

The Management of Urolithiasis

1 Introduction

Surgical management of urolithiasis has undergone fundamental changes since the advent of extracorporeal shockwave lithotripsy (ESWL). (Ref 1-2) The past decade has seen significant revolution in the management of stone disease as open surgical removal was supplanted by endoscopy and shockwave lithotripsy. Improved technology in ESWL and Percutaneous Nephrolithotripsy (PCNL) in the 80's and Ureteroscopy (URS) in the late 90's has stimulated this revolution, which has been readily embraced by both patients and urologists. These newer treatment modalities are well tolerated by patients because of associated lower morbidity and decreased hospital stay.

Currently in Singapore, the surgical treatment modalities for urolithiasis are the following :

- 1) ESWL,
- 2) Endoscopy
 - a) Retrograde ureteroscopic and cystoscopic approach
 - b) Percutaneous approach, and
- 3) Open surgical stone removal.

The purpose of this paper is to provide guidelines on the use of these various surgical treatment modalities for urolithiasis in Singapore today. The guidelines put forward in this report are not meant to be exclusive and is up to the attending urologist to individualise the treatment for his patient.

2 Indication for treatment of urolithiasis

The common indications for the treatment of urolithiasis includes the presence of symptoms and/or obstructive uropathy in a functioning kidney

3 Aim in the treatment of urolithiasis

The guidelines put forward in this paper is to achieve the aim of a stone free status and at the same time to reduce the incidence of unplanned secondary procedures and minimise complications.

4 Management of a renal calculi

4.1 Size

Stones with a maximal length of up to 2.0 cm in diameter can be considered for ESWL monotherapy. (Ref 3)

An alternative option is retrograde URS. (Ref 46-49)

Stones with a maximal length of more than 2.0 cm in diameter should be counselled on the possible need for percutaneous nephrolithotripsy (PCNL) as a primary modality and ESWL following PCNL as the secondary modality. (Ref 3-6)

Stones with maximal length of more than 2.0 cm in diameter are sometimes treated by using ESWL monotherapy with a DJ stent in-situ. These patients need to be counselled that this approach will result in a lower stone free rate as well as a possible protracted treatment duration due to numerous ESWL sessions to treat this large stone. The optimal treatment for such stone should remain as PCNL with or without ESWL combination therapy. (Ref 7-14)

4.2 Location

Renal stones located in the lower pole of the kidneys which are symptomatic and/or increasing in size on follow-up can be considered to be treated with ESWL monotherapy. However, patients need to be counselled on the expected stone free rates of < 50% of ESWL monotherapy vs 90% with PCNL. (Ref 15-26)

An alternative option to manage lower pole stones is retrograde URS with success rate at 80%. (Ref 50-51)

4.3 Composition

If stone composition is known beforehand, the calcium phosphate monohydrate (brushite) or cystine (esp > 1 cm in maximal length) then patients should be counselled on low stone free rates (>50%) with ESWL monotherapy and PCNL should be considered as a first line treatment modality. (Ref 27-29)

4.4 Use of Stent

In general, stents should be considered by the attending urologists when dealing with sizeable stones in patients with solitary kidney.

4.5 Special situations

4.5.1 Staghorn calculi

For the management of staghorn calculi, ESWL monotherapy should not be the first line treatment choice, but the combination of PCNL and ESWL should be utilised. (3-14)

As most staghorn calculi are struvite in nature with varying amounts of calcium, a more aggressive approach may be warranted. (Ref 30-32)

Open surgery may be considered for large and complex staghorn calculi.

4.5.2 Calculi in calyceal diverticulum

Not all calyceal diverticulum with stones are symptomatic and require operative intervention. Indications for operative intervention will include chronic pain secondary to diverticulum, recurrent urinary tract infection, gross haematuria or evidence of progressive renal damage.

