Dear Editor,

Renal cell carcinoma (RCC) is the most common (>90%) of adult renal neoplasms and is one of the most lethal urologic cancers with high mortality of rate of 140,000 per year.1 Clear cell variety comprises the major portion of RCC accounting for 70% of tumors, followed by papillary and chromophobe RCCs. A clear cell RCC needs to be labeled carefully as it carries a dampened 5-year survival rate of 44–69% and a higher risk of metastasis compared to papillary and chromophobe variety of RCCs.

Many large multicenter studies have shown tumor staging and grading are of utmost importance during tumor cancer diagnosis and treatment as it dictates the future course of action and the expected tumor behavior.2

We studied the association between features on multiphasic contrast-enhanced computed tomography (CECT) and World Health Organization/International Society of Urologic Pathology (WHO/ISUP) histologic grading of clear cell RCC.

The WHO/ISUP grading system has four grades, with the degree of nuclear prominence assessed to determine grades I–III and the presence of highly atypical “pleomorphic” cells and/or sarcomatoid/rhabdoid morphology defining grade IV.

Differential enhancement of the tumor and renal cortex was calculated as the difference between attenuation in corticomedullary (CMP), nephrographic (NP), and excretory phases (EP) minus attenuation on unenhanced scan. The relative enhancement (RE) in abovementioned phases was calculated as the ratio of differential tumor and cortical attenuation. There is a negative correlation between relative tumor enhancement in all phases with increasing tumor grades and the best association was shown in the NP phase with maximum area under the curve of 0.732 (p-value < 0.001). As per receiver operating characteristic (ROC) calculations, the optimal cutoff points for RE ratios below which there is a high probability of grades III and IV tumors is 0.79 in CMP, 0.59 in NP, and 0.45 in EP phases. Again, the NP phase shows the best sensitivity of 77.1% and specificity of 73.1% for prediction of high-grade disease.

On subgroup analysis in NP phase with tumors more than 5 cm in size and having less than 50% necrosis the sensitivity and specificity to predict high-grade tumors was 95.5 and 80.0%, respectively. It was found that when individual RE ratios in CM, NP, and EP phases were less than the abovementioned cutoff points and existed together in a tumor the specificity increased to 80.7% with an odds ratio of 23.0 for prediction of grades III and IV neoplasms.

Lower grade tumors (grades I and II) showed homogenous enhancement when compared with higher grade (grades III and IV) neoplasms as high-grade tumors can have intratumoral necrosis, hemorrhage, or degeneration.

Since cystic tumors contain less malignant cells they are usually of lower grades when compared with solid tumors. Larger sizes translated to higher grade tumors. Tumor size emerges as an independent prognostic factor in solid tumors with a p-value of <0.001 which is in accord with previous study conducted by Yildiz et al.3

As the tumor grade increased, there was a change in pattern of calcification from nil to subtle specks seen in lower grades to dense in high grades (p-value 0.006).

Tumor size had positive associations with tumor grade, volume of necrosis, and type of calcification.

Age, sex, and laterality were not meaningful parameters in predicting tumor grade.

In patients with anticipated short life expectancy due to other comorbidities presenting with renal mass, we suggest a size cutoff point of 5.4 cm which can be considered safe for active surveillance on the basis of ROC calculations.

In summary, RE values on multiphasic CECT when used together either in NP and EP or CMP phases have a specificity of 80.7% for predicting high WHO/ISUP histologic tumor grade. On subgroup analysis, there was further increase in sensitivity and specificity.

Role of multiphasic Contrast-enhanced Computed Tomography in predicting WHO/ISUP histologic grading of Clear Cell Renal Cell Carcinoma

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