EDITORIAL COMMENT

The Role of Unenhanced Spiral Computed Tomography in Acute Renal Colic

Huay-Ben Pan*

Department of Medical Education and Research, Kaohsiung Veterans General Hospital, and Department of Medical Imaging and Radiological Sciences, I-Shou University, Kaohsiung, Taiwan, R.O.C.

When clinicians are confronted with a suspected diagnosis of acute renal colic, urinalysis is traditionally checked in these patients. However, urinalysis does not have a high enough negative predictive ability to exclude imaging evaluation. When both the clinical features and urinalysis were non-conclusive, 33% of patients may have urolithiasis found on computed tomography (CT) images.[1] The imaging modalities used to aid the diagnosis of acute renal colic include radiography (kidney ureter bladder; KUB), intravenous urography (IVU), sonography, CT and magnetic resonance imaging (MRI). In emergent situations, if the cause of acute abdomen is attributed to renal colic, KUB is always the first choice. When ureteral stones have been identified, clinical management can start without the need of further imaging investigation. The sensitivity of KUB for ureterolithiasis detection is around 58–62%.[2,3] A combination of KUB and sonography has been recommended to improve the sensitivity. However, ultrasound is actually technique-dependent, and is not routinely used for emergent settings in every institute.

IVU, the traditional gold standard for ureteral stone detection, has a sensitivity of 59.1–87.0%.[4] If the collecting system cannot be opacified in cases of severe stone obstruction, then the interpretation of IVU would be the same as that of KUB. Helical CT is widely used nowadays, and is more familiar to physicians who might produce a more accurate diagnosis. Studies that investigate whether non-contrast CT (NCT) will replace IVU have been done in the past decade.[4–7] Comparing the 2 modalities, IVU provides better spatial resolution (if patients are well prepared), while CT has greater contrast resolution. Both can accurately detect stone obstruction, but CT is more reliable in diagnosing the presence of offending stone size. CT can provide additional information such as periureteral stranding or urinoma to disclose the degree of stone obstruction. Other advantages of NCT include: (1) being a less time-consuming procedure; (2) no contrast medium allergy; (3) no adverse effect on kidney function; (4) being able to offer alternative diagnosis (e.g. change the impression of renal colic to acute appendicitis); (5) ability to detect 2 coexisting different acute conditions (e.g. acute appendicitis and ureteral stone obstruction); and (6) ability to detect 2 coexisting pathologies (e.g. ureteral stone and transitional cell carcinoma).[7] Furthermore, with the increased use of NCT, there was no significant decrease in the positive rate of renal colic detection.[8] Thus, it is likely that IVU as the preferred assessment of acute renal colic will be abandoned in the emergency department in the near future, unless sonography or CT modality is not available.

Regarding the radiation dose, IVU is estimated to be about 2.5 mSv, which is less than that of the standard dose of CT scans (10 mSv). However, on low dose NCT scans (50 mAs rather than 260 mAs), the calculated mean effective radiation dose was 1.40 mSv for males and 1.97 mSv for females.[9] The management of renal colic is based on the stone size and its location (both of them may affect renal function). While low-dose NCT is limited in its ability to show small-sized calculi of ≤ 2 mm, it is still comparable to standard-dose CT for the diagnosis of ureteral stones and alternative disease.[9] This is due to the fact that ureteral stones of < 5 mm would normally result in spontaneous passage, thus not causing obstruction. In theory, low-dose NCT may be the best option for acute renal colic.

With the volumetric manner of data acquisition by multislice spiral CT, advances in 3-dimensional reconstruction technique such as the curve multiplanar reformation (MPR) reconstruction have been applied.[7] Some of the suspected lesions seen from the axial view

*Correspondence to: Dr Huay-Ben Pan, Department of Medical Education and Research, Kaohsiung Veterans General Hospital, 386, Ta-Chung 1st Road, Kaohsiung 813, Taiwan, R.O.C.
E-mail: panhb@vghks.gov.tw • Received: October 1, 2007 • Accepted: November 22, 2007

can be confirmed to be the offending stone by additional use of curve MPR images. This has been shown more accurately to predict stone size in the craniocaudal direction, though false-negative results can be caused by metallic prosthesis in the hip joint resulting in a severe artifact.

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