CAN INTRATUMOURAL VASCULARISATION CT CONTRAST DYNAMICS HELP DIFFERENTIATE MALIGNANT RENAL TUMOUR SUBTYPES?

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Objectives. Various types and malignancy grades of malignant renal tumours can be difficult to differentiate on imaging, however, they have impact on recurrence likelihood and other adverse outcomes, therefore early subtype recognition could benefit treatment strategy.

Materials and Methods. A retrospective study design was applied to a cohort of renal tumour resection patients who underwent preoperative computed tomography (CT) scans. CT scan data was processed to quantitatively and qualitatively assess tumour vascularisation by measuring lesion contrast media uptake and wash-out (HU), and evaluate tumour contrast enhancement patterns. Tumour histology and grading was performed post-resection and findings correlated to imaging data.

Results. 82 patients were enrolled in the study: 76 had renal cell carcinomas (93%) of which 55 (72%) were predominantly clear-cell carcinomas (ccRCC) with fewer papillary (N = 11), chromophobe (N = 7) and sarcomatous (N = 3) RCCs. 44% of RCCs were WHO grade 2; 27%, 22% and 7% were grade 1, 2 and 4, respectively. 6 patients had urothelial carcinomas. Papillary and chromophobe RCCs were likelier to have homogeneous enhancement on arterial phase than ccRCCs ($\chi2$ = 43.48; p = 0.03), whereas urothelial carcinomas didn't have significantly different contrast uptake or wash-out patterns on other imaging phases. Higher grade malignant tumours had significantly higher density values (34–45 HU) on pre-contrast scans (F = 6.71; p = 0.01) and exhibited slower contrast wash-out on delayed phase imaging (F = 3.07; p = 0.03).

Conclusions. Quantitative and qualitative contrast dynamic assessment proved differences between ccRCCs and other subtypes of malignant renal tumours. High grade renal tumours exhibit slower contrast wash-out and have higher density on pre-contrast scans, possibly due to intratumoural haemorrhage. The findings provide possibility for new paths into prospective research with other imaging modalities such as contrast enhanced ultrasound and MRI for vascularization pattern analysis.