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Case Report

Acute Pulmonary Embolism

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Abstract: A 74 years old male patient presented with a two days history of dyspnea, orthopnea, pleuritic chest pain, hemoptysis, and fever after a history of fall from his bed with 2 fractured ribs two days ago. On physical examination his heart rate was 120 beats per minutes, temperature 40°C and blood pressure 110/60 mmHg. Arterial oxygen saturation was 96% on air. No heart murmur was noted but there was decreased air entry in right lower lobe of the lung. Chest X-ray showed 3rd and 5th rib fractures on the right side as well as lower lobe consolidation. ECG showed sinus tachycardia. The D-dimer level was > 2000ng/mL (normal level < 500 ng/mL). Subcutaneous enoxaparin 40mg (twice daily) was started immediately. Pulmonary CT angiography revealed right pulmonary embolism. Subcutaneous enoxaparin was continued for a couple of days with daily international normalised ratio (INR) check until D-dimer level was < 500 ng/mL.

Keywords: Ribs fracture, Dyspnea, Hemoptysis, Enhanced Contrast Chest CT scan, Pulmonary Embolism

INTRODUCTION

The patient is a 74-year old, non-obese male, previously a heavy smoker with a medical history of hypertension and Type-2 diabetes. He had a history of fall two days ago and presented to the Accident & Emergency department (AED) complaining of pleuritic chest pain, mild dyspnea, hemoptysis, dizziness and fever. The symptoms had started two days prior to him calling at the hospital. Chest X-ray showed 3rd and 5th fractured ribs right side and right lower lobe consolidation (see Fig. 1). No pneumothorax was noted. His vitals were as follows: BP 110/60 mmHg, temperature 40°C and arterial oxygen saturation on ambient air was 94% whilst his ECG showed sinus tachycardia. He had a hip decompression surgery done several years ago. And, having suffered from peripheral vascular disease for some time, the patient had equally had a left above knee amputation fifteen months ago. Cardiovascular, abdominal and neurological examinations were insignificant except for respiratory which showed decreased air entry in right lower lobe. Intercostal nerve block was done with 10ml 1% lignocaine in AED to relieve the pain. The patient was admitted for further observations and investigations. Echo Doppler of the right lower limb did not show any features of deep vein thrombosis (DVT) and cardiac echography was normal with an ejection fraction of 64%. Haemoglobin was 13.5 g/dL, Protein S 85%, Protein C 81% and D-dimer >2000 ng/ml. Liver function, together with urea and electrolytes were within normal limits.

Fig-1: Chest X-ray
Fractures 3rd and 5th ribs

Intravenous antibiotic-amoxicillin/clavulanate potassium 1.2 g 8 hourly (Augmentin) was started for possible aspiration pneumonia and anticoagulation subcutaneous low-molecular-weight heparin i.e subcutaneous enoxaparin 40 mg/0.6 ml (twice per day) for pulmonary embolism. A Computer Tomography pulmonary angiogram was performed 48hrs after his

admission confirming the diagnosis of right pulmonary embolism with right lower lobe consolidation co-existing with lung infarction in the same lobule Fig. 2. His ECG did not show any dynamic changes since admission apart from tachycardia. The repeated D-dimer decreased to <500 ng/ml 6 days later. The patient made a full recovery. He was discharged after 2 weeks on Tab vitamin K antagonist (warfarin) 3mg Nocte with an INR of 3.0 and analgesics for ribs fracture associated pain. He had been asymptomatic during his 8 months of follow up (INR target 2.0 to 3.0).

