PE50 Can 3d virtual imaging improve the accuracy of nephrometric scores in assessing renal tumors complexity?

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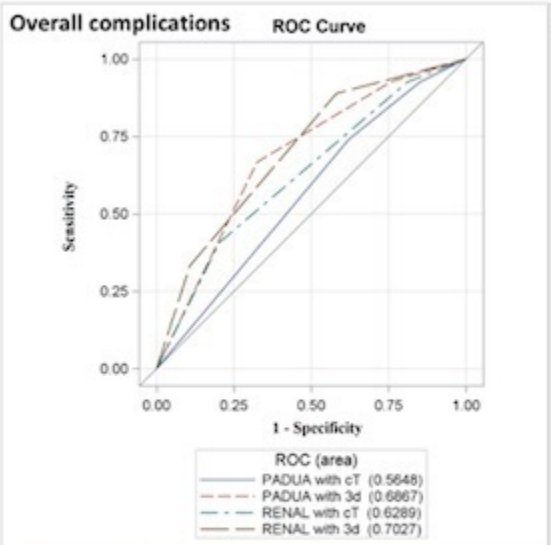
Introduction & Objectives: Notwithstanding the abundance of nephrometric scores developed, their role in evaluating renal tumors complexity remains potentially suboptimal, being based on bi-dimensional images. Aim of the study is to apply the use of standard PADUA and RENAL nephrometry parameters to three-dimensional virtual models (3DVMs) produced by bi-dimensional images, creating 3D-based PADUA and RENAL nephrometry scores/categories (3D-NS/NC), in order to reclassify the surgical complexity of the renal masses and to compare the new 3D-NS/NC with the standard 2D-based nephrometry scores (2D-NS/NC), to assess their predictive role for postoperative complications.

Materials & Methods: For all patients with localized renal tumors undergoing minimally invasive partial nephrectomy (mi-PN) from 09/16 to 09/18, 3D- and 2D-NS/NC assessments were performed preoperatively. Chi-square test evaluated the different patient's distribution on the basis of the imaging tool (3DVMs and 2D imaging) used to assess the NS/NC, Cohen's k coefficient the concordance between classifications. ROC curves have been produced to evaluate sensitivity and specificity of the 3D-NS/NC vs 2D-NS/NC in predicting the occurrence of postoperative complications. General linear model was used to perform multivariable analyses, looking for predictors of overall postoperative complications.

Results: 101 patients were included in the study. The evaluation of PADUA and RENAL score via 3DVMs showed a downgrading in comparison with the same scores evaluated with 2D imaging in 48.5% and 52.4% of the cases. Similar results were obtained for NC (29.7% and 30.7% for PADUA risk and RENAL complexity categories). 3D-NS/NC demonstrated better accuracy than 2D-NS/NC in predicting overall and major postoperative complications (differences in AUCs for each NC reaching statistical significance comparing 3DVMs vs 2D imaging assessment, as shown in Fig. 1). Multivariable analyses confirmed the 3D-PADUA/RENAL NC as the only independent predictors of overall (p=0.007; p=0.003) and

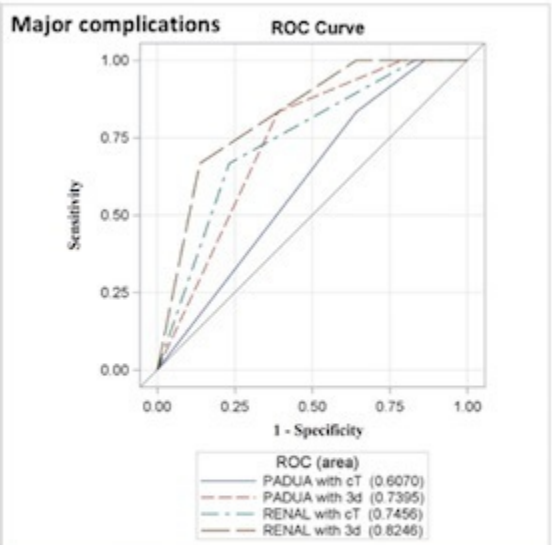
major postoperative complications (p=0.03; p=0.003).

Fig. 1



ROC Contrast Estimation and Testing Results by Row

Contrast	Estimate	Standard Error	95% Wald Confidence Limits		Chi-Square	Pr > ChiSq
PADUA with 3d - PADUA with cT	0,1219	0,0315	0,0602	0,1836	14,9835	**0,0001**
RENAL with 3d - RENAL with cT	0,0738	0,0321	0,0109	0,1367	5,2959	**0,0214**



ROC Contrast Estimation and Testing Results by Row

Contrast	Estimate	Standard Error	95% Wald Confidence Limits		Chi-Square	Pr > ChiSq
PADUA with 3d - PADUA with cT	0,1325	0,023	0,0874	0,1775	33,2036	**<0,0001**
RENAL with 3d - RENAL with cT	0,0789	0,0253	0,0293	0,1286	9,7304	**0,0018**

Conclusions: The 3DVMs seems to be more precise than 2D imaging in assessing the renal masses surgical complexity via NS/NC, due to a better perception of tumor depth and its relationships with intrarenal structures, as confirmed by the higher accuracy in predicting postoperative complications.