

AbstractID: 6691 Title: Comparison of digital tomosynthesis technology with conventional technology for intravenous pyelogram (IVP) studies

Purpose: Digital tomosynthesis is a new spin on an old idea. It has been extensively studied and developed, but is just beginning to find its way into the clinic. We seek to compare digital tomosynthesis to conventional tomography utilizing a computed radiography (CR) system. To this end, we have developed quantitative measures to compare image quality and dose between images acquired using digital tomosynthesis and those acquired using conventional tomography with CR.

Materials and methods: "Standard" IVP studies were performed on uniform acrylic phantoms. Dose in terms of entrance air kerma (EAK) was measured for each of the studies. The uniform phantom images were also used to quantify non-uniformities in the images both globally and locally. Also, images were evaluated for the presence of artifacts.

Results: EAK values for a standard IVP study (3 scout images, 3 tomographic cuts during 3 phases) of a "medium" patient consisting of 6 inches of acrylic ranged from 3.54 mGy to 80.1 mGy, depending upon technique, for digital tomosynthesis studies to 51.2 mGy for the same CR study. Also, keep in mind that additional planes or slice thicknesses can be derived from the digital data at no extra dose cost to the patient. Uniformity measures varied significantly in processed images for digital tomosynthesis studies acquired at varying techniques. Uniformity was consistent throughout conventional tomographic studies. Processed digital tomosynthesis images also displayed artifacts, some which mimic pathologic anatomy.

Conclusions: Digital tomosynthesis has the potential to significantly reduce patient doses in IVP studies. However, techniques must be chosen appropriately to maximize image quality and minimize the presence of artifacts.