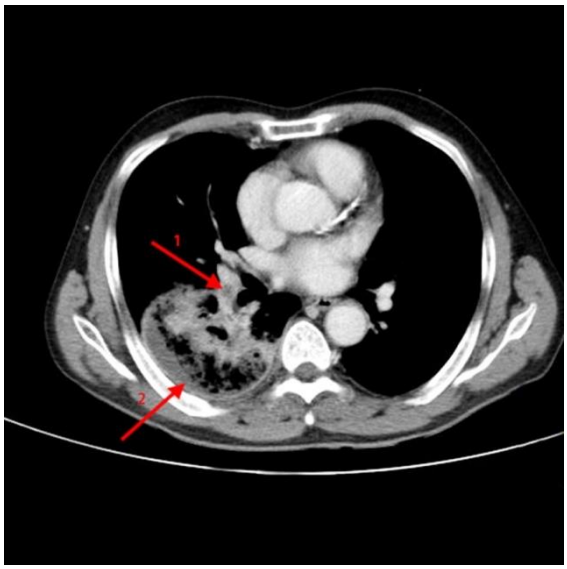

Fig-2: Chest CT angiography- Contrast enhanced

DISCUSSION

Pulmonary embolism (PE) is a blockage in one of the pulmonary arteries in the lungs mostly caused by blood clots. 79% of PE arise from lower limb Deep Venous thrombosis (DVT) [1].Patients usually present with symptoms such as dyspnea, hemoptysis, pleuritic chest pain, tachypnea and tachycardia. It is the major cause of death which is associated with surgery, trauma and medical illness. Moreover, 15% of all in-hospital deaths is due to PE and is also responsible for 20-30% of deaths associated with pregnancy and delivery within European countries and the United States [2].

According to a study conducted by John A. Heit et al. from January 1976 to December 1990, it was found that the risk of VTE was 22 fold higher for patients with recent surgery, 12 fold more for patients with recent trauma and nearly 8 fold higher for patients confined to bed. The authors also observed that patients with previous superficial vein thrombosis were over 4 times more likely to develop DVT or PE [3]. Our patient had peripheral vascular disease (PVD) after which an above knee amputation was done under spinal anaesthesia 15 months ago. He was hardly ambulated following the intervention and it is probable that venous stasis could have been a contributing risk factor for the PE in his case. The study also found that the risk of VTE among patients who underwent surgery was lower when regional anaesthesia (spinal or epidural showing 11.5 fold increased risk) was used as compared to when general anaesthesia (19 fold increased risk) was used [3].

Age is an independent risk factor for DVT and there is no strong evidence to correlate the risk associated with patients' sex [3]. However, this is not the case for traumatic patients. Age is an important factor in predicting the risks of VTE. As per Kyle J. Van Arendonk et al, the risks of VTE increase slightly at the age of 13 years (0.3%) and then increase considerably at the age of 16 years (0.8%) [4]. Another risk factor for VTE is obesity because it leads to limited mobility and stimulates other conditions related to VTE such as hypertension, diabetes and venous stasis. Around 25% of obese people who suffer from VTE have been reported to die within seven days of venous thromboembolism (VTE) [5]. Moreover, resistance to activated protein C remains the most common anticoagulation disorder.

D-dimer testing is recommended as the next step in diagnosing a suspected PE. A D-dimer level of < 500ng/mL or 0.5 mg/L is considered to be negative and no further diagnostic testing is required.[2] However, the specificity of D-dimer level falls for hospitalised, elderly and pregnant patients.[6] Patients with a D-dimer level > 500ng/mL should undergo CT pulmonary angiography to confirm the diagnosis of PE. Moreover, pregnant women who have a high clinical probability of pulmonary embolism must undergo multidetector CT as it delivers higher dose of radiation to the mother and advantageously/favourably a lower dose to the fetus [6].

Patients at risk must be identified and should be given appropriate prophylaxis to increase survival. As per a study two groups of patients were selected. One group was administered with 40 mg subcutaneous LMWH twice daily and the other group was treated with unfractionated heparin 5000 U 8 hourly. No thrombotic events in enoxaparin treated patients were reported and only one case of PE occurred in heparin treated patients. Moreover, the use of LMWH for 10 days after hospital discharge proved that thrombosis rates were significantly lower with prolonged prophylaxis. However, bleeding occurred in both groups in a similar percentage. These findings suggest that usage of subcutaneous enoxaparin tends to be more beneficial in treating VTE. The rate of fatal PE is lower in those patients who receive pharmacologic prophylaxis in conjunction with compression stockings and early ambulation [5].

There is no relationship between PE and fractured ribs but in line with this study, our patient

could have died from increasing pulmonary morbidity such as pneumonia, pneumothorax and ARDS secondary to rib fracture rather than PE alone [7]. This line of reasoning is also supported by the study conducted by Benjamin T.Flagel et al. where they showed a statistically significant rise in mortality rate with each successive rib fracture [7]. The number of pulmonary complications and rib fractures are strongly correlated. The frequency of pneumonia ranges from 3% for one fractured rib and rises to 5.2% for 4 or 5 fractured ribs [7]. Appropriate analgesia can reduce the incidence of complications but differs with the different ways of administration. Repeated intercostal nerve block with a local analgesia improves the peak expiratory flow (PEF) rate and oxygen saturation. Besides, sodium bicarbonate when mixed with local anaesthesia speeds the anaesthetic effect. This improves the quality by increasing the intensity and duration of block [8]. Epidural analgesia compared to local anaesthetic improves tidal volume and maximal inspiratory force [7].The improvement with the epidural route reduces the number of ventilator days, mortality (increased survival by 96%), the incidence of nosocomial pneumonia and provides superior analgesia. However, in the medical literature epidural anaesthesia have been underused among such trauma patients [7].

