Mild concentric LVH, moderate AR, dilated LA and grade I diastolic dysfunction on 2D echo. Baseline hemoglobin was 8 g/dL.

Shortly before surgery, the patient's saturation dropped to 68% and was shifted to ICU on 5 L/min oxygen via face mask. Based on clinical assessment and supportive investigations with CT Pulmonary Angiography showing hypodense eccentric filling defect noted in the segmental branch of left supero-anterior pulmonary artery suggestive of acute pulmonary embolism. D-Dimer level came out to be markedly high (4132 µg/mL) indicating significant fibrinolytic activity consistent with suspected pulmonary embolism. Serum Troponin I levels were also high (16.36 ng/L). Stabilization included supplemental oxygen, careful monitoring and avoidance of fluid overload. Clexane 0.4 mg subcutaneously was administered for pulmonary thrombosis.

Preoperatively 18G cannula was secured for fluid and drug administration. Multipara monitors were attached and ECG was showing irregularly irregular heart rate with discrete P wave and sinus tachycardia. Hence, before induction injection Amiodarone 150 mg IV in 100 mL normal saline was given to achieve rate control for AF and successful rate control was achieved after giving amiodarone. An arterial line was secured for continuous invasive BP monitoring. Injection midazolam 1 mg IV and injection fentanyl 100 mcg IV given as premedication, after that the patient was induced with 100 mg IV succinylcholine and 100 mg IV propofol followed by endotracheal intubation with 8.0 mm cuffed tube. Maintenance was achieved with isoflurane, oxygen and nitrous oxide. Injection Vecuronium used as a muscle relaxant and prophylactically 1 g IV tranexamic acid in 100 ml NS was administered.

Intraoperatively, a restrictive fluid strategy was adapted, a total of 500 mL crystalloids was administered. Surgical blood loss was replaced with one unit of packed RBCs, minimizing fluid overload risk in the AF and PE. Norepinephrine infusion (0.16 mg/mL at 5 mL/hour) was started intraoperatively to maintain mean arterial pressure and continued postoperatively in the SICU at 4 mL/hr.

The patient remained intubated initially in the SICU and was extubated uneventfully later the same evening. Postoperatively USG-guided femoral nerve block using 0.5% bupivacaine (10 mL) diluted with 10 mL normal saline was given twice for postoperative analgesia. No systemic opioids were required as pain relief was excellent.

Clexane 0.4 mg was administered subcutaneously for pulmonary thrombosis prophylaxis with careful monitoring for bleeding.

The patient's delirium resolved and he became cooperative, conscious, and well-oriented. Hemodynamic parameters stayed stable with no recurrence of hypoxia or arrhythmia. He was shifted to the ward in 48 hours and the postoperative period was uneventful.

## Discussion

Patients with long bone fractures are susceptible to thromboembolic events due to Virchow's triad: immobilization, endothelial injury, and hypercoagulability. Pulmonary embolism is life-threatening and requires early diagnosis, anticoagulation, and hemodynamic optimization.

Once pulmonary embolism is suspected, the likelihood of PE is assessed by Well's criteria. (Table 1) For cases with a high or non-high clinical probability of suspected PE, laboratory testing and diagnostic imaging should be carried out accordingly (Image 2).

The D-dimer assay is a blood screening test with a strong negative predictive value in patients with low suspicion of PE. A negative D-dimer value rules out PE but the converse is not true. In absence of PE, D-dimer levels are raised in the post-operative state, MI, major trauma, cancer, sepsis, and various systemic illnesses. In spite of newer generation tests like latex agglutination or rapid ELISA with 'sensitive D-dimer' testing being preferred, adjusted D-dimer based on certain criteria like age-adjusted, YEARS algorithm, and clinical probability have been proposed for patients with low to

intermediate probability of PE. In PE, secondary to vascular obstruction, pulmonary vascular resistance increases pressure overload in the right ventricle. This causes relief of cardiac bio-markers such as NT-pro BNP, BNP and troponins.