Percutaneous management of calyceal diverticulum is the most effective approach for rendering patient with calyceal diverticulum stone free and for achieving diverticular ablation. (Ref 33-35)

4.5.3 Role of Laparoscopy

For renal pelvic stones, calyceal diverticulum stones, stones in anatomical variance (eq. Horseshoe kidney), laparoscopic surgery offers another minimally invasive alternative to open surgery. It is however investigational at present and limited to specialized laparoscopic centers. (Ref 52-54)

5 Management of ureteric stone

5.1 Probability of Spontaneous passage

Stones ? to 0.5 cm in transverse diameter that do not pass spontaneously within 4 to 6 weeks or a reasonable period and / or are causing recurrent symptoms should be considered for ESWL monotherapy. (Ref 39-42)

Stones > 0.5 cm in transverse diameter should be considered for treatment as the chance of spontaneous passage is low in stone of this size.

5.2 Stone of 1cm or less in proximal ureter

As a guideline ESWL monotherapy is recommended as first line treatment for most patients with this stone. In event that the shockwave therapy fails, then the option of a PCNL or ureteroscopy and intracorporeal lithotripsy would be acceptable second line procedures. Open surgery should only be considered in standard patients as a salvage procedure.

5.3 For stone > 1.0 cm in proximal ureter

In dealing with larger stones in upper ureter, ESWL, PCNL and URS are all acceptable treatment choices but URS may become less appropriate as the stone encountered becomes larger. However, improvement in laser technology makes it more acceptable as first line modality in certain areas with appropriate facilities. An open surgery should again not be a first line treatment in most patients with large ureteral

stones but may be appropriated for non-standard patients and it is certainly an acceptable alternative as a salvage procedure.

5.4 For stone of 1 cm or less in the distal ureter

ESWL and URS are both acceptable treatment choices. Blind basketing without fluoroscopy guidewire cannot be encouraged as a treatment option. Open surgery should not be a first line treatment but should be considered as a salvage procedure.

5.5 For stone larger than 1.0 cm in distal ureter

For large stone in the ureter, ESWL monotherapy and / or URS are both acceptable for first line treatment options. Blind basketing is again not recommended and open surgery should be reserved as a salvage procedure

5.6 Type of ESWL machine

Stone along the entire length of the ureter can be considered for ESWL if the lithotripter system with high resolution fluoroscopy is available for reliable stone localization. If the lithotripter system has only ultrasound facilities for stone localisation, distal ureteric stones may have to be treated with URS as a first line modality.

5.7 Use of stents

In general, routine stenting is not recommended as part of ESWL therapy and instead ureteric stone should be treated in-situ and without stents.(Ref 43-45)

6 Contra-indications in the use of ESWL for the management of urolithiasis

6.1 Absolute contra-indications (Ref 54-56)

6.1.1 Pregnancy

6.1.2 Untreated Urinary Tract Infection

6.1.3 Distal obstruction to the stone that cannot be bypassed with a stent

6.1.4 Untreated bleeding diatheses

6.1.5 Non functioning kidney

6.2 Relative Contraindications (Ref 54-56)

6.2.1 High stone burden eg. Staghorn calculus

6.2.2 Abnormal renal anatomy

eg.

- uretero-pelvic junction obstruction
- calyceal diverticulum
- horseshoe kidney

6.2.3 Stone composition – cystine or brushite

6.2.4 Uncontrolled hypertension

6.2.5 Morbid Obesity

7 Contra-indications to PCNL

7.1 The only absolute contra-indication is uncorrected bleeding diathesis.

7.2 In some patients percutaneous access cannot be done safely. These are usually persons with gross organo-megaly such as splenomegaly, or anatomical distortion secondary to such problems as scoliosis, which make access dangerous. CT scan is suggested if PCNL is chosen to plan the access route.

8 Open surgery

Open surgery in general should only be reserved as a salvage procedure for patients suffering from urinary stone disease. However, when facilities and / or expertise is not available, open surgery remains a viable

treatment option with good outcome.

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