Gabler, Block 2 CAT

Yazici S, Kiris T, et al. Relation of contrast nephropathy to adverse events in pulmonary emboli patients diagnosed with contrast CT. Academic Emergency Medicine. 2016;34: 1247-1250.

Background: Acute pulmonary embolism (APE) can be a very deadly diagnosis in the ED with a mortality rate as high at 50% if hemodynamic instability is present. Fortunately, computerized tomography pulmonary angiography (CTPA) is readily available in our ED todays and has a very high sensitive and specificity for the diagnosis of PE; however, it is not without its risks. Contrast induced nephropathy (CIN), generally defined as transient renal impairment following exposure to contrast is one such risk. Although CIN is generally transient, some literature suggests that it is associated with increased mortality. This study set out to examine the incidence of CIN in patients with APE after having CTPA and its association with in-hospital adverse outcomes. Secondarily, they looked at risk factors for developing nephropathy.

Methods: This was a retrospective study between 2011 and 2015 performed at a university hospital in Turkey. A total of 222 patients were diagnosed with APE, of these 33 were excluded for presenting with cardiogenic shock, having only one creatinine measurement at follow-up, taking nephrotoxic drugs, receiving renal replacement therapy, and for being diagnosed by modality other than a CTPA. The remaining 189 patients had CTPA performed with 85 cc of iodinated contrast (OMNIPAQUE). Researchers recorded multiple data points including baseline labs, past medical history, demographics, presenting symptoms, vital signs, results of echocardiography, and any possible treatment complications. Serial labs were obtained and CIN was defined by an absolute peak creatinine level of $\geq$25% or $\geq$0.5mg/dL from baseline at least 48 hours after CTPA.

Results: The study found that 24 (13%) of patients developed CIN after CTPA. The average increase in creatinine was from 0.993 to 1.33 in those patients diagnosed with CIN. In total, 69 (36.5%) of patients had a GFR less than 60 ml/min/1.73m2 prior to CTPA and this was independently associated with development of CIN as was age greater than 75. Of the remaining data points, the study did not report statistically significant risk factors for developing CIN. Furthermore, they found that in-hospital adverse events (average length of stay 7.3 days) occurred in 8 patients (4%). The number of patients with in-hospital adverse events was also higher in the CIN group (16.7% vs. 2.4%).

Limitations: The data was retrospectively collected and may not have included all important data points, for example albumin on arrival, which does affect the GFR. Additionally, the number of in-hospital adverse events was low but certainly did not include all possible adverse events, either way, when only 8 patients had adverse event it is difficult to say that CIN was truly associated with worse outcomes.

Bottom Line: CTPA is a frequently performed study in the ED but certainly carries risks. As ER physicians, we often do not recognize the complications of the studies and procedures that we perform. Previous studies have reported that CIN develops at a rate of 4.9 to 6 % of the time in all patients that receive CTPA (even if the study is negative). It is no surprise that the rate in this paper is higher than that reported in previous studies as patients with CTPA also often have hypoxia and increased right ventricular pressure that can lead to reduction in renal perfusion. CTPA is an important diagnostic tool but for those patients particularly with advance age and lower GFR, we should vigilantly maintain hydration, stop any nephrotoxic drugs, and prevent additional contrast exposure.