Stratification of acute PE based on hemodynamic stability and RV dysfunction is critical for prognosis and appropriate management (Table 2). Low-risk PE cases constitute the majority of cases around 65% to 70% while 5% to 10% are categorized under high-risk. High-risk PE more often than not manifests bilaterally, occasionally as a characteristic "saddle" thrombus in the bifurcation of the main pulmonary artery. In Intermediate-risk PE, Obstruction of more than one-third of the pulmonary vasculature is observed.

Anticoagulation is the cornerstone of management in acute PE. In low-risk and intermediate low-risk cases, only anticoagulation is required. In high-risk PE cases, anticoagulation should be administered immediately. The commonly used agents are unfractionated heparin (UFH), low molecular weight heparin (LMWH) and warfarin. Initiation of warfarin as monotherapy may paradoxically increase hypercoagulability by decreasing endogenous anticoagulants protein C and S. This can be prevented from happening by "bridging" warfarin with parenteral anticoagulants for at least 5 days after initiation.[9]

NOACs (non-vitamin K antagonist oral anticoagulants) that have a fast onset of action are prescribed in fixed doses without the need for laboratory coagulation monitoring and have minimum drug-to-drug and drug-to-food interaction.[10] NOACs are superior to warfarin in terms of safety and are equally efficacious as warfarin. In a meta-analysis of 24,455 patients with acute VTE, NOACs in comparison to warfarin had a 40% reduction in major bleeding, 61% reduction in non-fatal intracranial bleeding and 64% reduction in fatal bleeding.[11]Three factor Xa inhibitors- apixaban, rivaroxaban and an oral thrombin inhibitor, dabigatran are the approved NOACs for VTE management.

High-risk PE and intermediate high-risk PE need thrombolysis therapy along with anticoagulation. Fibrinolysis can be administered to patients up to 14 days after the onset of new symptoms. Most dangerous complication is Intracranial haemorrhage. The usual course of treatment includes 100 mg alteplase continuous infusion over 2 hours through the peripheral vein or intravenous streptokinase 250,000-unit bolus followed by 100,000 units per hour for 12-24 hours.

Important anesthetic considerations in this case were early recognition of Pulmonary embolism and atrial fibrillation. Anticoagulation with Clexane 0.4 mg and stabilization allowed safe surgical fixation. Restrictive fluid therapy and vasopressor support both reduced right ventricular strain. Cardiac rhythm control was achieved with Amiodarone administered during pre-induction period, stabilized AF thereby minimizing risk of intraoperative arrhythmia. The arterial line allowed real-time detection and management of hemodynamic fluctuations. Cautious use of crystalloids (500 mL) combined with transfusion for blood loss prevented cardiac compromise. Effective perioperative care and analgesia brought back orientation and cooperation of the patient postoperatively. USG-guided femoral nerve block with 0.5% bupivacaine provided superior analgesia, reduced opioid need and facilitated early mobilization. Through multidisciplinary coordination, strict monitoring, anticoagulation, and individualized anesthetic strategies the patient had a smooth perioperative course despite multiple high-risk factors.

**Conclusion**

With diligent planning, high-risk old aged patients with IT femur fracture complicated with PE, AF, anemia, and delirium can safely undergo surgery. Early diagnosis, anticoagulation, hemodynamic optimization, restrictive fluid therapy, invasive monitoring, and multimodal analgesia are important in improving perioperative outcomes and facilitating early recovery.

