

Evaluation of Guidelines for Surgical Management of Urolithiasis



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Purpose: Many urological societies have provided evidence-based guidelines to help the urologist make therapeutic choices. However, the recommendations in these guidelines may be heterogeneous because they were developed using various methods. The objective of this study was to review key guidelines on the surgical management of urinary stones to provide practical guidance for clinical application.

Materials and Methods: Guidelines on urolithiasis from all international urological societies were searched through the society websites. A search on PubMed® and Medline® restricted to publications in English was also performed for guidelines published between January 1, 2010 and July 1, 2017. Only the latest versions of guidelines containing an evaluation of the level of evidence and the grade of recommendation were included in the final analysis. All recommendations on surgical stone management and recommended techniques for each surgical modality were included. The AGREE II (Appraisal of Guidelines for Research and Evaluation II) instrument was used to assess the quality of the included guidelines.

Results: Three international guidelines were included in analysis, including those of AUA (American Urological Association)/ES (Endourological Society), EAU (European Association of Urology) and SIU (Société Internationale d'Urologie)/ICUD (International Consultation on Urological Diseases). We highlighted the heterogeneity in the level of evidence and the grade of recommendation which arose due to the different methods of evaluations that had been adopted. Despite this our review highlighted the considerable similarities among the guidelines. In certain specific situations for which no good evidence was available the recommendations could only be based on expert opinion.

Conclusions: An option to provide clear guidance to the urologist might be to combine these international guidelines into one to reduce confusion about the surgical management of urolithiasis.

Abbreviations and Acronyms

AGREE II = Appraisal of Guidelines for Research and Evaluation II

AUA = American Urological Association

EAU = European Association of Urology

ES = Endourological Society

fURS = flexible URS

GOR = recommendation grade

ICUD = International Consultation on Urological Diseases

LOE = evidence level

OCEBM = Oxford Centre for Evidence-Based Medicine

PCNL = percutaneous nephrolithotomy

SIU = Société Internationale d'Urologie

SWL = shock wave lithotripsy

URS = ureteroscopy

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THE prevalence of urolithiasis has increased during the last decades and now affects approximately 9% of the American adult population with comparable increases in other developed countries.^{1–9} It was estimated that 25% of these patients will undergo a surgical procedure to remove stones.¹⁰ In the last 3 decades the surgical management of kidney stones has undergone many technological advances with the development of SWL, rigid and flexible URS, and PCNL. During this period each of these treatment modalities has benefited from many improvements along with changes in indications and many opportunities for critical evaluation. Many scientific organizations have provided evidence-based guidelines to define the role of each modality in the surgical management of urinary stones and help the urologist make therapeutic choices. Unfortunately the methods used to develop these recommendations may vary among guideline panels. Moreover, with the constant release of new scientific publications guidelines quickly become outdated and require frequent updating.¹¹

Recently efforts have been made to harmonize recommendations. In 2016 AUA and ES together edited recommendations on the surgical management of urolithiasis and in 2017 EAU also provided updated urolithiasis recommendations.^{12–15} SIU collaborated with ICUD in 2014 to publish recommendations on stone disease.¹⁶ The objective of this study was to review key guidelines on the surgical management of urinary stones to provide practical guidance for clinical application.

MATERIALS AND METHODS

Guidelines on urolithiasis from all international urological societies (Africa, Asia, Europe, India, and North and South America) were searched through the society websites. A search on PubMed and Medline restricted to publications in English was also performed for guidelines published between January 1, 2010 and July 1, 2017 using the search terms urolithiasis, nephrolithiasis, guidelines and stone disease. Only the latest versions of guidelines containing an evaluation of LOE and GOR were included in the final analysis. National guidelines were excluded as they do not provide meta-analyses, LOE or GOR and most of them use international guidelines as support.

All recommendations on surgical stone management and recommended techniques of each surgical modality (SWL, URS and PCNL) were included. Specific clinical situations were also assessed, such as pregnancy, kidney transplantation, steinstrasse, horseshoe kidney and residual fragments.

