Adequate Contrast Enhancement Of CT Pulmonary Angiograms

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INTRODUCTION

Assessment of the contrast enhancement in CT pulmonary angiograms to ensure sufficient for diagnosis.

OBJECTIVES

Suboptimal enhancement of CT pulmonary angiograms leads to non diagnostic studies and therefore unnecessary exposure to contrast and radiation.

STANDARD

Previously published research suggests that a level of 210 Hounsfield Units (HU) is required in the vessel to identify chronic thrombus from enhancing vessel (Ref 1). Acute thrombus has lower Hounsfield units than chronic and therefore the level of vascular enhancement can be lower but still distinguishable from the thrombus. Given that contrast enhancement is often lower in more peripheral vessels, a level of 210 HU in the main pulmonary artery was defined as the level for acceptable enhancement.

TARGET

Papers have suggested that approximately 10.8% of CTPAs may be suboptimal based on all causes, including poor contrast enhancement and motion artefact amongst other factors (ref 2). Therefore the target has been defined as no more than 11% of CTPAs having HU <210 in the main pulmonary artery

Data Collection / Methods

Assess local practice

Indicators

A circular region of interest is measured in the largest axial image of the main pulmonary artery with a diameter of approximately 50% of the vessel.

Data items collected

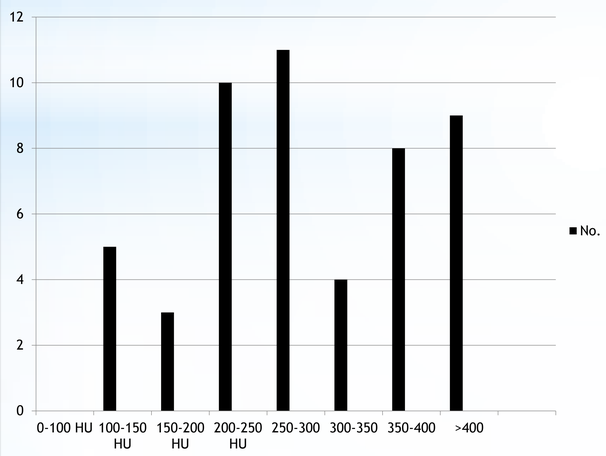
The details of scan and the average HU for each patient is recorded in a database. The percentage of scans below the threshold of 210 HU is then calculated

Study:

Retrospective study

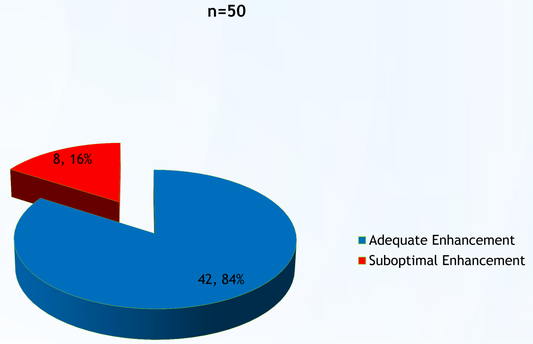
50 consecutive CTPAs per protocol is assessed.

Ranges of HU in CTPA



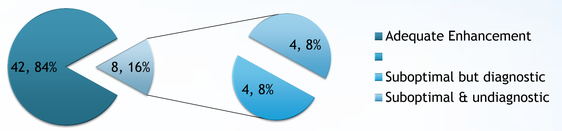
RESULTS

Adequate Vs Suboptimal Enhancement



Target was defined as no more than 11% of CTPA having HU<210 in the main pulmonary artery. Result showed 5% deviation from the standerd. (Total 16% Suboptimal enhancement)

RADIOLOGY REPORT



>>> Non of the patient with suboptimal CTPA had any further study (VQ Scan /CTPA)

>>> Non of the patient has VQ scan prior to CTPA

Suggestions for change

- Ensure radiographers realise the importance of a large cannula (ideal minimum of 20 gauge) in the antecubital fossa with appropriate arm positioning not too high above the head. The preferred rate of contrast injection should be established.With faster scanners and appropriate patients, scanning in minimal rather than maximal inspiration can be encouraged (to avoid a negative intrathoracic pressure drawing unopacified blood in from the IVC).The strength and volume of contrast can be adjusted and the use of a saline chaser explored.Utilise a different protocol:

- Fixed timing eg 17s

- Bolus tracking, generally performed from the main pulmonary artery, but different thresholds may be used and the time to first scan slice can be varied.

- Test bolus can be used to define the optimum timing using a preliminary bolus to define the peak enhancement and following it with the diagnostic scan

Re-Audit

Re-audit will be done after implementing the changes.

REFERENCES

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