Introduction

At many academic institutions, after-hours CT pulmonary angiograms (CTPA) are preliminarily interpreted by radiology residents, often without immediate attending approval until the following morning. Given the high mortality rate of untreated pulmonary embolism, up to 26% according to Barratt and Jordan in 1960,[1] rapid and accurate diagnosis for PE is crucial for appropriate patient management.

At our institution, the CTPA studies performed during the day are signed out and/or finalized by a chest radiology attending. The vast majority of afterhours CTPA studies are preliminarily interpreted by a radiology resident during his/her call shift in the ED reading room. Their responsibilities include interpreting most radiologic studies from the adult ED (with immediate attending approval) as well as preliminarily interpreting all neuroradiologic and pediatric studies (with attending approval the following morning).

Objective

➢ To compare preliminary resident interpretations on CTPA to final attending reports. Specifically, the pathologies were categorized as:
   1. Acute PE
   2. Other pathology involving pulmonary arteries
   3. Other pathology NOT involving pulmonary arteries

➢ Are there any significant differences between residents of different post-graduate year?

➢ In discrepant cases, what is the size or level of the pulmonary embolus?

Materials and Methods

544 CTPA studies performed at University campus of UMass from 7/1/2013 to 10/15/2013 were collected from our institutional PACS. Subsequently, 148 studies performed between 8AM to 4PM were excluded as these were performed during the day and most likely approved by an in-house chest radiology attending. 81 of the remaining 396 studies had preliminary resident interpretations. Additional 15 studies were included by the author during November of 2013. A total of 96 studies with preliminary resident interpretations were collected.

Each resident interpretation was compared with the final attending report, considered the reference standard. Discrepancy in studies with pathology involving and not involving pulmonary arteries were individually recorded.

Results

16 of 96 studies were positive for pathology in the pulmonary arteries.

- 13 studies positive for acute PE → 1 discrepant resident (PGY-3) interpretation.
- 3 studies positive for other pathology in pulmonary arteries → 2 discrepant (one PGY-3 and one PGY-4) resident interpretations.

The remaining 80 of 96 studies had 10 discrepancies (12.5%).

- 7 discrepancies (four PGY-3 and three PGY-4) for pneumonia/consolidation >10 mm.
- 1 discrepancy (PGY-3) for development of new cavitation within a consolidation.
- 1 discrepancy (PGY-3) for severe pathologic lymphadenopathy.
- 1 discrepancy (PGY-4) for tiny left pneumothorax.

Sample Discrepant Cases

1 discrepancy for acute PE

- PGY-3 resident interpreted as “No evidence of pulmonary embolism. Final attending report was positive for PE, the largest clot burden in the RUL lobar and RLL segmental arteries.”

2 discrepancies for other pathology involving pulmonary artery

- PGY-4 resident interpreted as “No PE.” Final attending report mentioned complete occlusion of RUL segmental arteries by mass and/or lymphadenopathy.
- PGY-3 resident interpreted current study as “Limited by motion artifact.” Final attending report mentioned chronic PE in the RLL lobar artery, grossly unchanged from the prior study.

Discussion

13 of 96 (16.7%) of CTPA studies with preliminary resident interpretations were positive for acute PE. Of the 13, only one study by PGY-3 resident was discrepant. Although not occurred in our study, had a resident missed a subsegmental pulmonary embolism, this probably will not be clinically significant as discussed by Wiener and Schwartz.[2]

The residents performed well in detecting acute PE, however they missed 2 of 3 other pathology involving pulmonary arteries, although one of which (stable chronic PE) is probably not clinically significant. Also, the residents performed well in other pathology not involving pulmonary arteries. Of note, greater than 10 mm size threshold was arbitrarily set for pneumonia and/or consolidations.

Only PGY-3 and PGY-4 residents participated in the study, 39 of 96 studies were interpreted by PGY-3 while the remaining 57 were interpreted by PGY-4. As one would expect, higher level residents performed better in all categories except other pathology involving pulmonary arteries. However, this may be due to the limited number of cases in that category.

Limitations

- Our study was performed from July to October 2013. During this period, PGY-2 residents were not scheduled for any ED shifts due to their inexperience. Also, PGY-5 residents were in preparation for the boards and did not partake in any ED shifts. Only four PGY-3 and five PGY-4 residents were able to participate in the study.

- Our study has a relatively small sample size (96 studies).

- The responsibility of the radiology resident is different at each institution so the results may vary.

References