

Poster #: 13

**Title of Abstract:** DIAGNOSTIC PERFORMANCE OF ITERATIVELY RECONSTRUCTED DOSE MODIFIED MDCT ANGIOGRAPHY EXAMS OF LIVING RENAL DONORS.

**Institution:** Massachusetts General Hospital

**Authors:** Yasir Andrabi MD, MPH, Avinash Kambadakone MD, Mukta Agrawal MD, Dushyant V. Sahani, MD.

**Modality:** CT

**Organ System:** GU

**Intro:** Concerns regarding exposure to high radiation dose have been expressed while evaluating living renal donors using CT angiography which continues to be the modality of choice. Iterative reconstruction enables us to attain dual benefit of lowering kVp, i.e, significant dose reduction and increased attenuation without significant increase in image noise.

**Purpose:** The purpose of this study was to evaluate the diagnostic performance of iteratively reconstructed (IR) dose modified multi detector computed tomography (MDCT) angiography of living renal donors in comparison to standard dose filtered back projection (FBP)

**Methods Used:** In this retrospective study, we reviewed the MDCT studies of 85 potential renal donors (32 men, 53 women; mean age,  $44.2 \pm 11.3$  yrs) who underwent dual-phase CT angiography (CTA) exams using a same vendor CT equipment (GE Healthcare) between 2009 and 2013. Images were reconstructed with filtered back projection (FBP) technique (Group A, n=47) or ASIR (Group B, n=38). The weight based IV contrast protocol and scan parameters were constant for both the patient cohorts except for the use of higher noise index (x1.3) in the ASIR group. A weight based tube potential (kV) using either 120 kV or 100kV was applied. Two experienced readers reviewed the MDCT exams (axial, 2D and 3D-reformations) for its subjective quality and rendered systematic interpretation on the relevant anatomy (vascular and excretory system). Surgical report served as a reference standard for the operated kidney. Interpretations from the Reader 1 were used for determining concordance between the two readers for the anatomy of the non-operated kidney.

**Results of Abstract:** All the 85 CTA exams were rated of diagnostic quality with a comparable IQ scores within the two groups. Vascular anomalies were diagnosed in 59 of 170 donor kidneys (34.7%). In 48 operated kidneys with less complex anatomy, 10 anomalies were correctly identified by both readers (100% diagnostic accuracy). For the remaining 49 vascular anomalies in 122 non-resected kidneys, there was excellent agreement between the readers ( $k = .94$ ). The radiation dose was 34-66% lower in the ASIR group compared to FBP (p value  $< .0001$ ).

**Discussion:** Using ASIR, 34-66% dose reduction can be accomplished in kidney donor CTA exams without compromising image quality or diagnostic performance with substantially higher dose reduction benefits with the use of lower kVp acquisition.

**Scientific and/or Clinical Significance?** Iterative reconstruction enables us to address two major concern of radiologists while evaluating renal donors, 1) High image quality to assure excellent diagnostic performance, and 2) low radiation dose exposure to otherwise healthy renal donors.

**Relationship to existing work** Very few studies have validated the diagnostic performance of IR images against a robust reference standard and there are no published studies in support of IR algorithms in renal donor exam.

N/A