The AGREE II instrument was used to assess the quality of the included guidelines.¹⁷ It consists of 23 key items graded from 1—strongly disagree to 7—strongly agree organized in 6 domains, followed by 2 global rating items (overall assessment). Each domain captures a unique dimension of guideline quality. The domains include evaluation of the scope and purpose of the guidelines to evaluate a specific health question and the target population as well as stakeholder involvement in which appraisers focus on the inclusion of individuals from all relevant professional groups, whether the views and preferences of the target population were sought and whether the target users of the guidelines are clearly defined. The other domains evaluated are the rigor of development, which is an assessment of the gathering and synthesizing of recommendations, and the clarity of presentation, which is whether the recommendations are specific and unambiguous, the presentation of the condition or health issue is clear and the key recommendations are easily identifiable.

One domain is applicability, which considers whether factors facilitating or hindering clinical application are described and whether advice is provided on how recommendations could be put into practice. Moreover, this domain evaluation looks for monitoring or auditing criteria and whether there is consideration of the potential resource implications of applying the recommendations. The last domain is the editorial independence of evaluating the views of funding bodies to determine whether they influenced the guideline content. It is also noted whether competing interests of the guideline development groups are reported and adequately addressed.

Each domain score is calculated by summing all the scores of the individual items in a domain and by scaling the total as a percent of the maximum possible score for that domain using the formula, (total obtained domain score from all appraisers – minimum possible score / maximum possible score – minimum possible score) × 100. The overall assessment indicates the overall quality of the guideline as a whole and whether it can be recommended for routine practice.

According to the recommendation of the AGREE II consortium each guideline was evaluated by 4 appraisers (BP, SD, JB and SP) to increase the reliability of the assessment. All authors independently assessed the guidelines after undergoing training using the online AGREE II tutorial and practice exercise.¹⁸ The 4 reviewers were urologists experienced with urolithiasis management and 2 had experience with writing guidelines and rating GORs.

RESULTS

Only 3 international guidelines were included in the final analysis. The other international guidelines did not provide specific guidelines on treatment of

urolithiasis with clearly stated LOEs and GORs. In general they followed the AUA or EAU guidelines. Thus, we assessed guidelines from AUA/ES edited in 2016, EAU updated in 2017 and SIU/ICUD updated in 2014.^{12–16}

Evidence Level Assessment and Recommendation Grading

AUA/ES guidelines are based on a comprehensive systematic review and meta-analysis of peer reviewed articles. LOE and GOR evaluations are more specifically stated in AUA/ES guidelines than in EAU guidelines (supplementary Appendix 1, <http://jurology.com/>). AUA/ES guidelines were published in 2016 and include revisions of previously published AUA guidelines from 2005 and 2007. Unlike other guidelines those of AUA/ES include the results of meta-analyses performed by panels from those associations.

EAU guidelines were updated in 2016 based on systematic reviews and meta-analyses published in the current literature. The recommendations were assessed using the LOE and GOR classification system, modified based on the OCEBM definitions of LOE.

SIU/ICUD guidelines are based on the ICUD recommendations using modified OCEBM definitions of LOE and GOR. In addition, SIU/ICUD guidelines reference some discussions in EAU and AUA guidelines. Unfortunately recommendations on surgical management and techniques appear to be heterogeneous, and certain specific points were not included as clear recommendations from the panel.

Urinary Stone Surgical Treatment

Ureter. Conservative management of uncomplicated ureteral stones is possible (supplementary tables 1 and 2, <http://jurology.com/>). The cutoff size for observation is 10 and 6 mm in AUA and EAU guidelines, respectively. According to EAU guidelines medical expulsive therapy with α -blockers is an option, particularly for distal ureteral stones greater than 5 mm. AUA recommends this treatment for distal ureteral stones only. If conservative management is chosen, followup is mandatory. Unlike EAU, AUA suggests a maximal duration of conservative treatment of 4 to 6 weeks from the initial clinical presentation. SIU/ICUD guidelines do not list LOE or GOR for the conservative management of ureteral stones, although they state that intervention should be done for stones greater than 7 mm.

