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Case Report

Pulmonary infarction with phlegmasia cerulea dolens: a sequelae of deep vein thrombosis

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ABSTRACT

Deep vein thrombosis (DVT) can lead to severe complications such as pulmonary embolism and phlegmasia cerulea dolens (PCD), both of which are life-threatening conditions. The coexistence of infected pulmonary infarction and PCD is exceptionally rare, demanding timely diagnosis and multidisciplinary management. A 70-year-old male with diabetes and sepsis presented with fever, limb pain, and swelling. Investigations included Doppler ultrasound, computed tomography (CT) angiography, and positron emission tomography (PET) - CT scans, confirming DVT, pulmonary embolism, and *Aspergillus flavus* infection. The patient was managed with anticoagulation, antifungal therapy, and glycemic control. The left popliteal vein thrombus measured 3.5 cm, with thrombosis extending to the right superficial femoral vein. Blood glucose was 250 mg/dl, creatinine 1.5 mg/dl, and leukocyte count 18,000 cells/mm^3. After treatment, leukocyte count normalized to 10.23×10^3 cells/mm^3, and limb pain resolved. Follow-up revealed substantial clinical improvement by discharge on 11 January 2023. This case highlights the importance of early recognition and a multidisciplinary approach to managing infected pulmonary infarction and PCD in patients with DVT.

Keywords: DVT, Pulmonary infarction, PCD, *Aspergillus flavus*, Sepsis

INTRODUCTION

Deep vein thrombosis (DVT) is a common vascular condition characterized by the formation of blood clots in the deep veins, typically of the lower extremities. While often manageable, severe complications can arise, including pulmonary embolism and phlegmasia cerulea dolens (PCD). PCD is a rare but catastrophic manifestation of DVT marked by extensive venous occlusion, resulting in severe limb ischemia, venous gangrene, and, if untreated, loss of the affected limb or death. This condition poses both limb- and life-threatening risks, requiring prompt diagnosis and aggressive management to improve outcomes.[1-5]

Pulmonary infarction, a consequence of embolization from DVT, occurs when a clot obstructs the pulmonary arterial circulation, leading to localized ischemia and necrosis of lung tissue. Although typically sterile, pulmonary infarctions can become infected, exacerbating systemic inflammation and worsening the clinical prognosis.[6,7] The coexistence of infected pulmonary infarction and PCD is exceptionally rare and represents an extreme sequela of unmitigated thromboembolic disease. This dual pathology not only heightens the complexity of clinical presentation but also underscores the need for a multidisciplinary approach involving critical care, vascular surgery, and infectious disease management.[8]

The present case highlights the unique challenges posed by this combination of complications. A patient presenting with signs of DVT, severe limb pain, cyanosis, and systemic symptoms such as fever and hypoxia necessitates a high index of suspicion for both PCD and pulmonary infarction. The synergistic effects of venous obstruction and systemic infection demand an integrated treatment

strategy, including anticoagulation, thrombolysis or thrombectomy, infection control with targeted antibiotics, and supportive care.

This report emphasizes the importance of early recognition and timely intervention in preventing fatal outcomes in such rare but severe cases. By detailing the clinical course, diagnostic process, and therapeutic approach in this case, this case report aims to raise awareness of these complications and provide insights into optimizing management strategies for similarly challenging presentations.

CASE REPORT

A 70-year-old male patient was admitted to the Internal Medicine department on 16 December 2022, presenting with a complex clinical picture. The patient reported acute febrile illness, characterized by persistent fever, cough with expectoration, and significant pain in the left lower limb. He also experienced abdominal pain, generalized weakness, uneasiness, and swelling in the left leg and foot, which was notably red and painful. His medical history included diabetes mellitus, which is a critical factor in his overall health status and may have contributed to the severity of his current condition.

Clinical examination

Upon examination, the patient exhibited signs of sepsis, including elevated heart rate and temperature. Vital signs recorded included a temperature of 101.5°F, heart rate of 110 beats per minute, and blood pressure of 90/60 mmHg, indicating possible septic shock. The left lower limb was swollen, tender, and exhibited signs of erythema. Respiratory assessment revealed bilateral adventitious breath sounds, including bilateral rhonchi and wheezing. Abdominal examination showed the abdomen to be soft with tenderness, particularly in the left lower quadrant. The left lower limb was swollen, tender, and exhibited signs of erythema.

