

A Race Against Time: Saddle Pulmonary Embolism Following Pelvic Trauma - A Tale of Teamwork and Tenacity in a Resource-Limited Setting

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ABSTRACT

A 72-year-old male polytrauma patient with pelvic and femoral fractures secondary to a high-velocity motor vehicle collision developed acute hemodynamic instability and refractory hypoxia six hours post-admission, prompting emergent Computed Tomography Pulmonary Angiography (CTPA), which revealed a life-threatening saddle Pulmonary Embolism (PE) occluding the pulmonary artery bifurcation. Immediate therapeutic anticoagulation with Low-Molecular-Weight Heparin (LMWH) was initiated while a multidisciplinary team implemented aggressive hemodynamic optimization, including judicious fluid resuscitation, vasopressor support and continuous invasive monitoring to mitigate right ventricular failure and circulatory collapse. This case underscores the critical importance of maintaining a high index of suspicion for Venous Thromboembolism (VTE) in trauma patients, particularly those with pelvic fractures and highlights the essential role of rapid interdisciplinary collaboration, structured risk stratification and resource-adaptive management strategies in improving outcomes for this time-sensitive, high-mortality condition.

Keywords: Saddle pulmonary embolism, Pelvic trauma, Venous thromboembolism, Anesthetic management, Resource limited setting

1. Introduction

Venous Thromboembolism (VTE), encompassing Deep Vein Thrombosis (DVT) and Pulmonary Embolism (PE), remains a leading preventable cause of morbidity and mortality in trauma patients, particularly those with pelvic fractures¹. The prothrombotic triad of endothelial injury, stasis and hypercoagulability-exacerbated by prolonged immobilization, surgical intervention and systemic inflammation-places these individuals at exceptionally high risk². Among the most catastrophic manifestations is saddle PE, a life-threatening

condition in which a large thrombus straddles the bifurcation of the main pulmonary artery, precipitating acute right ventricular failure, hemodynamic collapse and mortality rates exceeding 20% in hemodynamically unstable cases^{3,4}.

The diagnostic and therapeutic challenges of saddle PE are magnified in polytrauma patients, where competing priorities-such as hemorrhage control, fracture stabilization and traumatic brain injury management-may delay recognition and intervention⁵. Moreover, the anesthesiologist's role becomes pivotal in balancing anticoagulation with bleeding

risk, optimizing right ventricular function and coordinating multidisciplinary care in time-sensitive scenarios⁶. This case report details the management of a 72-year-old male who developed a saddle PE following high-energy pelvic and femoral fractures, highlighting the critical interplay between early suspicion, rapid imaging and resource-adaptive resuscitation strategies. By examining this high-stakes clinical scenario, we underscore the importance of protocolized VTE prophylaxis, dynamic risk stratification and the anesthesiologist's central role in perioperative crisis management, particularly in resource-constrained settings.

2. Case Report

A 72-year-old previously healthy male was admitted following a high-velocity motorcycle collision, presenting with right hip dislocation, bilateral pubic rami fractures and right femoral neck fracture. Initial assessment revealed stable vital signs (BP 130/80 mmHg, HR 88 bpm, SpO₂ 96% on room air), prompting placement in skin traction while awaiting surgical intervention. Preoperative evaluation identified a high VTE risk (Caprini score 9) due to severe trauma, prolonged immobilization and advanced age, leading to initiation of mechanical thromboprophylaxis with intermittent pneumatic compression devices; pharmacological prophylaxis with LMWH was deferred pending anticipated surgical repair within 24 hours.

Six hours post-admission, the patient acutely decompensated with hypoxemia (SpO₂ 85% on room air), tachypnea (RR 24/min) and markedly elevated D-dimer (10 µg/mL). Immediate anesthetic interventions included high-flow nasal cannula oxygen therapy (40 L/min, FiO₂ 0.6) which improved oxygenation to SpO₂ 92%, avoiding immediate intubation. Point-of-care echocardiography demonstrated preserved right ventricular function without signs of strain, while lung ultrasound excluded alternative pulmonary pathology. Continuous arterial line monitoring was established in anticipation of potential hemodynamic instability or bleeding complications from subsequent anticoagulation.

Definitive diagnosis via CTPA (Computed Tomography Pulmonary Angiography), delayed due to institutional resource constraints, ultimately revealed a saddle pulmonary embolism at the arterial bifurcation without right ventricular dysfunction, classifying the patient as intermediate-low risk (Figure 1 and 2). Therapeutic enoxaparin (60 mg SC BID) was initiated following imaging, necessitating multidisciplinary consultation to balance thromboembolic treatment against perioperative bleeding risks. The planned orthopedic procedure was consequently postponed for 48 hours to permit adequate anticoagulation⁷.

The patient demonstrated gradual clinical improvement over the subsequent 48 hours, achieving stable oxygenation (SpO₂ 95% on 2 L/min O₂) and hemodynamics (HR 80 bpm), permitting successful open reduction and internal fixation under general anesthesia with lung-protective ventilation parameters. This case highlights the critical importance of vigilant thromboembolic monitoring in trauma patients, particularly those with pelvic fractures and underscores the anesthesiologist's pivotal role in coordinating complex perioperative decision-making involving anticoagulation management, hemodynamic optimization and surgical timing.

