TESTING THE AGILE DATABASE FOR AN EXTERNAL VALIDATION OF A NOMOGRAM TO PREDICT MALIGNANCY OR AGGRESSIVENESS OF RENAL MASSES, BASED ON R.E.N.A.L. SCORE

Alessandro Antonelli[1], Andrea Minervini[2], Luca Cindolo[3], Angelo Porreca[4], Simone Crivellaro[5], Paolo Parma[6], Stefano Zaramella[7], Bernardo Rocco[8], Pierluigi Bove[9], Vincenzo Pagliarulo[10], Antonio Celia[11], Carlo Ceruti[12], Mario Falsaperla[13], Roberto Nuciotti[14]

[1]Clinica Urologica Università degli studi di Brescia;
[2]Clinica Urologica, Università di Firenze;
[3]Unità Operativa di Urologia, Ospedale di Chieti-Vasto;
[4]Unità Operativa di Urologia, Ospedale di Abano Terme;
[5]Clinica Urologica, Università di Udine;
[6]Unità Operativa di Urologia, Ospedale di Mantova;
[7]Unità Operativa di Urologia, Ospedale di Novara;
[8]Clinica Urologica, Università di Milano;
[9]Clinica Urologica, Università La Sapienza di Roma;
[10]Clinica Urologica, Università di Bari;
[11]Unità Operativa di Urologia, Ospedale di Bassano del Grappa;
[12]Unità Operativa di Urologia, Università di Torino;
[13]Università Operativa di Urologia, Ospedale di Catania;
[14]Unità Operativa di Urologia, Ospedale di Grosseto, Italy

Introduction and Aim: Actually only a few preoperative systems are available to predict malignancy or aggresiveness of a renal mass, and all of them suffer from a low predictive accuracy. Recentely, Kutikov et al. (1) generated a nomogram based on R.E.N.A.L. score, that showed a predictive accuracy higher than 70%. The aim of this study was to perform an external validation of this predictive tool on a cohort of patients submitted to partial nephrectomy.

Methods: Agile is a collaborative group of Italian young (<40 yrs) urologists with a specific interest in mini-invasive surgery. Since 2011 the group perspectively shared and compiled a database to collect the data of all the patients undergoing open, laparoscopic or robotic partial nephrectomy. Among the data, also R.E.N.A.L. score has been calculated in its attributes by an urologist blinded of the final pathology. After the centralization of database, the nomogram proposed by Kutikov has been applied to each case, using the online calculator available at www.cancernomograms.com, to calculate the predicted probability of malignancy and aggressiveness. A logistic regression model has been used to estimate the correlation of each of the parameters included into the nomogram and the final pathology. Results: The data of 294 patients have been collected (185 male, 109 female, age 63±12 yrs), submitted to open (197 patients), laparoscopic (28) or robotic (69) partial nephrectomy. Histology was benign in 60 cases (21.6%), malignant in 234 (79.4%); among malignant cases, was aggressive - high grade - in 34 (17.9%), not aggressive in 144 (82.1%). Mean total R.E.N.A.L. score was 5.8±1.6. The Tables present the results of statistical analysis that estimate the correlation of the parameters included into the nomogram with malignancy (Table I) or aggressiveness (Table II) at final pathology (in bold correlation with statistical significance).

Table I. *Statistical correlation between characteristics and malignant histology.*

	p	RR (95% CI)
Age (yrs)	0.364	1.011 (0.988-1.034)
Male gender	0.010	2.138 (1.203-3.798)
Nephrometry sum	0.217	1.129 (0.931-1.368)
R attribute	0.303	
1	referent	
2	0.544	1.252 (0.606-2.588)
3	0.175	0.347 (0.075-1.603)
E attribute	0.376	
1	referent	
2	0.326	1.371 (0.731-2.572)
3	0.265	2.360 (0.521-10.689)
N attribute	0.322	
1	referent	
2	0.685	1.262 (0.410-3.889)
3	0.141	2.524 (0.737-8.644)
L attribute	0.049	
1	referent	
2	0.021	2.471 (1.145-5.332)
3	0.924	0.968 (0.498-1.881)
involvement of renal sinus		
no	referent	
yes	0.347	0.59 (0.201-1.758)

Table II. *Statistical correlation between characteristics and high grade RCC.*

	p	RR (95% CI)
Age (yrs)	0.364	1.011 (0.988-1.034)
Male gender	0.010	2.138 (1.203-3.798)
Nephrometry sum	0.217	1.129 (0.931-1.368)
R attribute	0.303	
1	referent	
2	0.544	1.252 (0.606-2.588)
3	0.175	0.347 (0.075-1.603)
E attribute	0.376	
1	referent	
2	0.326	1.371 (0.731-2.572)
3	0.265	2.360 (0.521-10.689)
N attribute	0.322	
1	referent	
2	0.685	1.262 (0.410-3.889)
3	0.141	2.524 (0.737-8.644)
L attribute	0.049	
1	referent	
2	0.021	2.471 (1.145-5.332)
3	0.924	0.968 (0.498-1.881)
Involvement of renal sinus		
no	referent	
yes	0.347	0.59 (0.201-1.758)

advanced or metastatic tumors – the present study aims at validating the nomogram on a cohort of cases submitted to partial nephrectomy, in which the prediction of malignancy or aggressiveness could be more clinically important because these masses could be amenable of ablation or observation. The nomogram showed a poor predictive ability for malignancy, whereas a discrete accuracy for aggressiveness, mainly due to a strong relationship with the diameter of the tumor. Since the external validation failed, the nomogram should be recalibrated on a cohort of small renal masses. 1 Kutikov A, Smaldone MC, Egleston BL et al: Anatomic features of enhancing renal masses predict malignant and high-grade pathology: a preoperative nomogram using the RENAL Nephrometry score. Eur Urol 60(2): 241-248, 2011.

The malignancy rate predicted by the nomogram for benign and malignant tumors was 79.2% and 80.3%, respectively (AUC 0.541, p=0.326); the predicted aggressiveness rate for non-aggressive and aggressive renal cancer was 30.9% and 38.6%, respectively (AUC 0.660, p=0.004). Conclusion: Conversely to the cohort in which the nomogram has been generated – that included also