Laboratory investigations

Laboratory tests revealed significant abnormalities. The complete blood count (CBC) showed leukocytosis with a white blood cell count of 18,000 cells/mm^3, indicating an ongoing infection. The patient's blood glucose level was recorded at 250 mg/dl, reflecting poor glycemic control. Renal function tests indicated a serum creatinine level of 1.5 mg/dl, suggesting mild renal impairment, likely secondary to dehydration or infection.[9]

Imaging studies

Radiological investigations were crucial in diagnosing the underlying conditions. A Doppler ultrasound of the lower limbs confirmed DVT involving the left popliteal vein and deep veins of the left calf. The ultrasound findings indicated non-compressibility of the left popliteal vein, with a thrombus measuring approximately 3.5 cm in length. A CT angiography of the lower limbs revealed an eccentric hypodense thrombus along the posterior wall of the distal right superficial femoral vein, extending into the right popliteal vein. Notably, there was an absence of contrast opacification in the right posterior tibial and peroneal veins, suggesting thrombosis.[10]

A CT scan of the chest revealed a hypodense eccentric partial filling defect in the right upper lobe segmental branches of the right pulmonary artery, with normal opacification of the distal arteries. The findings were suggestive of pulmonary hypertension, evidenced by a dilated main pulmonary artery and its right and left branches. Additional findings included diffuse areas of ground-glass opacities, patchy areas of consolidation in the bilateral lung fields, and mild left-sided pleural effusion.

Additionally, a whole-body PET-CT scan was performed due to the patient's respiratory symptoms. The scan revealed bilateral lung opacities with ground-glass opacities and patchy areas of consolidation, particularly in the right upper lobe and throughout the left lung. The largest lesion measured approximately 4.5 cm in diameter. The findings were suggestive of an infective etiology, likely due to *Aspergillus flavus*, as confirmed by bronchoalveolar lavage (BAL) results, which showed a positive culture for the fungus. The left pleural effusion was measured at approximately 150 cc, indicating possible complications from the underlying pulmonary condition.

Diagnosis

The patient was diagnosed with an acute febrile illness, lower respiratory tract infection caused by *Aspergillus flavus*, pulmonary embolism, DVT, and left lower limb gangrene. The patient initially developed DVT and pulmonary infarction with PCD, which subsequently became infected with *Aspergillus*. The presence of gangrene required careful monitoring and consideration of potential surgical intervention.

Management

The management of the patient involved a multidisciplinary approach. Anticoagulation therapy was initiated to address the deep vein thrombosis and prevent further thromboembolic events. The patient was also started on antifungal treatment to combat the pulmonary infection caused by *Aspergillus flavus*. Close monitoring of his diabetes was essential to stabilize his overall health and prevent further complications.

Throughout his hospitalization, the patient showed gradual improvement. His fever subsided, and the pain in the left lower limb decreased significantly. During hospital stay, the desaturation with pulmonary oedema observed in the patient was treated in ICU and patient was put on non-invasive ventilator after counselling the patient’s family regarding the medical condition. By the time of discharge

on 11 January 2023, the patient was stable, with a follow-up plan established to monitor his recovery and manage his diabetes effectively. This case highlights the importance of early diagnosis and comprehensive management in patients with complex medical conditions, particularly in the elderly population.

The case study results indicate a complex clinical scenario involving a 70-year-old male patient with multiple health issues. Imaging studies revealed significant findings, including DVT affecting the left popliteal vein and deep veins of the left calf. An eccentric hypodense thrombus was identified along the posterior wall of the distal right superficial femoral vein, extending into the right popliteal vein. Notably, there was an absence of contrast opacification in the right posterior tibial and peroneal veins, confirming thrombosis in these areas.

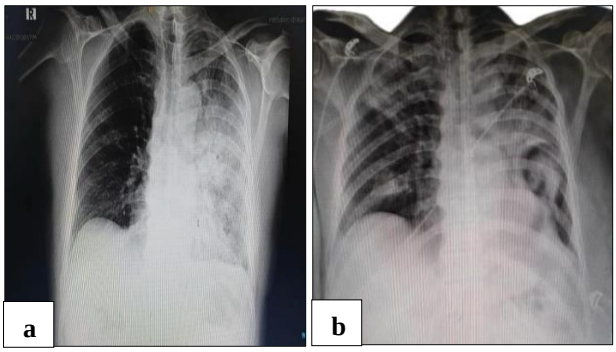

Figure 1 (a and b): Chest X-rays of the patient.

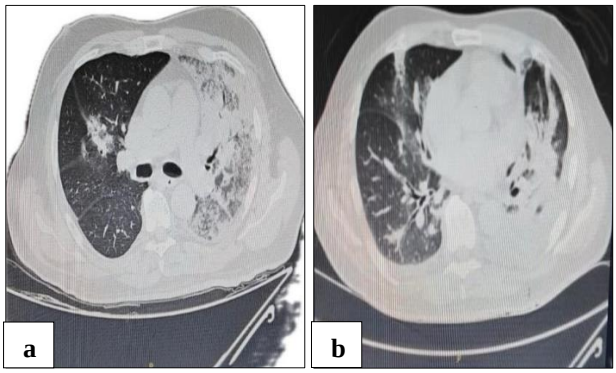

Figure 2 (a and b): PET-CT scan of the patient's lungs.

