Elevation of d-Dimer without evidence of Venous Thromboembolism

Shravani Vedak and Siddhaarth Ranjan
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01

Background

- Thrombosis is the formation of a blood clot in the blood vessel.
- If the blood clot moves from one site to another in the body, it is called an embolus.
- An embolus in the artery is called an arterial embolism, and an embolus in the vein is called venous thromboembolism.

D-dimer (DD)

- DD is a soluble fibrin degradation product resulting from the breakdown of the fibrinolytic system of thrombi.
- DD serves as a valuable marker of coagulation and fibrinolysis activation.
- Elevated DD levels may indicate an increased risk of blood clotting or a recent clot.
- DD levels are typically low or undetectable unless significant clot formation and breakdown occur in the body.
- Normal DD level is considered less than 0.50 µg/mL.

D-dimer (DD), continued

- DD has been evaluated to determine the optimal duration of anticoagulation in VTE patients, to diagnose and monitor disseminated intravascular coagulation, and to aid in the identification of medical patients at high risk for VTE.
- The quantification of DD levels thus serves a vital role in guiding therapy.
- Increased d-Dimer levels: Breakdown of blood clot, and may be evidence of a blood clot
- Venous Thromboembolism: A blood clot that blocks blood flow through the veins. A VTE can be stuck in the deep veins of the legs or arms (deep vein thrombosis, DVT) or travel through the veins to the lungs and cause pulmonary embolism (PE). A VTE that blocks the lungs is life-threatening.

Relationship of DD with VTE

- DD are present in the blood (low and undetectable levels)----> No blood clot
- DD increase in blood levels: possibility of blood clots
- We have a patient who shows an elevation of DD.
- Does this patient have VTE?
- To find out, we will need to do some tests. What are those tests?
- Does this patient, who shows elevation of DD, have thrombosis?

The Case

The patient was admitted to the ER with:

- Coughing
- Nasal congestion
- Mild pain on the right lateral side of the chest that worsens on inspiration
- Difficulty breathing, and a low-grade fever.
- No other symptoms were noted, and other systems were normal.

List of Medications taken

- Aspirin 81 mg daily
- Carvedilol 12.5 mg per day
- Clopidogrel 75 mg per day
- Empagliflozin: 25 mg per day
- Esomeprazole 20 mg
- Insulin aspart PRN
- Insulin aspart [rDNA origin]: 30 IU per day

List of Medications taken, continued

- Insulin degludec: 16 IU per day
- Rosuvastatin 5 mg per day
- Fluticasone 250/Salmeterol 50: 1 spray twice a day
- Ezetimibe: 10 mg per day
- History: Nothing significant

Clinical Findings

Upon examination, the following findings were found:

- Temp 100 degrees F
- SpO2 (Oxygen saturation): 95 mm Hg
- BP 154/65 mm Hg, pulse 75 bpm, Resp 20 per minute, all other organs normal
- COVID-19 and RSV: negative
- Leukocytosis: WBC Count: 9.5
- Serum creatinine: 1.28 (normal <0.09)
- HS Troponin 77
- BNP 165
- Procalcitonin 0.35

Clinical Findings, continued

- ECG: Normal, with NSR (Normal Sinus Rhythm)
- Elevated DD 1395 ng/ml (threshold for age 80: 800 ng/ml)
- CT Angiography chest with IV contrast: No evidence of PE (pulmonary embolism)
- Transthoracic Echocardiography (TTE): No evidence of DVT
- Community-acquired pneumonia of the right lower lobe
- Acute pulmonary edema
- The patient was discharged after a 36-hour hospitalization.