The Surgeon General estimated that venous thromboembolism (VTE) is responsible for at least 100,000 deaths yearly in the United States[2]. The former also stated that VTE is a very common cause of death among adults in hospitals which could be prevented and hence should be seen as national priority [4]. The current study is important because it seeks to raise awareness among junior doctors to recognise the risk factors, signs and symptoms promptly in such patients despite having normal arterial oxygen saturation. Therefore, immediate actions must be taken in patients diagnosed with PE as this may entail a very rapid death if treatment is delayed.

Image Interpretation and Diagnosis

The area of the tip of the arrowhead 1 is slightly darker than normal indicating a decreased ability for contrast dye to enter the right pulmonary artery. This is indicative of pulmonary embolism. Right lower lobe consolidation co-existing with lung infarction in the same lobule can also be seen (melting ice pattern), indicated by arrowhead 2.

Learning Points

- PE patients usually present with dyspnea, orthopnea, pleuritic chest pain, hemoptysis, tachycardia and hypotension.
- Common risk factors of PE are recent lower limb surgery, trauma, obesity and immobility leading to venous stasis. Besides, patient undergoing surgery under general anaesthesia has higher risks of having a pulmonary embolism than those who had spinal/epidural anaesthesia.
- The commonest ECG finding in PE is sinus tachycardia. Dynamic ECG changes such as widespread flattened T waves and right axis deviation can be seen. S1Q3T3 pattern, ST segment changes or the appearance of right bundle branch block may also be present.
- D-dimer level is the first investigation to be done in suspected PE cases followed by pulmonary CT angiography if D-dimer level is above normal value. The normal D-dimer level is < 500 ng/mL or < 0.5 mg/L
- The drug of choice for pulmonary embolism is subcutaneous enoxaparin 40 mg twice per day followed by daily international normalised ration (INR) until we have a normal D-dimer level. Patients undergoing treatment should be asked for any bleeding tendencies such as epistaxis, hemoptysis, hematemesis, melena or fresh blood in stool.

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REFERENCES

1. Walker, B. R., & Colledge, N. R. (2013). *Davidson's principles and practice of medicine*. Elsevier Health Sciences.
2. Konstantinides, S. (2008). Acute pulmonary embolism. *New England Journal of Medicine*, *359*(26), 2804-2813.
3. Heit, J. A., Silverstein, M. D., Mohr, D. N., Petterson, T. M., O'fallon, W. M., & Melton, L. J. (2000). Risk factors for deep vein thrombosis and pulmonary embolism: a population-based case-control study. *Archives of internal medicine*, *160*(6), 809-815.
4. Van Arendonk, K. J., Schneider, E. B., Haider, A. H., Colombani, P. M., Stewart, F. D., & Haut, E. R. (2013). Venous thromboembolism after trauma: when do children become adults? *JAMA surgery*, *148*(12), 1123-1130.
5. Brotman, D. J., Shihab, H. M., Prakasa, K. R., Kebede, S., Haut, E. R., Sharma, R., & Segal, J. B. (2013). Pharmacologic and mechanical strategies for preventing venous thromboembolism after bariatric surgery: a systematic review and meta-analysis. *JAMA surgery*, *148*(7), 675-686.
6. Agnelli, G., & Becattini, C. (2010). Acute pulmonary embolism. *New England Journal of Medicine*, *363*(3), 266-274.

7. Flagel, B. T., Luchette, F. A., Reed, R. L., Esposito, T. J., Davis, K. A., Santaniello, J. M., & Gamelli, R. L. (2005). Half-a-dozen ribs: the breakpoint for mortality. *Surgery*, *138*(4), 717-725.
8. Miller, R. D. Philadelphia: Elsevier Churchill Livingstone; 2005. *Millers Anesthesia*, 2294.