

# Surgical Management of Stones: American Urological Association/Endourological Society Guideline, PART I



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**Purpose:** This Guideline is intended to provide a clinical framework for the surgical management of patients with kidney and/or ureteral stones. The summary presented herein represents Part I of the two-part series dedicated to Surgical Management of Stones: American Urological Association/Endourological Society Guideline. Please refer to Part II for an in-depth discussion of patients presenting with ureteral or renal stones.

**Materials and Methods:** A systematic review of the literature (search dates 1/1/1985 to 5/31/2015) was conducted to identify peer-reviewed studies relevant to the surgical management of stones. The review yielded an evidence base of 1,911 articles after application of inclusion/exclusion criteria. These publications were used to create the Guideline statements. Evidence-based statements of Strong, Moderate, or Conditional Recommendation were developed based on benefits and risks/burdens to patients. Additional directives are provided as Clinical Principles and Expert Opinions when insufficient evidence existed.

**Results:** The Panel identified 12 adult Index Patients to represent the most common cases seen in clinical practice. Three additional Index Patients were also created to describe pediatric and pregnant patients with such stones. With these patients in mind, Guideline statements were developed to aid the clinician in identifying optimal management.

**Conclusions:** Proper treatment selection, which is directed by patient- and stone-specific factors, remains the greatest predictor of successful treatment outcomes. This Guideline is intended for use in conjunction with the individual patient's treatment goals. In all cases, patient preferences and personal goals should be considered when choosing a management strategy.

**Key Words:** nephrolithiasis; ureteroscopy; nephrostomy, percutaneous

## BACKGROUND

Kidney stones are a common and costly disease; it has been reported that over 8.8% of the United States population will be affected by this malady, and direct and indirect treatment costs are estimated to be several billion dollars per year in this

country.<sup>1-3</sup> The surgical treatment of kidney stones is complex, as there are multiple competitive treatment modalities, and in certain cases more than one modality may be appropriate.

The surgical management of patients with various stones described

## Abbreviations and Acronyms

AUA = American Urological Association  
CBC = complete blood count  
CT = computerized tomography  
MET = medical expulsive therapy  
PCNL = percutaneous nephrolithotomy  
SWL = shock-wave lithotripsy  
UPJ = ureteropelvic junction  
URS = ureteroscopy  
UTI = urinary tract infection

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herein is divided into 13 respective patient profiles (table 1). Please refer to the unabridged version of this Guideline for a complete description of each Index Patient.

## METHODOLOGY

Consistent with the AUA published Guideline methodology framework,<sup>4</sup> the AUA commissioned an independent group to conduct a systematic review and meta-analysis of the published literature on various options for the surgical management of stones.

The quality of individual randomized controlled trials or clinical controlled trials was assessed using the Cochrane Risk of Bias tool.<sup>5</sup> The quality of case-control studies and comparative observational studies was rated using the Newcastle-Ottawa Quality Assessment Scale.<sup>6</sup>

The AUA categorizes body of evidence strength as Grade A, B, or C based on both individual study quality and consideration of study design, consistency of findings across studies, adequacy of sample sizes, and generalizability of samples, settings, and treatments for the purposes of the Guideline.<sup>4</sup>

Evidence-based statements are provided as *Strong*, *Moderate*, and *Conditional Recommendations* with additional statements provided in the form of *Clinical Principles* or *Expert Opinion* (table 2).

## GUIDELINE STATEMENTS

**Imaging, Preoperative Testing.** 1. **Clinicians should obtain a non-contrast CT scan on patients prior to performing PCNL. (Strong Recommendation; Evidence Strength: Grade C)**

The use of computerized tomography for preoperative assessment in those with nephrolithiasis prior to performance of percutaneous nephrolithotomy has gained widespread acceptance as it defines stone burden and distribution and provides information regarding collecting system anatomy, position of peri-renal structures and relevant anatomic variants. It may also be used to predict

operative outcomes and, in some instances, stone composition.<sup>7,8</sup>

2. **Clinicians may obtain a non-contrast CT scan to help select the best candidate for SWL versus URS. (Conditional Recommendation; Evidence Strength: Grade C)**

The Panel recognizes that multiple imaging modalities may be used to preoperatively assess candidates for shock-wave lithotripsy (SWL) and ureteroscopy (URS).<sup>9</sup> However, in light of the breadth of information provided by CT, the Panel feels that CT can be useful to help determine whether SWL or URS is better suited for a given patient.

3. **Clinicians may obtain a functional imaging study (DTPA or MAG-3) if clinically significant loss of renal function in the involved kidney or kidneys is suspected. (Conditional Recommendation; Evidence Strength: Grade C)**

If a clinician suspects compromised renal function, obtaining a functional imaging study (DTPA or MAG-3) can help guide treatment for stone disease. Nuclear renography can define the differential function of the two kidneys in addition to assessing for urinary tract obstruction. It should be noted that the ability of nuclear renography to assess obstruction may be limited in cases of moderate to severe chronic kidney disease.

4. **Clinicians are required to obtain a urinalysis prior to intervention. In patients with clinical or laboratory signs of infection, urine culture should be obtained. (Strong Recommendation; Evidence Strength: Grade B)**

It is critical that clinicians obtain a urinalysis prior to stone intervention in order to minimize the risks of infectious complications. A urine culture should be obtained if urinary tract infection is suspected based on the urinalysis or clinical findings. If the culture demonstrates infection, the patient should be prescribed appropriate antibiotic therapy.

5. **Clinicians should obtain a CBC and platelet count on patients undergoing procedures where there is a significant risk of hemorrhage or for patients with symptoms suggesting anemia, thrombocytopenia or infection; serum electrolytes and creatinine should be obtained if there is suspicion of reduced renal function. (Expert Opinion)**

The American Society of Anesthesiologists recommends selective ordering of preoperative complete blood count and serum chemistry testing.<sup>10</sup> The Panel recommends that a CBC be obtained prior to procedures where there is a significant risk of hemorrhage or if a patient has symptoms suggesting anemia, thrombocytopenia, or infection.

**Table 1. Index Patients**

1	Adult, $\leq 10$ mm proximal ureteral stone
2	Adult, $\leq 10$ mm mid ureteral stone
3	Adult, $\leq 10$ mm distal ureteral stone
4	Adult, $> 10$ mm proximal ureteral stone
5	Adult, $> 10$ mm mid ureteral stone
6	Adult, $> 10$ mm distal ureteral stone
7	Adult, $\leq 20$ mm total non-lower pole renal stone burden
8	Adult, $> 20$ mm total renal stone burden
9	Adult, $\leq 10$ mm lower pole renal stone(s)
10	Adult, $> 10$ mm lower pole renal stone(s)
11	Adult, with residual stone(s)
12	Adult, renal stone(s) with pain and no obstruction
13	Child, ureteral stone(s)
14	Child, renal stone(s)
15	Pregnant female, renal or ureteral stone(s)

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