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Renal functional outcomes after robot-assisted partial nephrectomy and percutaneous cryoablation of clinical T1 renal cell carcinoma – a prospective study

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Background:

Treatment of elderly patients with renal cell carcinoma (RCC) is challenging due to comorbidities, including renal functional impairment. Partial nephrectomy (PN) and thermal ablation (TA) are recommended to minimize the risk of development or progression of chronic kidney disease (CKD).

Our aim was to investigate renal function after robot-assisted PN (RAPN) and percutaneous cryoablation (PCA) in RCC T1 (cT1) and evaluate the relationship between baseline renal function and renal functional outcome.

Material and method: Patients with RCC cT1 treated with RAPN or PCA between June 2019 and January 2021 were prospectively and consecutively enrolled after a MDT conference. Renal function was evaluated using estimated glomerular filtration rate (eGFR), Tc-99m diethylenetriamine-pentaacetate (DTPA) plasma clearance, Tc-99m mercaptoacetyltriglycine (MAG3) renography, CKD stage based on eGFR and DTPA, and renal volume at baseline and 6 months after treatment.

Results: Fifty-six patients were included (18 RAPN, 38 PCA) with a median age 66.5 years (interquartile range (IQR): 56.5-74.0). We found a significantly higher age (68.5 years; $p=0.019$) and Charlson comorbidity index (3.0; $p=0.007$) in PCA patients. The median tumor size was 3.3 cm (IQR: 2.5-3.9), and tumor characteristics did not differ significantly between RAPN and PCA. Total renal volume decreased significantly after PCA (-18.2 cm^3 ; $p=0.001$). Baseline CKD stage IIIb-IV was predictive of a greater reduction in renal volume (-31.8 cm^3 ; $p=0.003$) but no other renal function measures. Renal function declined significantly after either treatment based on creatinine-based measures and DTPA clearance.

Conclusion: This study found a decrease in renal function 6 months after both RAPN and PCA. Patients with CKD IIIb-IV showed a greater decline in renal volume than patients with baseline normal renal function. The renal functional changes were similar for RAPN and PCA patients.