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Histopathological analysis of peritumoral pseudocapsule infiltration and surgical margin status after enucleative robot-assisted partial nephrectomy (RAPN) for malignant renal tumors

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INTRODUCTION & OBJECTIVES: The aim of the study is to perform a detailed histopathological analysis of the tumor-parenchymal interface after RAPN performed with an enucleative strategy for malignant renal cell carcinoma (RCC), focusing on both the peritumoral pseudocapsule (PS) infiltration and the surgical margin status.

MATERIAL & METHODS: Data were prospectively collected from a cohort of 124 consecutive patients undergoing enucleative RAPN at our Institution from November 2010 to December 2013. PS and healthy renal margin (HRM) thickness, degree of PS infiltration and surgical margin status were analyzed by a dedicated uropathologist. Tumor histotype was classified according to the 2012 ISUP Vancouver Classification of Renal Neoplasia.

RESULTS: RCCs were classified as low, medium and high complexity (PADUA score 6-7, 8-9 and ≥10, respectively) in 69.4%, 23.4% and 7.2% of patients, respectively. Tumor histotypes was: clear cell (cc) RCC in 61.3% of patients, papillary (p) RCC in 14.5%, chromophobe (ch) RCC in 16.1%, multilocular cystic renal neoplasm of low malignant potential (MCCN-LMP) in 4.9% and clear cell papillary RCC (ccpRCC) in 3.2%. PS was absent in 1.6% of cases. Partial and complete PS infiltration were recorded in 39.0% and 17.1% of cases, respectively, while it was intact in 43.9%. Positive surgical margins were recorded in 2.4% of patients. Median thickness of PS and HRM were 263.3 (IQR 137.3-444.6) μm and 401.6 (IQR 137.9-921.2) μm. Peripheral and sinus fat invasion were recorded in 9.4% and 1.1 % of patients, respectively. Median PS thickness was significantly higher in ccpRCC and MCCN-LMP compared to the other histotypes (209 vs 389 μm; p=0.001). Among the latter subgroup, median PS thickness was significantly higher in ccRCC compared to pRCC and chRCC (220.2 vs 111.1 vs 59.5 μm; p<0.001). Tumor diameter at histopathological analysis was significantly different between tumors with (PS+) and without (PS-) pseudocapsule infiltration (3 (IQR 2.4-4.0) vs 2.6 (IQR 1.9-3.5); p=0.05), as well as tumor histotype (p=0.01) , nucleolar grading (p=0.01) and pT status (p=0.002). On the contrary, there was no significant difference regarding PS and HRM thickness between the two groups.

CONCLUSIONS: According to our study, a well-defined peritumoral PS was almost always present in case of malignant RCCs, although its thickness varied among different tumor histotypes, being significantly thicker and less infiltrated in tumors of low malignant potential. PS infiltration was significantly associated with tumor diameter, nucleolar grading and pT stage. In our cohort, there was no relationship between the degree of PS infiltration and both surgical margins status after RAPN with enucleative intent. However, these findings need to be confirmed by further studies assessing the long-

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term prognostic role of PS infiltration for RCC.