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Multifaceted Display of Acute Pulmonary Embolism Clinical Presentation - A Case Series

Nishi Somarkutty[1]*, Rintu Mary Roy[1], Dr. Sippy Biju Thomas[2], Dr. Sunil Antony[3]

[1]Pharm D. Intern, Nazareth College of Pharmacy Othera, Thiruvalla, Kerala, India
Corresponding Author Email: *nishisomarkutty[at]gmail.com*

[2]Pharm D. Intern, Nazareth College of Pharmacy Othera, Thiruvalla, Kerala, India

[3]Department of General Medicine, Believers Church Medical College Hospital, Thiruvalla, Kerala, India

[4]Associate Professor, Department of General Medicine, Believers Church Medical College Hospital, Thiruvalla, Kerala, India

Abstract: ***Acute pulmonary embolism is a very commonly underdiagnosed and potentially fatal disease. The varied clinical manifestations could be the outcome of intricate interactions between several organs. The unpredictable way in which pulmonary embolism presents itself frequently impedes prompt identification and treatment, leading to a higher mortality rate. Enhancing our knowledge of the various clinical symptoms and figuring out their underlying mechanisms can aid with timely intervention. Here we present a series of 12 cases which highlights different clinical presentations of pulmonary embolism. The necessity of maintaining a high index of clinical suspicion for pulmonary embolism in patients who are immobilized, quick diagnostic testing, and prompt treatment for patients who present with pulmonary embolism are all emphasised in this article.***

Keywords: Pulmonary embolism, immobilized

1. Introduction

The third most prevalent cardiovascular condition, after acute coronary syndrome and stroke, is venous thromboembolism (VTE), which includes pulmonary embolism (PE) and deep vein thrombosis (DVT)[1] Pulmonary embolism occurs as a complication of deep vein thrombosis. It usually occurs when a thrombus is formed in the artery of the lung and impedes the blood flow[2]Rarely PE can arise from other substances like air and comorbid conditions. This masks the clinical assessment and delays the timely diagnosis of individuals presenting with VTE thereby increasing the risk of complications like PE and death. PE has been associated with a high mortality rate. Early diagnosis with appropriate treatment improves the condition[3] Factor V leiden mutation, prothrombin gene mutation, protein C deficiency , protein S deficiency, hyperhomocystenemia are some of the genetic risk factors leading to PE. Acquired risk factors include immobilization for prolonged period (lying in bed for more than 3 days, travelling more than 4hrs), orthopaedic surgery (hip/ knee placement), malignancy (chemotherapy), indwelling venous catheter, infection(UTI, pneumonia etc)history of previous DVT, oral contraceptives, hormone replacement therapy, pregnancy, obesity, and cigarette smoking[4].

This case series seeks to shed light on the varied presentations of pulmonary embolism, how they relate to particular postures, and other clinical conditions. It also reveals how PE can be misdiagnosed on the first presentation.

Case 1
A 40 year old male, came with c/o diffuse severe abdominal pain referring to back since 1 day. His initial blood investigations showed increased levels of Amylase(1615.5 U/L), deranged ABG values, increased phosphorus (5.47mg/dL), decreased magnesium (1.58mg/dL), elevated CRP (44.5mg/L), triglycerides (162mg/dL), lipase (5307.0 U/L), transaminitis. Blood and urine cultures were sterile. Emergency USG showed features suggestive of acute pancreatitis with mild ascites and possible septated collection in left paracolic gutter. He was admitted in ICU and was started on O2 support and IV fluids. Patient had c/o abdominal distension, tachycardia and tachypnea. Abdominal girth were monitored and CECT abdomen showed Pancreatic body and tail necrosis (>30%) on contrast. Peripancreatic acute necrotic fluid collections are noted. Patient was intubated in view of tachypnea, desaturation and tachycardia. CTPA done showed pulmonary embolism. He was started on injection Heparin. Later he developed complaints of abdominal and chest discomfort. ECG taken showed biphasic T waves in V3, V4 and T inversion in I, II, avL, V5 and V6, he was started on antiplatelets. Patient is hemodynamically stable, hence discharged.