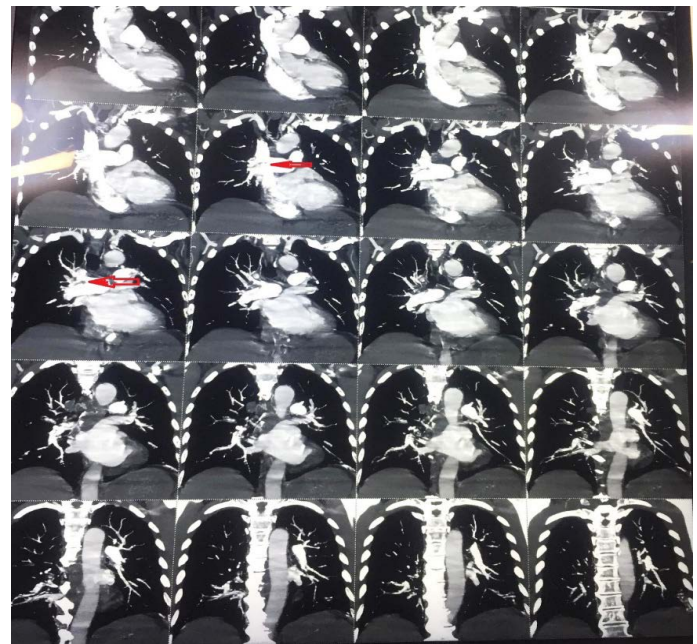


Figure 1: Arrow shows Saddle Pulmonary Embolism in Axial section of CTPA.

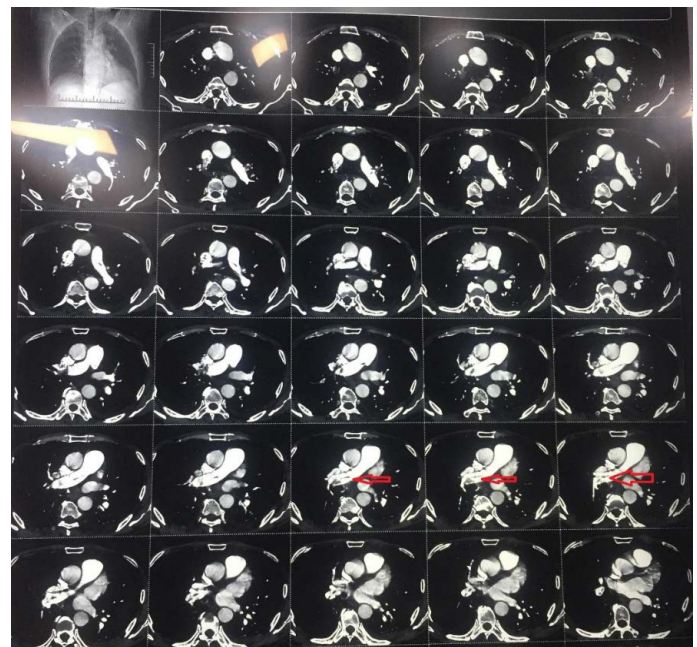


Figure 2: Arrow shows Saddle Pulmonary Embolism in Coronal section of CTPA.

3. Discussion

This case highlights several critical aspects in the perioperative management of trauma patients developing high-risk pulmonary embolism. The diagnostic utility of Point-of-Care Ultrasound (POCUS) proved invaluable, particularly in our resource-constrained setting, allowing for rapid assessment of right ventricular function and exclusion of alternative pathologies while awaiting confirmatory CTPA. The initial decision to withhold pharmacologic thromboprophylaxis, while clinically justified by the anticipated early surgery, underscores the delicate risk-benefit balance in trauma patients and the need for constant reevaluation of VTE risk as clinical circumstances evolve.

The successful outcome in this case was largely attributable to effective multidisciplinary collaboration, with anesthesia

orthopedic and critical care teams working in concert to optimize the timing of anticoagulation and surgical intervention. The two-hour delay in obtaining definitive imaging and lack of access to advanced therapies like catheter-directed thrombolysis demonstrate the challenges faced in resource-limited environments, emphasizing the importance of developing context-appropriate management algorithms. Our therapeutic approach aligned with current ESC guidelines recommending LMWH for hemodynamically stable PE, while anesthetic planning appropriately avoided neuraxial techniques due to anticoagulation concerns.

This case reinforces several key principles in trauma care: the importance of maintaining high clinical suspicion for VTE despite apparent stability, the value of POCUS in rapid assessment of critically ill patients and the need for institutional protocols to minimize delays in diagnosis and treatment. It also highlights how resource limitations necessitate adaptive strategies without compromising evidence-based care. The patient's eventual positive outcome validates this careful, multidisciplinary approach to managing complex trauma cases with thromboembolic complications. Key lessons include the need for institutional VTE prevention protocols, enhanced POCUS training for anesthesiologists and the value of multidisciplinary collaboration. Ultimately, the case reaffirms that vigilant clinical assessment and evidence-based decision-making remain fundamental to managing high-risk thromboembolic complications in trauma patients. Future directions should focus on improving rapid diagnostic capabilities and developing context-specific protocols for PE management in trauma patients across different healthcare settings.

4. Acknowledgement

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