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Interhospital management of high-risk acute pulmonary embolism in a patient with refractory immune thrombocytopenia and underlying hemorrhagic diathesis: A case report

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Abstract

We report the case of a 54-year-old woman with refractory primary Immune Thrombocytopenia (ITP) who was admitted to the Intensive Care Unit (ICU) of a primary-level hospital after elective complex ventral hernia repair. During the postoperative course, she developed abrupt hemodynamic collapse with severe hypoxemia, and imaging confirmed high-risk acute pulmonary embolism involving both main pulmonary arteries. Owing to profound instability, systemic fibrinolysis was administered despite the presence of recent surgery and an underlying hemorrhagic diathesis. Although thrombolysis was promptly initiated, the patient developed worsening right ventricular failure, obstructive shock, and major bleeding complications.

Because of persistent instability and limited response to initial treatment, urgent transfer to a tertiary referral center was coordinated. There, she underwent rescue percutaneous thromboaspiration and subsequent Extracorporeal Membrane Oxygenation (ECMO) support. Her course was further complicated by abdominal wall hemorrhage requiring embolization, recurrent thrombocytopenia, repeated transfusion support, and complex anticoagulation management.

This case highlights the clinical challenge of balancing thrombosis and bleeding in patients with ITP, particularly in the setting of life-threatening pulmonary embolism. It also underscores the value of early interhospital coordination, rapid escalation to advanced reperfusion strategies, and multidisciplinary decision-making in improving outcomes in complex critically ill patients.

Keywords: Immune thrombocytopenia; Pulmonary embolism; Fibrinolysis; Thromboaspiration; Extracorporeal membrane oxygenation; Interhospital transfer.

Abbreviations: ITP: Immune Thrombocytopenia; PE: Pulmonary Embolism; ICU: Intensive Care unit; LMWH: Low-Molecular-Weight Heparin; TPO-RA: Thrombopoietin Receptor Agonist; ECMO: Extracorporeal Membrane Oxygenation; PERT: Pulmonary Embolism Response Team; CTPA: Computed Tomography pulmonary Angiography.

Introduction

Pulmonary Embolism (PE) is a potentially life-threatening condition associated with high early mortality if not promptly recognized and treated. Contemporary European and American guidelines emphasize early risk stratification, rapid reperfusion in hemodynamically unstable patients, and timely escalation to advanced support when shock persists despite initial therapy [2,3]. In refractory cases, catheter-based reperfusion strategies, surgical embolectomy, and extracorporeal support may be considered as part of a rescue approach [2-5].

The management of PE becomes particularly challenging in patients with Immune Thrombocytopenia (ITP), in whom both bleeding and thrombosis may coexist. Although ITP is traditionally viewed as a hemorrhagic disorder, thrombotic events are increasingly recognized in these patients and may be related to immune dysregulation, systemic inflammation, splenectomy, and thrombopoietin receptor agonist therapy [9,10]. This dual risk creates a major therapeutic dilemma when life-saving anticoagulation or fibrinolysis is indicated.

We present a case of high-risk acute PE in a patient with refractory ITP and recent major abdominal surgery, in whom early interhospital coordination and multidisciplinary management were crucial to survival.

Case Presentation

A 54-year-old woman with a history of refractory primary ITP, unresponsive to several previous treatment lines, and hepatic steatosis was admitted to the ICU of a primary-level hospital for postoperative monitoring after elective complex ventral hernia repair. Her medical history was notable for multiple prior thrombotic events, some of them associated with eltrombopag therapy. Because eltrombopag, a Thrombopoietin Receptor Agonist (TPO-RA), may be associated with increased thrombotic risk, particularly in patients with liver disease, treatment had previously been switched to avatrombopag, another TPO-RA with a more favorable safety profile [1]. She had also undergone splenectomy and had a previously placed inferior vena cava filter.

During the postoperative period, avatrombopag was continued at a reduced dose and prophylactic-dose Low-Molecular-Weight Heparin (LMWH) was administered. Forty-eight hours after surgery, she suddenly developed profound hypotension (60/40 mmHg), tachycardia (130 beats/min), and oxygen desaturation (SpO_2 85%).