Case 2
A 74 year old female patient presented to the emergency department with alleged history of slip and fall at home followed by giddiness and sustained trauma to left hip, left shoulder and arm. She was evaluated clinically and radiologically and diagnosed with closed intertrochanteric fracture left femur. She was tested Covid positive on admission and was started on further management. Over the days she started to develop breathlessness and a drop in saturation was noticed. CTPA was done which showed evidence of pulmonary thromboembolism and doppler study revealed short thrombosis of right calf veins. She was started on INJ Heparin. Later she underwent closed reduction and PFNA 2 nailing on left femur. Patient is stable and wound healthy, no fresh complaints hence discharged.

Case 3

A55 year-old female came with complaints of mass per vaginum for 6 years. initially the mass was small in size but gradually increased over the years. she underwent vaginal hysterectomy + pelvic floor repair + sacrospinous fixation. patient tolerated the procedure well. patient was treated with iv fluids, antibiotics, analgesics, thromboprophylaxis and other supportive measures pre and post operatively. she developed sudden onset of tightness of chest and pain radiating to shoulder, her saturation dropped to 87% and was shifted to icu on post operative day 2. she was managed with oxygen support and other supportive medications. CTPA was taken and reported as bilateral pulmonary thromboembolism of segmental branches. initially she was started on heparin infusion followed by inj. clexane 60 mg for 5 days followed by tab. dabigatran 150mg bd. patient is hemodynamically stable and vitals within normal range, hence discharged.

Case 4

A 34 year old male patient who is a known case of T2DM, diabetic foot came with complaints of acute onset breathlessness. His routine lab investigations revealed anemia, raised PT-INR, D- dimer levels, elevated creatinine, hypoalbuminemia and hypomagnesemia and mild hypokalemia . His Trop I levels were mildly elevated, but remained stable. CT PA taken showed segmental branch infarcts in bilateral upper lobes. He was started on NIV support and treated with IV Augementin, clindamycin, oral azithromycin, nebulisation with steroids, bronchodilators, antiplatelets, potassium, Magnesium supplementation and lasix infusion. Heparin infusion was started for pulmonary thromboembolism. He was gradually tapered off of O2 support. He was symptomatically better and hence discharged.

Case 5

A 73 yr old female patient came with the complaints of breathing difficulty,cough,low grade fever for 4 days.Patient's routine blood investigations showed elevated blood infective markers and she was initiated on Inj.ceftriaxone, Tab.Azithromycin, steroids and bronchodilators. Patient was put on 2 litre O^2 via nasal prongs and saturation maintained. Patient had hypokalemia and was corrected by potassium infusion.Patient developed sudden onset of breathing difficulty and desaturation. In view of this d dimer was sent and was elevated (4979.59). CT PA chest done showed Acute pulmonary thromboembolism in right, left and bilateral lobar & segmental branches. Patient was started on anti-coagulant (Inj.heparin infusion),serial monitoring of aptt was done. She was then given Inj.Heparin infusion with Tab.Warfarin. Serial monitoring of INR was done and the dose of warfarin was adjusted accordingly with the INR reports. Patient improved symptomatically and is hemodynamically stable hence being discharged.

