Emergency Care Institute
NEW SOUTH WALES

ACI NSW Agency for Clinical Innovation

THE DIFFERENTIAL DIAGNOSIS DILEMMA

Learning from our Incidents:

RED FLAGS in the Emergency Department

The case

64 year old, semi-retired man, presented to ED with 4-day history of left upper quadrant (LUQ) pain.

At triage, pain was described as sharp and stabbing, worse on inspiration.

The case

Assessed by JMO, who noted that there was mild pitting oedema of the right leg however the patient was not in respiratory distress.

Oxygen therapy, 2L via nasal prongs, was commenced as the Sa02 had decreased from 96% to 93%.

What are your differential diagnoses?

The case

FBC, EUC and coagulation levels were taken.

CXR report stated:

'focal consolidation as well as mild volume loss (left lower lobe). Acute setting the appearance may be due to pneumonia'

What would you do now?

The case

The JMO and Senior Registrar agreed that a CTPA was warranted, however, after discussion with the Radiology Registrar and then with the ED Staff Specialist, the decision was made to await the pathology results.

Results: elevated Neutrophils (11.2), WCC (14.6) and CRP (214).

What would you do now?

The case

Following discussion amongst the ED team, the decision was made not to request the CTPA but to treat as pneumonia. Plan included administration of intravenous antibiotics and monitoring of observations.

Patient was transferred into the department's Clinical Decision Unit, oxygen therapy was removed and Sa02 was 94% on room air.

The case

The patient was discharged on oral antibiotics and analgesia following the evening medical handover.

Eight days later, the patient was found unconscious at work and brought to the ED by ambulance. Resuscitation was unsuccessful.

The case

The Coroner's office report stated that the cause of death was attributed to:

'Bilateral pulmonary thromboembolism with the underlying condition of DVT, right leg'

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What is the lesson here?

PE may present in an atypical manner, with concurrent lower respiratory tract infection.

If you have a high clinical suspicion of a PE, ensure it's ruled out before committing to an alternative diagnosis.

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What is the evidence?

- **Early diagnosis of pulmonary embolism (PE) may reduce morbidity and mortality**[1].
- In a study aimed at identifying clinical factors associated with delayed diagnosis of PE in the emergency department (ED), Torres-Macho et al.[2] found 33.5% of patients had a delayed diagnosis of PE. 21.5% of patients had their PE diagnosed by CT during hospitalisation after they had left ED, whilst 11.9% were sent home with an alternative diagnosis and returned to ED with the same complaints are were then diagnosed of PE.

What is the evidence?

- The most common incorrect alternative diagnoses given by emergency physicians for admitted patients were pneumonia (34%), exacerbation of COPD (16%), and exacerbation of asthma (15%).

- For those who were discharged and returned to ED, alternative diagnoses included pneumonia (41%), mechanical chest pain (9%), and heart failure (7%)[2].

What is the evidence?

- Patients with a delayed diagnosis of PE, due to being sent home with a misdiagnosis, were significantly younger, with a higher proportion of pleuro-mechanical chest pain and haemoptysis on clinical presentation and with a higher proportion of patients with a pulmonary infiltrate on chest x-ray as compared to patients who were diagnosed by CT was ordered while patient was in ED at first visit[2].

What is the evidence?

- Diagnosis of PE can be delayed due to patients with PE often having nonspecific symptoms.
- In their study that found 17% and 5% of patients had 7 and 25 days elapse between symptom onset and diagnosis, Bulbul et al[3] found PE diagnosis was delayed due to common disorders mimicking PE.

What is the evidence?

- Patients who were sent home with a wrong diagnosis and returned to the ED with the same complaints and were diagnosed of PE showed a typical profile concerning the following issues: absence of risk factors for PE, clinical profile of distal PE without dyspnoea and sharing symptoms with other clinical situations like respiratory tract infection or mechanical chest pain.

- **Presence of radiological infiltrate was an independent predictor of misdiagnosis**. This might be related to the fact that pulmonary infarction might be confounded with a pneumonic infiltrate[2].

References

1. Smith, S.B., Geske, J.B., Maguire, J.M. et al.*Early anticoagulation is associated with reduced mortality for acute pulmonary embolism*. Chest, 2010. 137: pp. 1382-1390.
2. Torres-Macho, J., Mancebo-Plaza, A.B., Crespo-Gimenez, A. et al. *Clinical features of patients inappropriately undiagnosed of pulmonary embolism*. American Journal of Emergency Medicine, 2013. 31 (12): pp. 1646-1650.
3. Bulbul, Y., Ozsu, S., Kosucu, P., Oztuna, F., Ozlu, T., Topbas, M. *Time delay between onset of symptoms and diagnosis in pulmonary thromboembolism*. Respiration, 2009. 78: pp. 36–41.

Another case

28 year old fit and well female presented to ED in the early morning following onset of pain under left lower breast. Pain reported to be reproducible on movement and with inspiration.

Triage nursing staff recorded patient being on nil medications. It was later discovered that the patient was on the OCP.

