IMAGING _____

Comparison of CT Urography and Excretory Urography in the Detection and Localization of Urothelial Carcinoma of the Upper Urinary Tract

Jinzaki M, Matsumoto K, Kikuchi E, Sato K, Horiguchi Y, Nishiwaki Y, Silverman SG
Department of Diagnostic Radiology, Keio University School of Medicine, 35 Shinanomachi, Shinjuku-ku, Tokyo 160-8582, Japan

Objective: The purpose of this study was to compare the accuracy of CT urography and excretory urography for the detection and localization of upper urinary tract urothelial carcinoma.

Materials and Methods: Of 128 patients at high risk for upper tract urothelial carcinoma who were examined with both CT urography and excretory urography between 2002 and 2007, 24 were undiagnosed and excluded. CT urography and excretory urography results of the remaining 104 patients and 552 urinary tract segments were compared with histopathologic examination or follow-up imaging at 1 year. Two readers independently scored the confidence levels for the presence or absence of upper urinary tract urothelial carcinoma in each of six upper urinary tract segments on both CT urography and excretory urography; differences were resolved by consensus.

Results: Upper urinary tract urothelial carcinoma was diagnosed in 77 (14%) segments of 46 (44%) patients. Per-patient sensitivity, specificity, overall accuracy, and area under the receiver operating characteristic curves for detecting carcinomas with CT urography (93.5% [43/46], 94.8% [55/58], 94.2% [98/104], and 0.963, respectively) were significantly greater than those for excretory urography (80.4% [37/46], 81.0% [47/58], 80.8% [84/104], and 0.831, respectively) ($p = 0.041$, $p = 0.027$, $p = 0.001$, and $p < 0.001$, respectively). Per-segment sensitivity and overall accuracy for the localization of upper urinary tract urothelial carcinoma were significantly greater with CT urography (87.0% [67/77] and 97.8% [540/552]) than with excretory urography (41.6% [32/77] and 91.5% [505/552]) ($p < 0.0001$).

Conclusion: CT urography was more accurate than excretory urography in the detection and localization of upper urinary tract urothelial carcinoma and should be considered as the initial examination for the evaluation of patients at high risk for upper urinary tract urothelial carcinoma.

Editorial Comment

This is a retrospective study looking at the accuracy of CT urography compared to excretory urography (EU) for the detection and localization of urothelial carcinoma of the upper urinary tract. The authors enrolled 104 patients in the study all of whom at risk for pelvocalyceal cancer. Their results show that the accuracy of CT urography for both the detection and localization of upper urinary tract urothelial carcinoma was significantly better than that of excretory urography. CT urography was superior particularly to detect small (< 15 mm) masses, usually hidden by contrast material or obscured by gas on EU. CT urography was able to detect tumor in obstructed and unopacified kidney. The main limitations of CT urography, were the incapacity of distinguish between inflammatory and cancerous pelvocalyceal wall thickening; incapacity to detect CIS or localize superficial extension of the tumor and to localize multiple papillary tumors smaller than 10 mm within unopacified collapsed segments.

In our experience differentiation between inflammatory and cancerous focal thickening of the pelvocalyceal system wall can be very difficult. Presence of endothelial irregularities, invasion of local tissue, obliteration of local fat plane and contrast enhancing are features characteristic of tumor. In the absence of these findings however, endoscopy with biopsy is mandatory for the differential diagnosis.

Evidence is growing that in near future, an optimized CT-urography protocol, will replace EU for the evaluation of hematuria and follow-up of patients at risk for urothelial cancer.

Dr. Adilson Prando
Head, Department of Radiology and
Diagnostic Imaging, Vera Cruz Hospital
Campinas, São Paulo, Brazil
E-mail: adilson.prando@gmail.com