Supplementary Table1. The candidate variables screening associated with renal sinus invasion via RFC algorithm.

Variables	Mean Decrease Accuracy	Mean Decrease Gini
Sex	-4.03E-36	2.46E-15
PNI	15.59108591	6.575154427
Smoking	-2.46E-36	2.19E-15
BMI	8.13E-21	0.002180416
Comorbidities	-1.000500375	1.78E-15
Surgical way	1.50E-38	3.82E-19
Nephrectomy	2.058179544	0.011247353
ASA	-2.00E-35	4.74E-16
Fuhrman classification	1.890697592	1.18E-15
R.E.N.A.L	7.782349344	0.269350385
Tumorsize	14.16989496	2.72072358
Grade	2.50E-38	1.33E-18
NLR	10.20673762	1.281174248
PLR	6.808602193	0.565325401
NAR	43.12909604	32.97002297
Age	5.611980175	0.270592205
NARFIB	20.56831778	11.94172685
HALP	25.13898653	18.63956239
Fibrinogen	4.454360834	0.89325783
AGR	4.890420217	0.103893401
AKI	14.58122407	3.699974022

Abbreviations. ASA: American Society of Anesthesia. NARFIB: neutrophil-to-albumin ratio(NAR) and fibrinogen(FIB) concentration. R.E.N.A.L: nephrometry score consists of [R]adius [tumor size as maximal diameter], [E]xophytic/endophytic properties of the tumor, [N]earness of tumor deepest portion to the collecting system or sinus, [A]nterior [a]/posterior [p] descriptor and the [L]ocation relative to the polar line. NLR: neutrophil to lymphocyte ratio. PLR: platelet to lymphocyte ratio. NAR: neutrophil to albumin ratio. PNI: prognostic nutrition index. HALP: hemoglobin level * albumin level * lymphocyte count / platelet count ratio. AGR: albumin to globulin ratio. AKI: body mass index*serum albumin/neutrophil-lymphocyte ratio.

Supplementary Table2. The ROC curve analyses for predicting renal sinus invasion in each ML-based model.

	AUC		No.of candidate variables
Model	**Mean**	**95%CI**	
RFC	0.924	0.414-1.434	8
SVM	0.889	0.396-1.399	10
DT	0.887	0.379-1.395	6
ANN	0.832	0.307-1.357	11
XGboost	0.797	0.264-1.330	9

Abbreviations: RFC. Random Forest Classifier. SVM. Support Vector Machine. DT. Decision Tree. ANN. Artificial Neutral Network. XGboost. eXtreme Gradient boosting. AUC. Area Under Curve. 95%CI. 95% confidence interval.