Additionally, the patient presented with left pleural effusion and subcutaneous edema in the abdominal wall and bilateral lower limbs, with the left side being more affected. The abdominal aorta and its major branches, as well as the bilateral common and deep femoral arteries, showed normal caliber and contrast opacification, indicating no significant vascular compromise in these regions. Furthermore, the CT scan of the chest revealed a hypodense eccentric partial filling defect in the right upper lobe segmental branches of the right pulmonary artery, indicative of pulmonary embolism. Additionally, the findings included diffuse areas of ground-glass opacities and patchy areas of consolidation in the bilateral lung fields. The presence of dilated pulmonary arterial system also suggested pulmonary infarction associated with the underlying condition. These findings emphasized the need for immediate anticoagulation therapy and careful monitoring of the patient's condition, particularly given the presence of multiple comorbidities, including diabetes and sepsis. Overall, the results highlight the complexity of managing such a multifaceted case.

Table 1: Comparison of hematological parameters at admission (16 December 2022) and discharge (11 January 2023).

Parameters	16 December 2022 (admission)	11 January 2023 (discharge)
TLC (10^3/cu.mm)	12.97 (4-10)	10.23 (4-10)
Platelet count (million/cu.mm)	175 (150-400)	207 (150-400)
PCV (hematocrit) (%)	41.3 (40-50)	42.5 (40-50)
MCH (pg)	28.9 (27-32)	27.9 (27-32)
MCHC (g/dl)	32.2 (31.5-34.5)	30.4 (31.5-34.5)
Hemoglobin (g/dl)	13.3 (13-17)	12.9 (13-17)
DLC – neutrophils (%)	87.7 (40-80)	65.3 (40-80)
DLC – monocytes (%)	2.3 (2-10)	8.6 (2-10)
DLC – lymphocytes (%)	9.7 (20-40)	23 (20-40)
DLC – eosinophils (%)	0.1 (1-6)	2.5 (1-6)
DLC – basophils (%)	0.2 (0-2)	0.6 (0-2)
Absolute monocyte count (/cu.mm)	11380 (2000-7000)	880 (200-1000)
Absolute lymphocyte count (/cu.mm)	300 (200-1000)	2350 (1000-3000)
Absolute eosinophil count (/cu.mm)	1260 (1000-3000)	260 (20-500)

DISCUSSION

This case study describes a rare and complex clinical scenario involving a 70-year-old male with diabetes mellitus, DVT, pulmonary infarction, PCD, and a secondary infection with *Aspergillus flavus*. The interplay of these conditions highlights the challenges in managing elderly patients with multifaceted health issues.

The patient initially presented with DVT, which progressed to pulmonary infarction and PCD. Pulmonary infarction, a direct consequence of thromboembolic events, became secondarily infected with *Aspergillus*

flavus, a complication attributable to the immune-suppressive effects of diabetes rather than sepsis. Diabetes is known to impair immune responses and create a pro-inflammatory state, predisposing individuals to infections in previously damaged tissues.[11,12] The diagnosis of fungal infection was confirmed via bronchoalveolar lavage (BAL), and antifungal therapy was promptly initiated.

The development of PCD in the left lower limb, marked by severe ischemia and venous congestion, further complicated the clinical course. PCD is a rare but serious manifestation of extensive DVT, often resulting in venous gangrene and systemic complications if untreated.[1-5] Doppler ultrasound revealed thrombi in the left popliteal vein, and CT angiography identified additional thrombi in the right superficial femoral vein. Anticoagulation therapy was initiated to address the thromboembolic events, but the management was complicated by the risk of bleeding in the presence of gangrene.[13]

Pulmonary infarction, although typically sterile, became infected in this patient due to hyperglycemia-associated immunosuppression. This secondary infection significantly exacerbated the systemic inflammatory response, leading to worsening respiratory symptoms and necessitating aggressive medical intervention, including antifungal treatment and supportive care. The bilateral lung opacities and pleural effusion observed on imaging were consistent with both the fungal infection and the associated pulmonary infarction.

The role of diabetes in this case was central, as hyperglycemia not only increased the susceptibility to infections but also contributed to the progression of thromboembolic events. Poor glycemic control, with blood glucose levels of 250 mg/dl, likely intensified the pro-inflammatory and hypercoagulable state, further complicating the patient's clinical picture.[14-16]

The complexity of this case required a multidisciplinary approach. Collaborative efforts among specialists in internal medicine, vascular surgery, and infectious diseases were vital in managing the patient's thromboembolic disease, fungal infection, and limb ischemia. Careful monitoring and balancing of anticoagulation therapy against the risks posed by gangrene were critical in optimizing the patient's outcomes.[17]

Despite these challenges, the patient demonstrated gradual improvement with resolution of fever and a reduction in limb pain. However, the presence of gangrene necessitated continued vigilance and potential surgical intervention.

This case underscores the importance of early diagnosis and targeted management in preventing fatal outcomes in rare but severe complications such as PCD and infected pulmonary infarction. It also highlights the critical role of glycemic control in mitigating the systemic impacts of diabetes in similar scenarios.

CONCLUSION

This case study illustrates the challenges and complexities involved in managing elderly patients with multiple comorbidities. The interplay of diabetes, infection, and thromboembolic events requires a comprehensive and coordinated approach to care. Early diagnosis, effective management of underlying conditions, and interdisciplinary collaboration are key to achieving positive outcomes in such complex cases. This case highlights the need for ongoing research and education to improve the management of similar cases in clinical practice.

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