Case 6

A 17 year old male came with complaints of high grade fever which lasted for 3 days. The patient symptoms improved but later developed intermittent fever associated with cough and expectoration. He also had 1 episode of mild hemoptysis. Chest x-ray showed right upper lobe consolidation. The patient was empirically started on Inj. Ceftriaxone 1 g IV BD and Tab. Azithromycin 500 MG.CECT chest was done and it reported right upper lobe consolidation and bilateral pulmonary embolism. Sputum AFB showed no Acid fast bacilli, TB PCR was also negative. Blood culture reports showed no bacterial growth. Bronchoscopy done and bronchial washings were sent for analysis. Bronchial washings reported negative for AFB, CBNAAT and culture. His D dimer was high. Inj Heparin was initiated (5000 units IV Q6H). Cardiology consultation and echocardiograghy was done to rule out infective endocarditis. Repeated 3 sets of blood culture reports showed no growth. Bilateral venous doppler of lower limbs showed no DVT. Repeat chest xray showed clearing of consolidation. He was afebrile for the rest of stay. Despite of Inj. Heparin for 5 days and his APTT was not adequately prolonged, heparin resistance was suspected. Anti thrombin activity was normal. After initial parenteral therapy of Inj. Heparin for 5 days, switched over to Tab. Dabigatran. The following night he complained of right sided chest pain in the infraaxillary region and was tachypneic on examination. In doubt of another embolism Inj. HEPARIN 5000 U stat was given, and infusion was started at 1000 units per hour and titrated with serial monitoring of aPTT. Pleuritic pain was managed with NSAIDs. After 4 days of heparin infusion, it was tapered and TAB.DABIGATRAN 150 mg 1-0-1 was started. His cough and right sided pleuritic pain has reduced, he is symptomatically better hence being discharged.

Case 7

A 61 year old female came with above mentioned complaints of intermittent burning type of abdominal pain. She was diagnosis with Multiple Polyps in Right Colon With High Grade Dysplasia. Right hemicolectomy was performed on her under General Anesthesia. Postoperatively she was mobilised. Started on incentive spirometry. Low molecular weight heparin was started on day 2. On day 3 after mobilization, she developed dyspnoea and saturation drop. ECG showed ischemic changes. Trop I was high. D dimer was high. She was shifted to ICU and given CPAP. Emergency cardiology and pulmonology consultation done and started on higher dose of LMWH and anti platelets. 2 D echo showed right heart strain. Pulmonary angiogram was done which showed evidence of central pulmonary embolism. She was continued on oral Dabigatrin 150 mg BD. At the time of discharge she was tolerating a full diet, passing stools, wound clean and maintaining o2 saturation on room air.

Case 8

A 52-year-old male, known case of Polyarteritis nodosa on treatment, bilateral varicose vein, non-healing ulcer-lower limb since 2 months, presented with complaints of shortness of breath. His ECHO showed mild Right Atrium/Right Ventricle dilatation. He was treated with heparin, methyl prednisolone, i.v antibotics along with other supportive measures. aPTT was monitored and heparin dosage was adjusted accordingly. On day 2 he developed acute onset shortness of breath, subsequently he was shifted to CCU and was initiated on NIV support. Right and left Pulmonary angiogram showed thrombus at origin. Pig tail catheter kept at main pulmonary artery, alteplase injection started at 1

mg/hour X 20 hours. Post procedure he gradually improved symptomatically. In view of persistent cough with expectoration antibiotics was uptitrated. Acitrom was started and INR was monitored and dosage was titrated accordingly. He improved symptomatically with medications and other suports and was discharged in stable state.

Case 9

A 57 year old female presented with complaints of lower back pain.MRI lumbar spine suggestive of canal stenosis at L4/5 due to diffuse disc bulge and flaval thickening at C3/4, C4/5 and C5/6.Later she developed drowsiness with hyperkalemia and tachypnea. HRCT and CT Angio Pulmonary taken showed Pulmonary thromboembolism involving right lower lobar pulmonary artery branch. ? Wedge shaped area of subsegmental collapse – consolidation involving apical segment of rightlower lobe likely to represent pulmonary infarct. Mild cardiomegaly was also present. Venous Doppler study of both lower limb was taken, which showed no evidence of deep vein thrombosis. She was started on Inj.Enoxapain 60 mg SC BDwith T. DABIGATRAN 150 MG 1-0-1 and serial monitoring of PT/INR/aPTT was done every 2 days. Later she improved symptomatically and was clinically stable, hence discharged.