Images

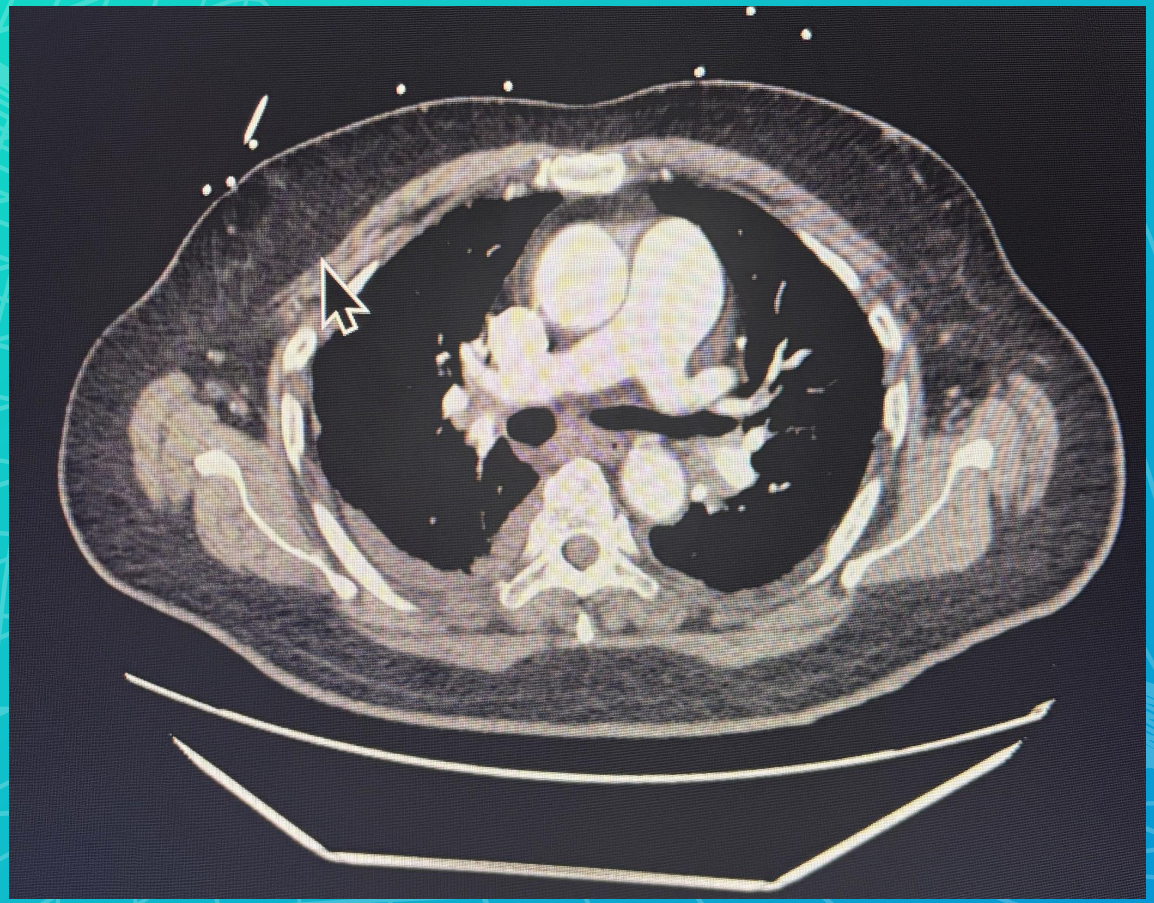

Figure 1: CT of chest showing main pulmonary artery at bifurcation filled with contrast..indicating a filling defect (no thrombosis).

