Urinary stone disease is a very common disease in human beings with a prevalence rate of up to 10%. Most urinary stones become symptomatic when they fall into the ureter causing pain or obstruction. Since the early 1980s, extracorporeal shock wave lithotripsy (ESWL) has been the mainstay of treatment for urinary stones including ureteric stones, due to its high success rate and relatively non-invasive nature. However, with advances in knowledge and technology, there have been recent changes in therapeutic options for ureteric stones.

Conservative Treatment

It is well known that there is a high incidence of spontaneous passage of ureteric stones depending on stone size and location. Up to 98% of small stones may pass spontaneously. A recent meta-analysis shows an overall spontaneous stone passage rate of 68% for ureteric stones < 5 mm, 47% for stones >5 mm and <10 mm and rarely for stones > 10 mm. Most stones that will pass will do so in 4 to 6 weeks. Various medications have been used to enhance stone passage. A recent meta-analysis shows a significant 29% increase in stone passage rate, a shorter time to stone passage and less analgesic requirement with the use of α blockers. The addition of a corticosteroid may further shorten the time for stone passage.

According to the latest AUA guideline, the prerequisites for conservative treatment of ureteric stones are a stone size < 10 mm, well controlled pain, no clinical evidence of sepsis and adequate renal functional reserve. Regular imaging should be performed to monitor stone progression and to assess upper tract obstruction. Stone removal is indicated in stones > 10 mm and in stones when there is persistent obstruction, failed stone progression, uncontrolled pain or sepsis.

Definitive Treatment

The efficacy of ESWL on the treatment of ureteric stones is related to stone size and stone location. Stone clearance rates range from 74% for stones < 10 mm to 43% for those > 10 mm. Clearance rates for stone located at proximal, mid and distal ureter are 82%, 73% and 74%, respectively. An average of 0.62, 0.52 and 0.37 additional procedure per patient are required for proximal, mid and distal ureteric stone, respectively. Serious complications are rare. It has been found that failure of ESWL in the treatment of ureteric stones is significantly related to pelvic location, stone size > 10 mm, ureteric obstruction and obesity (BMI >30). The strongest independent predictors of failure were pelvic stones and stones >10mm.

Comparing with in-situ ESWL, no improvement with stone clearance rate has been shown with the use of push-back or ureteric stent. In one study the use of stent decreases stone clearance rate significantly. The use of CT scan to measure stone density and hardness can predict treatment success. ESWL should not be used in stones with density > 750 HU as it predicts lower stone clearance rate and requirement for more treatment sessions. A change of practice from the use of fast rate (120/minute) to slow rate (60/minute) has shown to increase the success rate of ESWL significantly with a smaller number of shock waves and less complications. The use of α blocker after ESWL can improve stone clearance rate and decrease the use of analgesic drugs.

ESWL is not suitable in the presence of distal obstruction, coagulopathy, obese patients and in female patients who are pregnant. Furthermore, there are concerns regarding the effects of ESWL on fertility of both sexes in the treatment of distal ureteric stones. Possibility of damage to unfertilised eggs and ovaries has been raised. Although, no definite clinical effect on female fertility has been found, the latest AUA guideline suggests that informed consent should be obtained from women aged 40 or younger. While for men, there is significant deterioration in semen quality, in particular, a higher number of abnormal spermatozoa can be found for up to 12 weeks after ESWL.

With advances in intracorporeal lithotripsy and miniature of ureteroscopes, it has been shown that ureteroscopy consistently gives a high chance of stone clearance in a single procedure. Stone clearance rate is over 86% for mid and proximal ureteric stones and 94% for distal ureteric stones. These rates, in contrast to ESWL, have little variations with respect to stone sizes. Ureteroscopy using holmium:YAG laser can achieve a very high stone clearance rate of over 97% in distal, mid and proximal ureter with only 6% of patients requiring an additional procedure. Overall complication rate nowadays stands at less than 7% with a ureteric perforation and stricture rate of 2% and < 1%, respectively.

Although, ESWL and ureteroscopic lithotripsy are both acceptable treatment options in the latest AUA guideline.
on the management of ureteric stones, more evidence is showing favour towards the use of ureteroscopy with holmium laser lithotripsy, especially in the treatment of distal ureteric stones and stones > 10 mm in size when the disparity between ESWL and ureteroscopy on stone clearance rate is great and difference in complication rate is minimal. Ureteroscopy is particularly indicated in cases when ESWL is technically difficult or contraindicated such as radiolucent stones, stone density > 750 HU, obese patients, anticoagulation or pregnancy. Ureteroscopy is also indicated in failed ESWL as stone clearance rate after initial unsuccessful attempt drops off rapidly from 68% to 46% at first retreatment to 31% for second re-treatment with ESWL. Ureteroscopy should also be favoured in young adults with distal ureteric stones because of the unknown effect of ESWL on fertility.

References