Risk Stratify Before Scanning or Risk More than Rads and Renal Damage

Timothy Hegeman, DO

Story from the front lines:

A 46 year old man with a past medical history of poorly controlled diabetes, hepatitis C, peripheral neuropathy, and polsusbstance abuse returned to the emergency department 12 hours after being discharged for lower extremity pain. During previous admission he was restarted on anti-diabetic agents and a regimen for uncontrolled neuropathic pain. On current presentation he reported shortness of breath and light-headedness that started abruptly after inhaling crack cocaine just before presentation. Respirations were 20 per minute, heart rate was 110 and oxygen saturation was 86% on room air. Physical exam revealed moderate respiratory distress and course breath sounds throughout both lung fields. EKG showed sinus tachycardia and laboratory analysis revealed normal blood counts and basic chemistries. A chest x-ray was unchanged from prior admission showing stable, small bilateral pleural effusions. A CT pulmonary angiogram (CTPA) was performed to evaluated for acute pulmonary embolism (PE). The study was negative for PE but revealed a new 8mm left peri-bronchial lesion with hilar and axillary lymphadenopathy. The patient was admitted to the inpatient medicine service and within twelve hours of observation his respiratory complaints resolved and vital signs normalized without intervention. The patient remained hospitalized for several days for work up of the incidental CT findings. His work up included trans-esophageal biopsy, thoracentesis, and consultations with the inpatient oncology, pulmonary, and gastroenterology services. Pathology of his lung lesion and an axillary lymph node were benign. Chest CT performed several weeks later during an unrelated admission for diarrhea showed an unchanged 8mm lesion and resolved adenopathy. Cause of his peri-bronchial lesion and lymphadenopathy are unclear. He has been scheduled for follow up imaging to assess for growth or resolution.

Teachable moment:

Symptoms of PE can be non-specific and making the diagnosis can be challenging. PE work up can be enhanced by algorithms that quantify pre-test probability prior to further testing. The Christopher Study in 2006 showed prospective safety and efficacy in using the modified Wells criteria to guide D-dimer testing for low risk cases and CTPA for high risk cases and those with positive D-dimer.1 This has led to guidelines recommending some form of risk stratification prior to imaging and, in 2011, to the creation of a performance measure by the National Quality Forum surrounding the use of CTPA in patients with low clinical likelihood of PE.2 While the recommendation is evidence based, well known, and easily applicable, about 30% of CTPA studies are performed in patients with low risk clinical features and a negative D-dimer or no D-dimer at all.3 It is not clear why this guideline is often not followed but is perhaps related to
a combination of factors: practitioners may consider an imaging modality more definitive than Wells score and a D-dimer, they may presume that gaining more information about the patient (with imaging) would help the patient by evaluating other diagnoses (pneumonia, effusion, or mass), they may have a sub-optimal understanding of the negative predictive value of low risk by Wells and a negative D-dimer, and perhaps they are not fully considering the potential downsides of imaging. The case discussed above shows that the potential harms of CTPA go beyond the oft-considered renal failure and radiation exposure. Incidental findings may lead to invasive procedures and prolonged hospitalizations, each with their own downstream risks. One study found that a CTPA ordered in the ED was more than twice as likely to discover an incidental pulmonary nodule or lymphadenopathy than to discover a PE.\(^4\)

In the present case, the patient was low risk by Wells but CTPA was pursued without a D-dimer. Roughly half of similar patients in the Christopher study had negative D-dimers, suggesting that this patient may have had a 50% chance of avoiding his post-imaging work up. Considering the significant portion of low value CT imaging studies and the prevalence of subsequent incidental findings, closer adherence to a “stratify before scanning” protocol has the potential to prevent avoidable harms and the expense of a more invasive evaluation.

References:


