STONE DISEASE

Computed tomography—an increasing source of radiation exposure

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No abstract available.

Editorial Comment

The authors reported that 62 million CT scans are performed annually in the United States; including 4 million in children. The radiation dose, a measure of ionizing energy absorbed per unit of mass, is 10 milligrays compared to 0.01 for a PA chest x-ray. The radiation dose from a CT scan depends on the number of scans (for example with and without contrast), the tube current, the scanning time in milliamp-seconds, the size of the patient, the axial scan range, the scan pitch (or degree of overlap between adjacent CT slices), the tube voltage in kilovolt peaks and the scanner design.

The theoretical risk of ionizing radiation is that it can stimulate the generation of hydroxyl radicals which can then lead to DNA fragmentation or base damage. The authors extrapolate these risks from increased risks of cancer in atomic-bomb survivors (with a mean radiation dose of 40 milligrays) and nuclear industry workers (with a mean radiation dose of 20 milligrays), though in these situations the individuals were exposed to a uniform total body dose, while with CT imaging there is non-uniform exposure with efforts to limit exposure to the focused region of interest. The authors then go on to extrapolate the estimated attributable risk of death from cancer to a single CT scan, and report that the bulk of the risk occurs if the CT imaging is performed prior to the age of 15 years old, and the highest risk is related to digestive system malignancy after abdominal imaging.

Though this article received dramatic coverage by the press and led to heated discussions in our clinics, it is clear that the article is weak on science and strong on editorial opinion. The authors state that the evidence for an increased risk of cancer after a common CT scan is “reasonably convincing” though in the next sentence state that “no large-scale epidemiologic studies of cancer risk associated with CT scans have been reported.”

The author’s statement that 2% of cancers in the United States are attributable to CT scan imaging is unsubstantiated. They fail to acknowledge that while CT imaging exposes patients only to x-rays, atomic-blast survivors were exposed to particulate radiation, neutrons and other radioactive materials, the biological significance of which are unknown, and as such it is inaccurate to extrapolate from cancer risk in this cohort.

The authors acknowledge that though the individual risk estimates for attributable risk of death from cancer is very low, they believe it important from a public health standpoint. What is not calculated is the attributable risk of death by not imaging or by ordering a substandard imaging modality for fear of radiation.

As CT-scanners and CT-scan imaging becomes assimilated into ambulatory urology clinics, it is imperative for the supervising urologist to become educated on the techniques of adjusting image parameters to minimize radiation dose while maintaining adequate resolution of the image. Though this article emphasizes the importance of evaluating the need for a test before ordering it, it crosses the border of raising awareness into the realm of raising hysteria.

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Prestenting improves ureteroscopic stone-free rates

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Purpose: Although the use of stents after ureteroscopy has been studied extensively, relatively little has been published about stent placement before complicated ureteroscopic procedures. In this study, we examined our experience with stent placement before ureteroscopic management of renal and ureteral stone disease.
Patients and Methods: A total of 90 patients underwent ureteroscopic surgery on 115 renal units by a single surgeon from 2001 to 2006. All patients had documented follow-up with imaging either by CT or intravenous urography (IVU) with tomography. Patients were classified into two groups depending on whether they had a stent placed before ureteroscopy. Baseline characteristics, operative indications for stent placement, stone-free rates, and complications were compared between groups.
Results: Baseline characteristics were similar between the groups. The majority of patients received stents before stone management because of technical considerations during surgery (17/36, 47%) or infection (13/36, 37%). Strict stone-free rates after ureteroscopic treatment were 47% in the 79 procedures without previous stents, compared with 67% in the 36 procedures with prestenting ($P < 0.05$). Including small fragments (2 mm or smaller), stone-free rates improved to 54% v 78%, respectively ($P < 0.02$). Complications were not significantly different in the two groups ($P = 0.70$).
Conclusion: Although routine stent placement is not necessary before all ureteroscopic procedures, we demonstrate that it is associated with good stone-free rates and few complications. In this retrospective cohort, prestenting was associated with significantly higher stone-free rates. Prestenting should be considered in challenging cases.

Editorial Comment

The authors state that when possible a larger and longer ureteral stent used for prestenting, however further details regarding the specific stent size are not provided. Similarly the authors do not comment on the duration of prestenting. The authors do not comment on their practice of fragmenting versus basketing the treated stone. The authors do not comment on the percentage of patients imaged with CT scan in each group – if a greater proportion of unstented patients underwent postoperative CT scan imaging, the higher sensitivity of the test may explain the noted differences in stone-free rates.

Infection is known to result in decreased ureteral peristalsis, which theoretically could facilitate stone passage. Though 22% of the presented patients had calculi smaller than 5 mm, it is not reported what proportion of patients spontaneously passed stones prior to ureteroscopy. The authors utilized small ureteral access sheaths (10 mm internal diameter) in 20% of patients who were not prestented, and larger ureteral access sheaths (14 mm internal diameter) in 40% of patients who were prestented. One would anticipate that this would impact stone free rates, and may be the most important observation of this study. However, stone-free rates were not stratified based on sheath size. Similarly we are not told whether the decision to use a smaller sheath vs. larger sheath was empiric based on the presence of a stent or the result of difficulty passing a larger sheath.

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