According to the 3 international guidelines URS is recommended as first line treatment of distal ureteral stones greater than 10 mm. For stones less than 10 mm URS should be the first option in

AUA/ES guidelines while SWL is an equivalent option according to EAU and SIU/ICUD. In all guidelines URS is recommended as the first surgical modality for proximal ureteral stones regardless of stone size. The exception is that SIU/ICUD guidelines recommend SWL as first line treatment of proximal ureteral stones greater than 10 mm. For proximal ureteral stones less than 10 mm EAU and AUA/ES mention SWL as an option equivalent to URS.

Kidney. Active surveillance of asymptomatic, non-obstructing caliceal stones is possible (supplementary tables 1 and 2, <http://jurology.com/>). AUA/ES and EAU guidelines recommend followup imaging. According to EAU guidelines active surveillance is acceptable for stones up to 15 mm.

AUA/ES and EAU support stone treatment for asymptomatic stones in cases of stone growth, associated infection and specific situations such as vocational reasons. Otherwise surgical treatment is indicated in patients with symptomatic stones and/or obstruction. Surgical treatment of renal stones depends on stone size and location. For stones located in the renal pelvis or the upper and middle calyx fURS and SWL are first line treatments that are recommended for stones less than 20 mm. EAU and SIU/ICUD guidelines recommend PCNL as another option for stones between 10 and 20 mm. Regardless of location PCNL is the first option for stones greater than 20 mm.

For lower pole stones less than 10 mm the primary treatment is fURS or SWL. When the stone is between 10 and 20 mm, fURS and PCNL are the suggested options. SIU/ICUD guidelines recommend treating lower pole renal stones with SWL as the first choice for stones less than 15 mm (LOE 1) and fURS or PCNL for stones greater than 15 mm.

Specific Surgical Techniques

Shock Wave Lithotripsy. EAU and AUA/ES do not recommend pretesting before SWL (supplementary table 2 and Appendix 2, <http://jurology.com/>). SIU/ICUD guidelines suggest pretesting but this recommendation is not supported by evidence or a graded recommendation. EAU guidelines provide recommendations for the best frequency setting, use of coupling gel, imaging monitoring and analgesia during the procedure. AUA/ES and EAU suggest a prescription for α -blockers after SWL as an option to facilitate passage of stone fragments. AUA/ES guidelines recommend an endoscopic approach if initial SWL fails. SIU/ICUD guidelines precisely describe all aspects of the techniques and indications for SWL but most arguments are not supported by evidence, a graded recommendation or a clear literature review.

Ureteroscopy. AUA/ES, EAU and SIU/ICUD guidelines recommend using a safety wire, of which the LOE and GOR are low (supplementary table 2 and Appendix 2, <http://jurology.com/>). Only SIU/ICUD guidelines include a recommendation pertaining to the type of guidewire. They recommend polytetrafluoroethylene coated, floppy tipped wires because they are inexpensive. Laser or pneumatic lithotripsy may be performed with semirigid ureteroscopes while laser lithotripsy is preferred for fURS.

Routine placement of a ureteral stent is not recommended preoperatively or postoperatively. However, EAU guidelines mention that prestenting has been shown to improve outcomes, particularly for renal stones. AUA/ES, EAU and SIU/ICUD guidelines suggest prescribing α -blockers if the ureter is stented after the procedure to reduce stent discomfort. AUA/ES and SIU/ICUD also consider antimuscarinics to relieve these symptoms.

No specific indications on the choice of semirigid URS or fURS are mentioned in the guidelines. Nevertheless, fURS is recommended when antithrombotic therapy cannot be stopped according to EAU guidelines and it should always be available even when a semirigid procedure is performed. Only SIU/ICUD guidelines provide recommendations on the techniques and technological aspects of URS, including use of a ureteral access sheath or anti-retropulsion devices. Nevertheless, most of these recommendations have a low LOE and GOR, and are only supported by the opinion of the panel experts.

Percutaneous Nephrolithotomy. For uncomplicated PCNL a nephrostomy tube is optional. Flexible nephroscopy is recommended by AUA/ES while EAU guidelines recommend ultrasonic, ballistic or Ho:YAG laser fragmentation. Preoperative imaging is recommended. SIU/ICUD guidelines provide recommendations on technical aspects and management during PCNL, procedural imaging, renal puncture types, guidewire use and prone vs supine patient positioning.