Another case

Vitals:

HR 76/min

BP 95mmHg systolic

RR 18

SaO2 98% RA.

Given paracetamol and ibuprofen, and triage category 4.

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Another case

On review, patient's pain had resolved 30mins after initial presentation.

ECG performed, which showed sinus tachycardia at HR 110.

Which features of this patient's presentation are the Red Flags indicating a high risk of serious disease?

Another case

Patient seen by ED Registrar in Fast Track area, unmonitored. Noted that the patient "awoke with sharp left chest pain. Unable to breathe easily. Never happened before. Denies abnormal physical activity. No cardiac history. No PE risks. Pain coming from underneath the breast radiating to the left side. Much improved since ibuprofen and paracetamol".

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Another case

Vital signs repeated, and were normal.

Diagnosis of musculoskeletal chest pain given and patient discharged home.

Do you agree with the decision to discharge the patient home?

Another case

Two weeks later, patient presented to ED in cardiac arrest after losing consciousness whilst her father drove her to hospital.

Following nearly an hour of CPR, patient had return of spontaneous circulation and was transferred to ICU.

Another case

CTPA performed, which showed **massive pulmonary embolus with associated haemorrhage and infarction**.

CT Brain showed loss of frontal grey/white matter differentiation. Following family discussion, patient was taken off ventilator and died in the presence of her family.

If a patient has chest pain, a possible life-threatening differential diagnosis could be a PE.

Consider their risk factors and apply clinical decision rules to exclude a PE, before attributing symptoms to a musculoskeletal aetiology

What is the evidence?

- One quarter of patients with PE, present with sudden death [1].

- Dyspnoea is the most common presenting symptom, with tachypnoea being the most common sign [2].

- Typical presentations [2]:
  - Massive PE – severe dyspnoea, cyanosis, or syncope
  - Smaller, peripherally located PE – pleuritic chest pain, cough, haemoptysis

What is the evidence?

- Signs or symptoms of PE can be nonspecific, and there are no definitive clinical signs that confirm a diagnosis of PE.
- CT pulmonary angiogram is the predominant imaging technique for diagnosing PE. However, it would be inappropriate to investigate each patient with this procedure, exposing them to unnecessary and potentially harmful radiation, and IV contrast with a possible risk of anaphylaxis.
- As a result, clinical decision rules have been developed to aid clinicians in diagnosing or excluding PE.

What is the evidence?

For the Clinical Guideline produced by the American College of Physicians [3] :

http://annals.org/article.aspx?articleid=2443959&resultClick=3#r34-8

Wells Prediction Rule fo pretest probability of PE [4]

Clinical findings	**Score**
Previous DVT/PE	1.5
Pulse Rate > 100 bpm	1.5
Recent surgery/immobilisation	1.5
Clinical Signs of DVT	3
Alternative diagnosis less likely than PE	3
Haemoptysis	1
Cancer	1

Pretest probability:

0-1 Low, 2-6 Intermediate, >/= 7 High

Dichotomised </= 4 LOW, > 4 HIGH

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If Low risk on Wells score, you can progress to the **PERC rule** [5] :

PE can be ruled out if none of the 8 PERC criteria are present, in a patient with low pre-test probability for a PE as determined by the Wells PE score (<3)

Age < 50 yrs

Pulse rate < 100 bpm

SaO2 >/= 95%

No haemoptysis

No exogenous oestrogen use

No surgery/trauma <4 weeks

No history of VTE

No unilateral leg swelling

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Kline et al. chose 1.8% as the point of equipoise between:

(1) the benefits and risks of further investigations for PE, and

(2) the benefits and risks of *not* investigating further [5]

Access the ECI Clinical Tool:

Pulmonary Thromboembolism

http://www.ecinsw.com.au/PE

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References

1. Heit JA. The epidemiology of venous thromboembolism in the community: implications for prevention and management. J Thromb Thrombolysis. 2006; 21: 23–29
2. Piazza G, Goldhaber S. Acute Pulmonary Embolism. 2006 Circulation. 2006; 114: e28-e32 doi: 10.1161/CIRCULATIONAHA.106.620872
3. Evaluation of Patients with Suspected Acute Pulmonary Embolism: Best Practice Advice from the Clinical Guidelines Committee of the American College of Physicians. Raja AS, Greenber JO, Qaseem A, Denberg TD, Fitterman N, Schuur JD. Annals of Internal Medicine; Clinical Guidelines; 29 September 2015.
4. Wells PS, Anderson DR, Rodger M, Ginsberg JS, Kearon C, Gent M, et al. Derivation of a simple clinical model to categorize patients probability of pulmonary embolism: increasing the models utility with the SimpliRED D-dimer. Thromb Haemost. 2000; 83:416-20.
5. Kline JA, et al. Clinical criteria to prevent unnecessary diagnostic testing in emergency department patients with suspected pulmonary embolism. *J Thromb Haemost.* Aug 2004;2(8):1247-1255. PMID: 15304025

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