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Editorial Comment

EDITORIAL COMMENT

Shock-wave lithotripsy or ureterorenoscopy for renal stones?

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ABSTRACT

Kidney stones are a common condition with high direct and indirect costs; to date, the optimal urological approach for some particular presentations including non-lower pole kidney stones between 10 and 20 mm of diameter is not clear. A limited number of randomized controlled trials and observational longitudinal studies suggests that ureterorenoscopy (URS) could be superior to shock-wave lithotripsy (SWL) in achieving stone-free rates in this setting; however, such reports are generally weakened by a number of limitations including small sample size and scarce control for confounding. In this issue, Fankhauser *et al.* [1] report the results of a large observational retrospective study on the comparative efficacy and safety of URS and SWL for the treatment of previously untreated kidney stones.

Keywords: endourology, lithotripsy, nephrolithiasis, observational studies, outcomes

Kidney stone disease is a common condition, with an increasing prevalence and high direct and indirect costs [2–4]; both environmental and genetic factors are thought to play a role in its development [5–7]. A number of urological procedures are nowadays available to treat patients who present with this condition. Both the American Urological Association (AUA) and the European Association of Urology (EAU) guidelines recommend the use of either shock-wave lithotripsy (SWL) or ureterorenoscopy (URS) to treat lower pole and non-lower pole kidney stones ≤10 mm and non-lower pole stones between 10 and 20 mm; for lower pole stones between 10 and 20 mm, the AUA guideline does not recommend SWL as first-line treatment, and the EAU does not recommend SWL in the presence of unfavourable factors including shock-wave-resistant stones (e.g. brushite or cystine stones) and anatomic abnormalities [8, 9].

In this issue of *Clinical Kidney Journal*, Fankhauser *et al.* [1] analysed the efficacy and safety of SWL and URS as first-line treatments for previously untreated kidney stones ≤20 mm. Of all the patients treated in their centre between 2003 and 2014, the authors selected 1282 with previously untreated lower and non-lower pole stones and a stone diameter between 5 and 20 mm. The study sample was then divided based on the treatment type in 999 patients treated with SWL and 283 treated with URS, and both efficacy and safety outcomes evaluated. For the first, rates of stone-free and freedom from reintervention during follow-up were used, whereas for the latter the authors used the Clavien–Dindo grading system of perioperative complications until discharge. Compared with patients treated with SWL, those treated with URS had higher stone-free rates (84% versus 71%) and freedom from reintervention (79% versus 55%). The results remained significant after adjustment for a number of potential confounders and were confirmed in a subsample of 735 patients matched, based on a propensity score whose calculation included age, gender, body mass index, stone size and number of stones. A subgroup analysis based on stone location confirmed that URS was associated with better outcomes for non-lower pole stones, although stone-free rates were similar for the two techniques for lower pole stones, but with a

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significantly different freedom from reintervention rate. These results have not been explained by the authors but might be a consequence of forced indications to URS (stone volume, lower calix anatomy), even if the minimal fragments residual after URS led to higher freedom from reintervention. Overall, 3.7% of SWL patients and 7.4% of URS patients experienced perioperative complications.

In this study, the only independent predictors of stone-free rate and freedom from reintervention were treatment modality and the stone size measured bidimensionally. An important topic is to determine the optimal method for assessing stone volume, and thus stone burden, a helpful tool in predicting treatment outcome for renal stones. EAU and AUA guidelines consider the bidimensional size [8, 9]. The precise measurement of stone volume by 3D reconstruction can be accomplished using modern computer tomography (CT) scanning software [10], however this technique is not available in all hospitals or with routine acute colic scanning protocols. The evaluation of Hounsfield unit is another important tool in predicting treatment efficacy. Therefore, maximum diameters as measured by either X-ray or CT are used in the calculation of stone volume based on a scalene ellipsoid formula, as recommended by the EAU [9].

The strength of the study by Fankhauser *et al.* lies in the large number of patients analysed (almost double the number of patients included in a recent systematic review and meta-analysis on the same topic [11]), in the ample span of time included in the analysis and in the consistency of its results after propensity score matching. However, a number of limitations must also be considered. As acknowledged by the authors, the observational and monocentric nature of the study means the results could be prone to various potential biases and residual confounding. In particular, although the authors employ multivariate regression techniques and propensity score matching to control for potential confounders, the role of unmeasured and unknown confounders could not be entirely ruled out. The variables included in the models do not necessarily capture the indications to treat the patient with one given procedure, and such indications as well as their efficacy could have changed over the relatively wide span of time included in the analysis. Pre-treatment and post-treatment total stone burden was not investigated systematically, e.g. employing a standardized imaging protocol, but rather obtained from a mixture of ultrasonography, X-ray and CT scans. If the relative use of those imaging techniques varied across treatment groups, this could have influenced the results. Similarly, the timing of imaging evaluation during follow-up was not defined, and the groups could have potentially differed in follow-up length; in that case, the use of time-to-event analysis techniques rather than logistic regression could have been preferred. Furthermore, the study only collects information on procedure-related complications until discharge; a sizable number of reports have brought attention to the long-term effects of SWL procedures including high blood pressure, chronic kidney disease and diabetes [12–14], and a longer follow-up coupled with a larger sample size would be needed to capture them. Finally, the lack of a clear advantage of URS over SWL for lower pole stones, a finding that is not supported by the results of meta-analyses of randomized controlled trials [11, 15], deserves further elucidation.

Notwithstanding such limitations, the study by Fankhauser *et al.* provides interesting findings that could prove helpful in guiding the choice for stone removal in patients with stones ≤20 mm and in finding the balance between obtaining optimal rates of stone clearance and minimizing subsequent complications.

CONFLICT OF INTEREST STATEMENT

None declared. The results presented in this article have not been published previously in whole or part.

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