Case 10

A 49-year-old male, normotensive, euglycemic, presented with complaints of left lower limb pain and swelling, He was admitted for management of DVT Left Leg . Patient developed sudden onset chest discomfort and tachycardia and was shifted to MICU, CT Pulmonary angiogram revealed acute pulmonary embolism. He was started on Heparin infusion and serial aPTT monitoring was done. Repeat venous Doppler revealed left common iliac vein and visualized IVC appears patent. He was initiated on oral anticoagulant and became symptomatically better and hemodynamically stable, hence discharged

Case 11

A 42 year old male came with complaints of shortness of breath for 15 days, cough for 10days and coughing up of blood for 1 week, fever for 3-4 days, loss of appetite for 2 days associated right sided chest pain and severe left leg pain. His blood routine blood investigations showed elevated blood infective markers and started on Antibiotics(Inj Amoxicillin+ clavulanate, T Metronidazole,Tab Azithromycin), Tab Ethamsylate and Tab Tranexamic acid. Chest X-Ray showed right sided wedge-shaped consolidation. D-Dimer was sent and was elevated, CTPAdone showed Non-Occlusive thrombus involving segmental branches of right lower lobe and segmental branch to lateral basal segment of left lower lobe, Segmental collapse consolidation of medial segment of right middle lobe, inferior lingular of left upper lobe and basal segments of left lower lobe, Patchy collapse consolidation in right lower lobe, Atelectatic bands in left basal segments, mild right pleural effusion. He was started on anticoagulants(Inj Enoxaparin) and later switched to T Warfarin.2-D ECHO showed Normal LV systolic function. Patient improved symptomatically and infective markers showed reducing trend hence discharged.

Case 12

A 59 year old male came with complaints of increased shortness of breath, fever and cough with whitish mucoid expectoration for 10 days. He was started on antibiotics (Inj.Ceftazidime, Tab.Augmentin, Tab.Azithromycin), bronchodilators (nebulization with salbutamol and ipratropium bromide)and supportive therapy. His D dimer was 10000 .CTPA was done showed acute pulmonary thromboembolism involving left pulmonary artery and segmental branches to right middle,left upper and bilateral lower lobes.Screening ECHO showed normal LV systolic function. Venous doppler of both lower limbs showed no evidence of DVT. He was started on Inj. Enoxaparin 60 mg s/c BD and Tab. Warfarin 5 mg OD.Dosage of Inj Enoxaparin and Tab.Warfarin was adjusted according to the regular monitoring of PT, INR and aPTT reports. At the time of discharged patient was advised to continue Tab.Warfarin 3 mg for 3 days and to repeat PT, INR after 3 days.

2. Discussion

Acute Pulmonary Embolism (APE) is a potentially life threatening condition and is a commonly seen complication of Deep Vein Thrombosis (DVT). When addressing PE, the challenging factor is that it seldom exhibit the typical signs of this condition like abrupt onset of pleuritc chest pain, hypoxia and shortness of breath.[5] Injury or surgical procedures can result in blood vessel damage, which can trigger the formation of a blood clot. Prolonged bed rest during the recovery phase exacerbates this risk by reducing blood flow, further contributing to the likelihood of clot formation.[6] In this case series patient presented with unusual symptoms like cough, fever, back ache, abdominal pain, non-healing ulcer, also there were patients who presented with classical features like breathing difficulty, saturation drop, tachycardia, tachypnea, pleuritic chest pain, etc.

