

sicker patients to the large medical centers also might tend to increase complication rates. Overall the rates have been stable over time, suggesting that this is about what anyone might expect given a certain level of experience and capability with laparoscopy.

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## IMAGING

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### **MRI for preoperative staging of renal cell carcinoma using the 1997 TNM classification: comparison with surgical and pathologic staging**

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**Objective:** The purpose of our study was to determine the accuracy of MRI for preoperative staging of renal cell carcinoma using the 1997 TNM classification.

**Materials and Methods:** We conducted a retrospective review of MRI performed in 40 consecutive patients with 42 renal cell carcinomas before radical (n = 35) or partial (n = 4) nephrectomy or exploratory laparotomy (n = 3). The interval between imaging and surgery ranged from 1 to 59 days (mean, 17.9 days). Imaging was performed with T1- and T2-weighted, dynamic gadolinium-enhanced, and time-of-flight sequences. MRI and surgical-pathologic staging was performed using the 1997 TNM staging system. MRI staging was compared with surgical-pathologic staging as the gold standard. Agreement between the two staging methods was assessed using the kappa statistic.

**Results:** Agreement between MRI and surgical-pathologic staging was good for T staging (kappa = 0.72 and 0.78 for reviewers 1 and 2 respectively), poor for N staging (kappa = 0.13, both reviewers), good for M staging (kappa = 0.66, both reviewers), and excellent for the assessment of venous involvement (kappa = 0.93, both reviewers). MRI overestimated the T stage in five patients and the N stage in five and underestimated the T stage in three, the N stage in four, the M stage in one, and the extent of venous thrombosis in two patients.

**Conclusion:** MRI is a reliable method for preoperative staging of renal cell carcinoma using the 1997 TNM classification, in particular for assessing venous involvement.

### **Editorial Comment**

The TNM staging system for renal cell carcinoma was revised by the American Joint Committee on Cancer (AJCC) and the International Union Against Cancer (UICC) in 1997. The 1997 TNM staging system for renal cell carcinoma reclassifies tumors using criteria for size and for extent of renal vein / vena cava involvement that are different from the criteria used in the 1987 staging system. With this new TNM staging classification the size limit for T1 tumor was changed from 2.5 to 7 cm. This paper addresses very clearly the problems of the imaging criteria for adequate preoperative evaluation of tumor size, presence of perirrenal extension and regional adenomegaly. It's well known that on the basis of imaging features distinction between stage T1/T2 and stage T3a tumor cannot be reliably made. This occurs because the assessment of invasion of the renal capsule and Gerota's fascia in tumor larger than 3 cm of diameter is based on the utilization of poor predictive radiological

findings (perinephric stranding, perinephric collateral vessels and presence of discrete soft-tissue masses larger than 1 cm). Large exophytic masses may be stage T1 or T2 and tumors with a small extrarenal component may be stage T3a. Although accurate characterization of tumor size(T) is more difficult when we are dealing with larger renal tumors, the authors had a highly accurate T staging even evaluating large tumors(mean size 14.2 cm). An important contribution of this retrospective study was the finding that tumor size was not a good predictor for the presence of perinephric fat invasion. The authors found a major overlap between the sizes of tumors without and with perinephric fat invasion: mean size of T1 tumors, 3.4 cm (range, 0.8–7 cm); of T2 tumors, 14.2 cm (range, 8–19.3 cm); and of T3a tumors, 9.2 cm (range, 7.9–12 cm). The tumors of all four patients in their study who underwent partial nephrectomy were correctly staged as T1 (size range, 0.8–3 cm).

One of the main limitations of this study, as the authors pointed out, is that most of their patients had advanced tumors. This is a relevant issue since nowadays as many as 30 - 40% of renal tumors are small, discovered incidentally and frequently appropriately treated with conservative surgery. In a recent study using multi-detector CT the authors were able to differentiate between stages T1/T2 and T3a (by diagnosing fat infiltration on 1-mm scans) with 96% sensitivity, 93% specificity, and 95% accuracy; the positive and negative predictive values were, respectively, 100% and 93%(1). Regarding the detection of lymph node metastase, the limitation of CT and MR imaging remains the same. This occurs because it is still based on lymph node size criteria only. With 10 mm as the limiting size for normal nodes, 4% of lymph nodes have a false-negative finding and the false-positive findings ranges from 3% to 43%. This is explained by the fact that nodal enlargement may be determined by reactive hyperplasia. In the group of patients with smaller lesions one might expect small number of patients with metastatic adenopathy. For the detection of stages T3 b and T3c, MR and MDCT imaging are excellent modalities. These methods are highly accurate in determining the presence and superior extent of thrombus.

The major advantages of MRI, however, are the differentiation between tumor thrombus and blood thrombus since blood thrombus does not adhere to the wall of the vein and can be easily extracted.

Finally, it would be interesting to perform additional comparison of these results with the new and lower cutoff value of 4.5 cm proposed by some authors(2). It has been suggested that lowering the cutoff point resulted in better discriminatory power of the TNM classification (2).

### References

1. Catalano C, Fraioli F, Laghi A, Napoli A, Pediconi F, Danti M, et al.: High-resolution multidetector CT in the preoperative evaluation of patients with renal cell carcinoma. *AJR Am J Roentgenol.* 2003;180: 1271-7.
2. Zisman A, Pantuck AJ, Chao D, Dorey F, Said JW, Gitlitz BJ, et al.: Reevaluation of the 1997 TNM classification for renal cell carcinoma: T1 and T2 cutoff point at 4.5 rather than 7 cm. better correlates with clinical outcome. *J Urol.* 2001; 166: 54-58.

