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Introduction & Objectives: The radical nephrectomy (RN) and the partial nephrectomy (PN) represent the standard surgical techniques in the treatment of the localized RCC. Nevertheless, up to date the strict criteria affecting the selection of the appropriate surgical tactics in RCC treatment are still lacking. The aim of the study: to delineate the principal factors affecting the selection of the surgical tactics in RCC treatment based on multivariate analysis of the major clinical and nephrometric parameters.

Materials & Methods: The clinical data of 1158 patients with RCC stages T1-T2, who were surgically treated in 2010-2018, have been analyzed retrospectively. PN was performed in 922 pts (79.6%); RN in 236 pts (20.4%). Both groups were matched in terms of the major clinical and demographic parameters. The following nephrometric factors were taking into account: tumor size, exo- or endophytic growth pattern, the proximity of tumor to the renal cavitory system, and tumor location – in sinus (n=307), polar (n=464) or lateral (n=387). The volume of the functional renal parenchyma (VFRP) was assessed by the original methodology. All parameters were based on CT.

Results: A multivariate Cox regression analysis comprising 11 parameters was used for predicting PN or RN. When prognostic ROC curves were plotted, the non-linear neural network accounting for three parameters (VFRP, localization and size of tumor) proved as the most optimal (AUC=0.94(95%CI0.92-0.95) with model sensitivity of 86.5%(95%CI81.3%-89.0%) and specificity of 85.5% (95% CI 82.3%-88.3%). The nomograms demonstrating how VFRP and tumor size affect the selection of the appropriate surgical treatment depending on the tumor location have been plotted. For RCC with polar localization, VFRP > 58 % should be considered as indication for PN. For RCC located in sinus, the tumor size less than 38 mm on the average should be considered as indication for RN. The analysis allowed us for the development of the novel nephrometric system for the assessment of tumors of kidneys (NCIU-nephrometry). NCIU system that takes into consideration both tumor location (Nearness – central location of tumor; Collateral – peripheral location; Inferior – lower location; Upper – upper location) and VFRP allows one for determining precisely the indications for RN or PN.

Conclusions: The tumor size, the tumor location, and VFRP are the major factors affecting the selection of the appropriate surgical treatment of RCC. NCIU-nephrometry represents objectively the parameters mentioned above allowing for the optimal planning of the surgical strategy in the RCC treatment, namely RN or PN. In case of polar location of the tumor with VFRP>58%, PN should be considered. In case of medial location of the tumor, the size of the tumor is the principal factor affecting the selection of the surgical tactics. The less is the tumor size (fewer than 38 mm), the more likely is PN as the treatment choice.