The crucial phase in diagnosing and managing pulmonary embolism (PE) is having an early clinical suspicion. If a patient presents with chest pain or shortness of breath, along with a history of immobilization for atleast a week and if there is no alternate diagnosis to these symptoms, it should raise a suspicion for possible APE. Such patients must be screened out for PE. Applying the Wells Scoring system for patients experiencing respiratory distress, tachycardia, and those prescribed bed rest following surgery or immobilized can aid in the prompt identification of PE.[7] For a patient who is stable and has not experienced recent trauma or undergone surgery, it is advisable to conduct a d-dimer test. PE can be ruled out if the test results are negative. Consequently, d-dimer testing is less informative for post-operative patients, as their results may be elevated due to ongoing coagulation and fibrinolysis processes. Venous doppler of lower extremities is a fast and noninvasive technique capable of identifying deep vein thrombosis (DVT).Arterial blood gas shows hypoxemia, hypocapnia, and respiratory alkalosis. The radiographic findings of pulmonary infarction include a wedge-shaped, pleura-based triangular opacity with an apex pointing toward the hilus (Hampton hump) or decreased vascularity (Westermark sign). Echocardiography yields evidence of acute PAH and RV dysfunction in PE. A classic McConnell's sign in ECHO denotes PE. In highly unstable patients, evidence ofRV dysfunction is sufficient to

prompt immediate reperfusion without further testing. CT Pulmonary Angiogram is the gold standard for diagnosis of PE.[8]

Anticoagulant therapy is recommended for all patients with acute pulmonary embolism (PE) to prevent early mortality and the risk of recurrent, life-threatening venous thromboembolism (VTE). This treatment should be continued for a minimum of three months. During the initial acute phase, patients typically receive parenteral anticoagulation with unfractionated heparin (UFH) or low molecular weight heparin (LMWH) for the first 5 to 10 days. Extended therapy of anticoagulant is preferred for patient with cancer as the risk of recurrence is high. LMWH is preferred over Warfarin in such patients.Preventing clots in the deep veins in one's legs (deep vein thrombosis) can help prevent pulmonary embolism. Taking measures to prevent blood clots, including blood thinners(anticoagulants) after excluding bleeding risk, compression stockings, leg elevation, physical activity, keeping proper hydration and posture can prevent clots from forming in lower extremities.[9]

3. Conclusion

Acute pulmonary embolism (APE) often involves a intricate presentation of symptoms, potentially culminating in a life-threatening cardiovascular condition that can be challenging to diagnose. A multi-disciplinary team approach may be essential to enhance patient assessment and facilitate clinical decision-making, ultimately ensuring early diagnosis of the condition. An early suspicion of PE is crucial in order to prevent any misdiagnosis.Upon diagnosis, prompt and assertive intervention can result in a favorable outcome. Early prophylaxis with anticoagulant in suspected patient can reduce the risk of PE. Following treatment, appropriate counseling can mitigate the risk of pulmonary embolism recurrence.

Conflict of Interest
There are no conflicts of interest.

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Abbreviations
PE – pulmonary embolism
VTE - venous thromboembolism
DVT –Deep vein thrombosis
ICU – Intensive Care Unit
ABG – Arterial Blood Gases
CRP – C- reactive protein test
IV – intravenous
CECT - Contrast Enhanced Computerized Tomography
CTPA- Computed tomography pulmonary angiography
USG – ultrasonography
PFNA2 -Proximal Femoral Nail anti-rotation-Asia
T2DM – type 2 diabetes mellitus
PT –INR- prothrombin time –international normalised ratio.
NIV- Non-invasive ventilation
CBNAAT -Cartridge Based Nucleic Acid Amplification Test
AFB- Acid-fast bacillus
APTT -Activated Partial Thromboplastin Clotting Time
NSAIDs –Non steroidal anti inflammatory drugs.
CPAP (continuous positive airway pressure)
LMWH -Low molecular weight heparin
ECHO –echocardiogram
CCU- critical care unit
MRI- Magnetic resonance imaging
HRCT- High-resolution computed tomography
MICU- Medical Intensive Care Unit
IVC- inferior vena cava
(APE)-Acute Pulmonary Embolism

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