Point-of-care echocardiography showed severe right ventricular dilatation, a right-to-left ventricular basal diameter ratio >1, right ventricular free wall thickness <6 mm, acceleration of pulmonary flow with a pulmonary acceleration time <60 ms associated with a tricuspid regurgitation gradient <60 mmHg (60/60 sign), severe right ventricular systolic dysfunction with preserved apical contractility (McConnell sign), and a hyperechoic image suggestive of thrombus within the inferior vena cava. Computed tomography pulmonary angiography confirmed acute PE involving both main pulmonary arteries.

Given the patient's marked hemodynamic instability, therapeutic anticoagulation was initiated with enoxaparin 80 mg subcutaneously, followed by systemic fibrinolysis with alteplase 100 mg intravenously, administered as a 10 mg bolus followed by infusion of the remaining 90 mg over 2 hours [2]. Despite these measures, the patient deteriorated further, with worsening hypotension requiring escalating vasopressor support. Repeat echocardiography showed thrombus migration toward the right atrium (Figure 1) and worsening right ventricular dysfunction. Shortly thereafter, significant bleeding through the surgical drains and progressive anemia developed, requiring transfusion of blood products.

Because of persistent instability and the limited response to anticoagulation and systemic fibrinolysis, urgent transfer to a tertiary referral center was arranged. After multidisciplinary discussion between intensivists and interventional specialists, rescue percutaneous thromboaspiration of the residual thrombotic burden was performed (Figure 2) [3,5].

Despite partial reperfusion of the pulmonary vascular bed, the patient remained hemodynamically unstable and developed severe right ventricular failure refractory to inotropic support. Venoarterial ECMO was therefore initiated and subsequently converted to a veno-venoarterial configuration because of suboptimal flows. Anticoagulation was managed with continuous unfractionated heparin infusion guided by anti-Xa activity.

During the subsequent course, the patient developed major hemorrhagic complications involving the abdominal wall at the prior surgical site, resulting in hemorrhagic shock and the need for massive transfusion support (Figure 3). Computed tomography angiography demonstrated active bleeding, which was successfully treated by selective embolization of the left iliac circumflex artery. She also developed recurrent thrombocytopenia despite avatrombopag therapy and was managed with four cycles of intravenous immunoglobulins, corticosteroids, transfusion support, and placement of an additional temporary inferior vena cava filter above the previous device because of the coexistence of active bleeding and a high thrombotic burden.

Figure 1: Repeat echocardiography showing thrombus migration toward the right atrium.

Figure 2: Percutaneous thromboaspiration of the residual thrombotic burden.

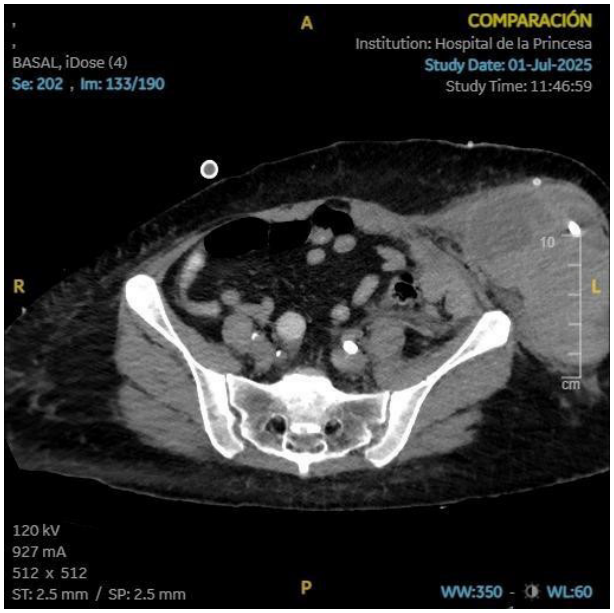

Figure 3: Abdominal wall hemorrhagic complication at the prior surgical site.

Following these interventions, the patient gradually improved, with no further thrombotic or hemorrhagic recurrence. She achieved complete hemodynamic stabilization and was ultimately discharged home with functional recovery.