**Image 1 – ECG**

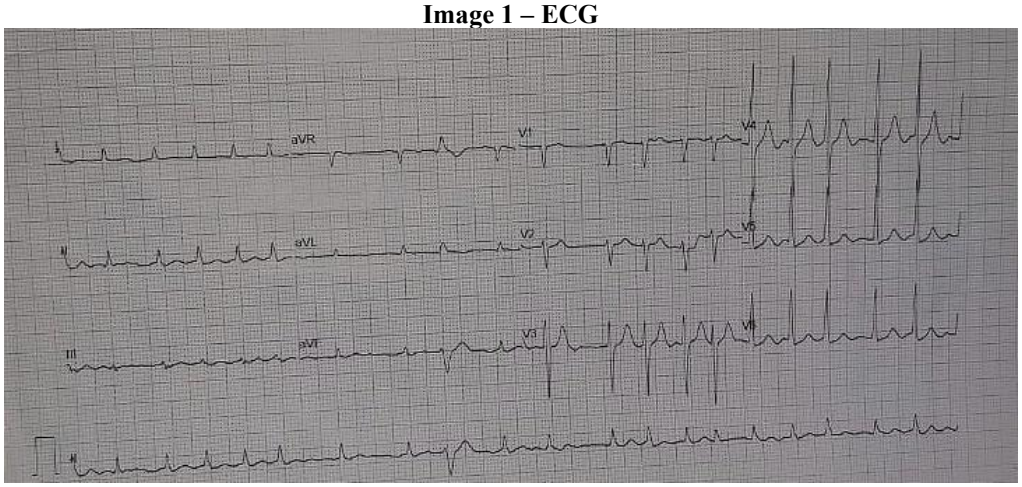

**Image 2. Integrated diagnostic approach for acute PE.**

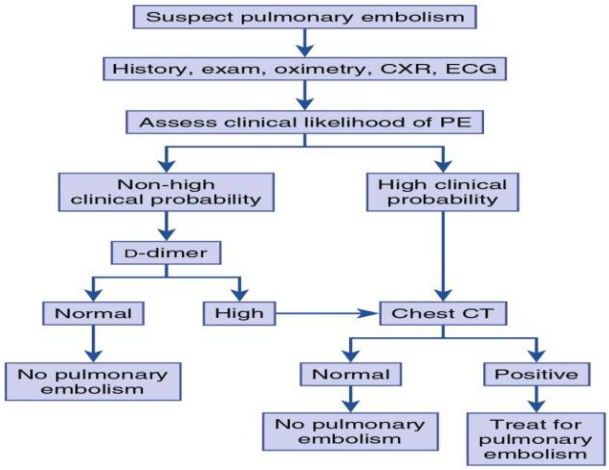


**Table 1. Well's criteria for clinical assessment of PE**
**>4 points = high probability, ≤4 points = non-high clinical probability.**
DVT: deep vein thrombosis, PE: pulmonary embolism

| CRITERION | SCORING |
|---|---|
| DVT symptoms or signs | **3** |
| Alternative diagnosis less likely than PE | **3** |
| Heart rate > 100 beats/min | **1.5** |
| Immobilization or surgery within 4 weeks | **1.5** |
| Previous DVT or PE | **1.5** |
| Haemoptysis | **1** |
| Cancer treated within 6 months or metastasis | **1** |

**Table 2. Classification of acute pulmonary embolism.**

| **CARDIOLOGY (ESC, 2019)** | **AMERICAN HEART ASSOCIATION (AHA, 2011)** | **HEMODYNAMIC STATUS** | **PE SEVERITY INDEX (PESI) (OR SIMPLIFIED PESI)** | **EVIDENCE OF DYSFUNCTION** | **TREATMENT** |
|---|---|---|---|---|---|
| High risk | Massive | Unstable | High | Typically, abnormal right ventricle RV on imaging elevated troponin, OR both | Anticoagulation and advanced therapy |
| Intermediate-high risk | Sub massive | Stable | High | Abnormal RV on imaging, AND elevated troponin | Anticoagulation with advanced therapy if clinical deterioration |
| Intermediate-low risk | | | High | May have abnormal RV on imaging OR elevated troponin BUT not both | Anticoagulation |
| Low risk | Low risk | Stable | Low | None | Anticoagulation with home therapy in a subset with reliable follow-up |

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