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### **Precaval right renal arteries: prevalence and morphologic associations at spiral CT**

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**Purpose:** To determine the prevalence and morphologic associations of precaval right renal arteries at spiral computed tomography (CT).

**Materials and Methods:** The authors retrospectively reviewed 186 arterial phase contrast material-enhanced spiral CT scans of the abdomen (5.0-mm section thickness in 97 scans, 2.5 mm in 89 scans) obtained during a 2-year period to identify patients with precaval right renal arteries. During routine interpretation of CT scans at daily readout, the authors prospectively identified 39 additional patients with precaval right renal arteries. All cases were evaluated for anatomic variants and associated clinical findings. Fisher exact analysis and chi2 analysis were performed to compare the frequency of anatomic variants between patients with and those without precaval renal arteries.

**Results:** Nine of 186 patients had precaval right renal arteries, for a prevalence of 5%. In the 48 patients with precaval renal arteries, 52 precaval arteries were found, of which 48 were accessory and four were dominant. Fourteen patients had right pelviectasis to the level of the precaval artery, and three of these had a clinical diagnosis of right ureteropelvic junction obstruction. Eighteen (35%) of the 52 precaval renal arteries arose from the anterior aspect of the aorta (within 30 degrees of the midline). The lower pole of the right kidney was rotated anteriorly in two (22%) of nine and 13 (33%) of 39 patients with precaval renal arteries in the retrospective and prospective groups, respectively, compared with four (2%) of 177 patients without precaval arteries ( $P < 0.05$  and  $P < 0.001$ , respectively).

**Conclusion:** On the basis of these results, precaval right renal arteries appear to be more common than previously reported. Anterior rotation of the lower pole of the right kidney should prompt a search for precaval renal arteries.

### Editorial Comment

Recently multidetector row CT(MDCT), using fast data acquisition and narrow collimation, has been shown a valuable method for angiographic applications. MDCT angiography provides additional anatomic data, notably regarding the angle of origin of the renal arteries, that is potentially useful for planning interventional procedures. This method is highly accurate and thus particularly useful for the detection of accessory renal arteries, early branching, and renal vein anomalies with an overall accuracy rate ranging from 89–100%. With the crescent use of the conservative and laparoscopic renal surgery the importance of previous knowledge of these anatomic variants and their associations is essential for the safety and success of these procedures.

In this manuscript the authors detected 9 of 186 patients with precaval right renal arteries, with a prevalence of 5%. These anomalous vessels were more frequently found in patients with an anteriorly rotated lower pole of the right kidney. For this reason they suggest that the finding of renal anomalies, especially an anteriorly rotated lower pole of the right kidney, should prompt a search for precaval renal arteries. We have seen sporadic cases of precaval right renal arteries only in patients with horseshoe kidneys.

In the 48 patients with precaval renal arteries, 52 precaval arteries were found, of which 48 were accessory and four were dominant. Fourteen patients had right pelviectasis to the level of the precaval artery, and three of these had a clinical diagnosis of right ureteropelvic junction obstruction. Since the anatomic position of the right renal artery is behind the inferior vena cava(IVC) and only the right gonadal vein is expected to pass anterior to IVC, an anomalous right renal artery passing anterior to the IVC can be injured inadvertently, especially during the retroperitoneal approach. Another important information is regarding the ventral origin of these precaval right renal arteries found in 37% of patients. This anterior origin may result in misidentification at laparoscopy of such vessels as the inferior or superior mesenteric or hepatic arteries. Additional important feature is related to frequency of patients with precaval right renal arteries (up to 6%) which may develop symptomatic ureteropelvic junction obstruction. This information requires adequate

preoperative protocol for the MDCT examination in order to demonstrate this anatomic variation which will allow useful information for conservative renal surgery and endopyelotomy.

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## UROGENITAL TRAUMA

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### **Self-expanding metallic stent placement for renal artery dissection due to blunt trauma**

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Case Report: No abstract available

### **Editorial Comment**

Reports in the literature concerning the successful treatment of blunt renal artery injury with endovascular methods are rare (3 cases in the literature). Endovascular treatments are very tempting, because open repair can be both dangerous and futile, with a high rate of post-surgical thrombosis. Also, most patients with open arterial repairs would be treated with anticoagulants to decrease the potential for postoperative thrombosis, although this is often not possible in a trauma population. The authors of this case report discuss a patient with a traumatic intimal tear of the renal artery which caused both renal hypoperfusion and renovascular hypertension, who was treated with placement of a wallstent in the artery. Renal perfusion improved immediately and the hypertension subsided. The authors gave heparin 10,000 IU for 48 hours followed by aspirin and the phosphodiesterase III inhibitor (cilostazol) for 3 months. The patient suffered no bleeding, which was surprising as she had liver and bilateral lung contusions. Although these authors show that endovascular treatment of significant traumatic renal artery stenosis is possible I believe that (although tempting) it likely remains impractical for the majority of out trauma patients whom we are unwilling to fully anticoagulate after their injury. Interventional radiology physicians also remain wary of placing stents in injured vessels because of the concern of artery rupture or stent migration, causing catastrophic bleeding (although these authors advocate both endoluminal ultrasound and the use of a long stent to make sure the entire injured portion is stented properly). Perhaps the future will bring an endoluminal arterial stent technology that won't require systemic anticoagulation. Until then, this potentially risky treatment will remain experimental at best.

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