Images

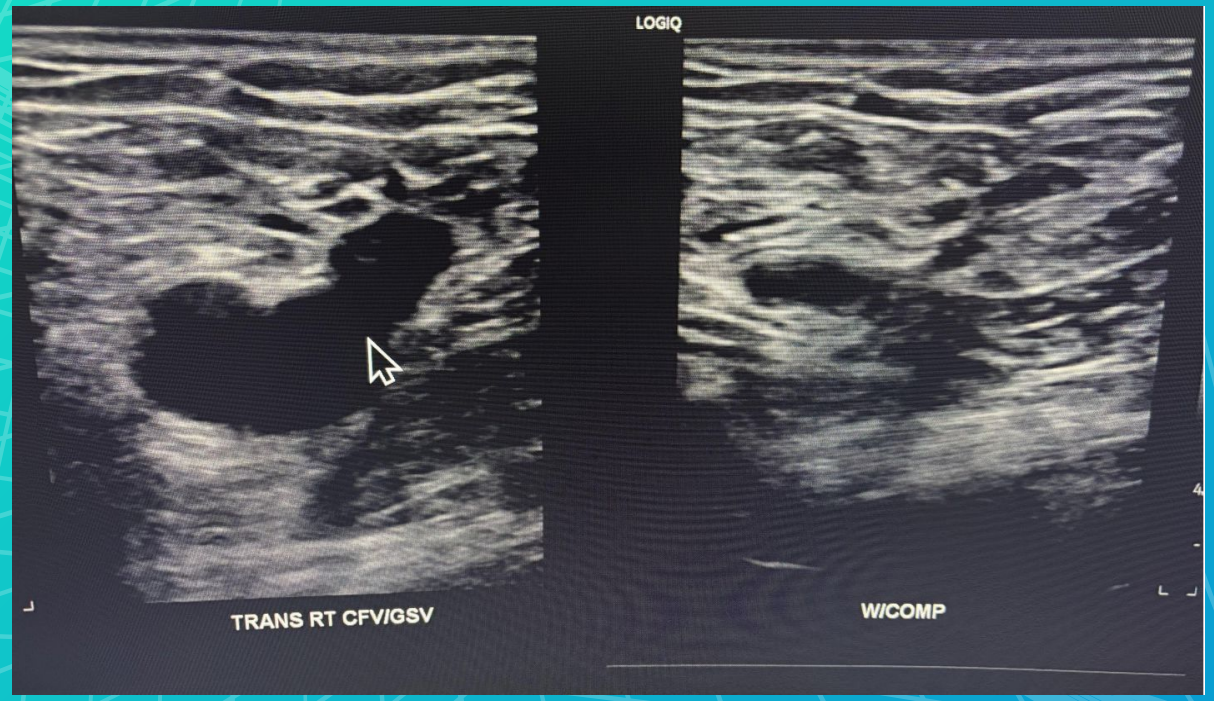

Figure 2 indicates the right common femoral vein as seen normally on the left, and compressed vein on the right showing no evidence of thrombus.

Diagnosis

- Insulin degludec: 16 IU per day
- Rosuvastatin 5 mg per day
- Fluticasone 250/Salmeterol 50: 1 spray twice a day
- Ezetimibe: 10 mg per day
- History: Nothing significant

Treatment

- Acetaminophen 325 mg
- Azithromycin 500 mg tablet
- Cefdinir 300 mg capsule
- CefTRIAXone 2 g in 20 ml NS
- Enoxaparin 40 mg
- Ondansetron 4mg
- Tramadol 50 mg

Paradox

- When the DD levels go high, it is understood that there may be evidence of blood clots.
- In our case, elevation of DD did not show any accompanying evidence of thrombosis (CT Angiography) chest with IV contrast: No evidence of PE (pulmonary embolism), and Transthoracic Echocardiography (TTE): No evidence of DVT

Acute Pulmonary Edema

- Pulmonary edema is a condition caused by too much fluid in the lungs.
- This fluid collects in the many air sacs, making it difficult to breathe.
- In most cases, heart problems cause pulmonary edema. However, fluid can collect in the lungs for other reasons.
- These include pneumonia, contact with certain toxins, medications, trauma to the chest wall, and traveling to or exercising at high elevations.

Acute Pulmonary Edema, continued

- Pulmonary edema that develops suddenly (acute pulmonary edema) is a medical emergency that needs immediate care. It can sometimes cause death, but prompt treatment might help.
- Treatment for pulmonary edema depends on the cause but generally includes additional oxygen and medications.
- Summary: It is generally understood that elevation of DD may indicate the presence of VTE.
- Our patient showed an elevation of D-dimer without any evidence of VTE.
- This indicates that elevation of DD is only suggestive of VTE and not confirmatory of VTE.

So, what have we learned so far?

- So our patient had elevated D-dimer but no other characterization of VTE. Very lucky.
- This tells us that although D-dimer is a very useful test, its elevated levels do not always confirm VTE.

Conclusion

- D-dimer is usually present in tiny quantities in the blood.
- Elevation of D-dimer may indicate presence of VTE.
- Our 85-year-old patient had a slightly elevated temperature, cough, pain in the right side of the chest, and difficulty in breathing.
- During examination, the D-dimer levels were found to be elevated significantly. Because of his suspicion of the presence of VTE, CT angiogram and TTE were performed and were negative.
- Our study emphasizes the point that elevation of D-dimer levels only indicates the possibility of VTE, but this is not conclusive evidence of VTE.

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References

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