Antibiotic Prophylaxis

Only in SIU/ICUD guidelines are specific recommendations included for different surgical modalities (supplementary Appendix 3, <http://jurology.com/>). Nevertheless, all guidelines recommend obtaining a urine culture before a procedure and treating if there is bacteriuria or infection. SWL is the only procedure for which antibiotic prophylaxis is unnecessary in the absence of urinary tract infection, or if the patient is at low risk for infection. SIU/ICUD guidelines recommend a 5-day course of treatment before URS in patients with chronic bacteriuria, maintenance of low intrarenal pressure

during the procedure and forced diuresis with diuretics perioperatively.

Specific Clinical Situations Recommendations

The different guidelines describe the management of specific clinical situations, including residual stones, staghorn stones, horseshoe kidney, renal transplantation, steinstrasse, pregnancy and caliceal diverticula. Supplementary Appendix 4 (<http://jurology.com/>) shows those recommendations. Supplementary table 2 (<http://jurology.com/>) summarizes the most relevant questions for the surgical management of urolithiasis with the author suggestions.

Guideline Quality Assessment with AGREE II

The 3 guidelines published between 2014 and 2016 were developed by specific urological societies. In the AUA/ES and the EAU guidelines expert consensus was used in all cases as a method to determine recommendations and a systematic literature search was specifically performed.

Supplementary table 3 (<http://jurology.com/>) shows an appraisal of the guideline scope and purpose, stakeholder involvement, guideline development rigor, presentation clarity, applicability, editorial independence and overall quality.

Two guidelines were well rated, including AUA/ES guidelines at 75% and EAU guidelines at 71%. SIU/ICUD guidelines were rated at only 50%. We evaluated AUA/ES and EAU guidelines as the recommended guidelines without the need for many modifications compared to the SIU/ICUD guidelines, which were not recommended or evaluated as needing modifications.

DISCUSSION

With the constant release of new studies in the literature and the evolution of surgical treatment for urolithiasis with time, some scientific societies have provided evidence-based guidelines to help urologists choose the best treatment for any individual patient. However, the recommendations in these guidelines may be heterogeneous because they were developed using various methods. Furthermore, some recommendations may vary among the guidelines, making it confusing to determine which recommendation to follow.

For these reasons in the current review we compared the key points of the international guidelines of the AUA/ES, EAU and SIU/ICUD scientific societies on the surgical management of urolithiasis, including those of the assessment of the respective LOEs and GORs. The quality of each guideline was also evaluated using the AGREE II instrument. We sought to summarize the

guidelines by pointing out similarities and differences to facilitate therapeutic decision making by urologists.

This review highlights the heterogeneity in LOE and GOR which arose due to the different methods of the evaluations adopted. AUA/ES used their own methodology and performed meta-analyses to provide recommendations on specific questions. On the other hand, EAU and SIU/ICUD based the recommendations on systematic reviews available in the current literature, which they evaluated using OCEBM methods. However, despite the abundance of research in certain areas there are certain specific situations for which no good evidence is available. Thus, the recommendations could only be based on expert opinion. Although the methods of developing these 3 guidelines differed, the current review highlights the considerable similarities among them, which may be reassuring to the reader.

The strength of this review is the comparison of guideline recommendations for practical clinical questions with clear and comprehensive answers available for a number of situations, supporting evidence-based treatment.

Although the guidelines on urolithiasis have tried to be evidence-based when possible, the recommendations remain unclear in certain specific situations. Perhaps these questions could be addressed by a more formalized collaborative network using well-defined efficient methodology. An option to provide clear guidance to the urologist might be to combine these international guidelines into one to reduce confusion about the surgical management of urolithiasis, providing access to the best evidence for the care of our patients.

CONCLUSIONS

Despite certain variations among the 3 international guidelines on urolithiasis this review highlights the consensus that exists in most areas, helping urologists choose the best treatment for any individual patient. Although the recommendations are based on high quality evidence as much as possible, in specific clinical situations they are only based on expert opinion. In these particular cases urologists should consider individual characteristics to adopt the most reasonable management.

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