Discussion

This case illustrates the exceptional complexity of managing high-risk PE in a patient with a pre-existing hemorrhagic diathesis and recent major surgery. In standard practice, systemic fibrinolysis is recommended for high-risk PE with hemodynamic instability; however, recent surgery and hemorrhagic diathesis are major concerns when considering thrombolytic therapy [2,3]. In our patient, the immediate threat posed by refractory shock and severe right ventricular failure outweighed the anticipated bleeding risk, particularly in a center without immediate access to advanced interventional reperfusion techniques.

The decision to proceed with full-dose systemic fibrinolysis was driven by the patient's critical presentation, the large thrombotic burden, echocardiographic evidence of imminent right heart decompensation, and the need to achieve at least partial stabilization before transfer. In this context, thrombolysis was used as a bridge to definitive rescue therapy rather than as the final therapeutic step.

Recent advances in PE care increasingly support multidisciplinary, escalation-based management. Catheter-based reperfusion has emerged as an important option for selected patients with intermediate- and high-risk PE, especially when systemic fibrinolysis is contraindicated, insufficient, or associated with major bleeding risk [3,5,7]. In addition, mechanical circulatory support may provide a bridge to recovery or further intervention in patients with refractory shock and severe right ventricular failure [4]. Our patient ultimately required both rescue thromboaspiration and ECMO, underscoring the importance of having access to tertiary-level resources.

Early interhospital coordination was central to the favorable outcome. The Community of Madrid's PE care pathway emphasizes structured referral networks, prompt identification of high-risk PE, and timely transfer to centers with interventional capability [8]. This model is aligned with the broader concept of the Pulmonary Embolism Response Team (PERT), which has been associated with improved risk stratification, greater use of advanced therapies, and better short-term outcomes in recent studies and meta-analyses [5,6].

ITP adds another layer of complexity. Although classically considered a bleeding disorder, it is now well recognized that patients with ITP may also develop venous and arterial thrombosis [9,10]. This paradox appears to be related less to platelet count alone than to a combination of immune activation, inflammation, prior splenectomy, and exposure to treatments such as corticosteroids, intravenous immunoglobulins, and TPO-RAs [9]. In our patient, several prothrombotic factors were present simultaneously, including recent surgery, immobility, splenectomy, TPO-RA therapy, prior thrombosis, and an indwelling vena cava filter.

Anticoagulation in ITP requires careful individualization. Available literature suggests that treatment intensity should be adapted to platelet count and bleeding risk, while therapies aimed at increasing platelet count may be required to permit safer anticoagulation [9,10]. In our case, maintaining the platelet count with immunomodulatory treatment was essential, but it also required ongoing reassessment of thrombotic risk. The subsequent hemorrhagic complications highlight how narrow the therapeutic window can be in these patients.

Overall, this case supports a pragmatic and dynamic management strategy in critically ill patients with PE and competing thrombotic and hemorrhagic risks. In selected circumstances, full-dose fibrinolysis may still be justified despite major bleeding concerns when used as a life-saving bridge to advanced therapy. The success of such an approach depends heavily on rapid multidisciplinary discussion, coordinated transfer pathways, and access to advanced reperfusion and circulatory support.

Conclusion

High-risk pulmonary embolism may occur even in patients with underlying hemorrhagic diathesis such as ITP, and it should remain in the differential diagnosis of any critically ill patient with acute hemodynamic or respiratory deterioration. In these complex scenarios, treatment decisions must balance the immediate risk of death from PE against the substantial risk of bleeding associated with reperfusion and anticoagulation.

This case underscores the importance of early interhospital coordination, multidisciplinary decision-making, and timely escalation to advanced therapies in tertiary centers. Such an approach may be decisive in improving survival and functional recovery in patients with life-threatening PE and highly challenging comorbid conditions.

Declarations

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Ethics approval: According to our institutional policy, formal ethics committee approval was not required for publication of a single anonymized case report.

Patient consent for publication: The patient provided consent for publication of her clinical case and the accompanying photographs/images.

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Data availability: All relevant data are contained within the manuscript.

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