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STONES

ROKS can predict recurrence

First-time patients with nephrolithiasis are at risk of further stone episodes, but a tool to predict recurrence for routine use in clinical care has been lacking. Now, Andrew Rule and colleagues from the Mayo Clinic, Rochester, USA, have developed the Recurrence of Kidney Stone (ROKS) nomogram, which enables clinicians to estimate the risk of a second symptomatic stone episode using information that is commonly collected at the first.

In their study, published in the *Journal of the American Society of Nephrology*, the investigators analysed data gathered between 1984 and 2012 from 2,239 adult patients with a first symptomatic stone episode. "We used a population-based historical cohort study design," Rule explains. "Manual chart review was key to identifying first-time kidney stone formers with truly symptomatic episodes." During a median follow-up of 11.2 years, 707 patients had a second symptomatic calculus. The recurrence rates increased with time, from 11% after 2 years to 39% after 15 years.

The researchers used clinical patient characteristics that were recorded before or ≤90 days after the first stone episode as predictors for symptomatic recurrence. Univariate analysis revealed that a family history of nephrolithiasis, ≥2 stones on imaging and >50% uric acid content of stones were individually associated with recurrence. In their multivariate analysis, the investigators evaluated only 11 out of 31 predictors to simplify their prediction model for the clinical setting. Young age, male sex, family history of nephrolithiasis, a suspected stone before the current symptomatic episode, nonobstructing stones, symptomatic pelvic or lower-pole stones, as well as known uric acid composition were significant predictors of recurrence.

Finally, Rule and colleagues used linear Cox model coefficients to develop the ROKS nomogram: each predictor was assigned a fixed number of points between 8 (gross haematuria) and 92 (uric acid content), enabling clinicians to easily estimate the probability of recurrence at various time points using the sum on the basis of presence or absence of each factor. Notably, the model was designed so it can also be used for individuals without imaging data, as imaging is not always performed in patients with a first symptomatic calculus.

Commonly, patients are advised that a stone episode recurs in 50% of cases in the 10 years following the first episode—based on data from high-risk patients seen at specialist centres. "The ROKS score helps to determine a more-individualized estimate of the probability for symptomatic recurrence," Rule points out. "The average risk at 10 years was ~30%, but could be >50% in high-risk individuals and <10% in low-risk individuals." Such individualized data can help clinicians and patients make informed choices regarding the need for interventions—to avoid long-term complications in high-risk patients, but also unnecessary costs and adverse events associated with medications in low-risk populations.

Now, the team is performing a prospective study to clarify the use of 24-h urine collection in further improving risk prediction of a second symptomatic calculus.

Clemens Thoma

Original article Rule, A. D. *et al.* The ROKS nomogram for predicting a second symptomatic stone episode. *J. Am. Soc. Nephrol.* doi:10.1681/ASN.2013091011

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