

## The Revolution in Urology

Improvements in technology has made the treatment of urological disorders safer and easier.

Endourology is the branch of urologic surgery concerned with endoscopic procedures which are carried out to visualize or manipulate the urinary tract.

It first emerged as a branch of surgery as far back as 1878 when Maximilian Carl-Friedrich Nitze and Joseph Leiter designed the first cystoscope – an endoscopic tool which allows doctors to examine the urinary bladder via the urethra.

Ureteroscopy, which is also an endoscopic procedure, was introduced around one century later in the late 1970s to help diagnose and treat conditions in the distal ureter, the lowest part of the ureter which is close to the bladder.

Over the years, it has evolved to become the standard minimally-invasive procedure for the diagnosis and treatment of conditions within the upper urinary tract, including those within the upper ureter and the kidney.

Common reasons to carry out an ureteroscopy include urolithiasis (stones), ureteric stricture (narrowing of the ureter), obstructions in the ureter, upper tract transitional cell carcinoma, and upper tract investigation of haematuria (blood in the urine) and lesions.

Twenty years ago only large-bore ureteroscopes were available which resulted in a number of reported injuries to the ureter.

However, improvements in the design of endoscopes in recent years have made procedures much safer and easier to perform.

Smaller caliber semi-rigid ureteroscopes have been developed which have removed the need to routinely dilate the ureteric orifices prior to a ureteroscopy. The ureter can be accessed much easier and the risk of injury has been greatly reduced. However, a significant drawback with this method is the limited view it produces.

To counter this drawback, some ureteroscopes have been developed with a continuous irrigation feature that optimizes the view and prevents proximal migration of stone fragments. The image quality of the classical semi-rigid ureteroscope was compromised by the moiré (honeycomb) effect caused by the use of optical fibers for light transmission. The incorporation of Charged Coupled Device (CCD) chips into the distal tip of semi-rigid and even flexible ureteroscopes has revolutionised the image quality so there is no honeycomb effect, and the image size is greater than that of the standard endoscope on the TV monitor.

The most recent introduction of the flexible video-ureteroscope has extended the realm of endourology in managing problems in the upper urinary tract even further.

Surgeons can now see stones and tumors of the upper ureter inside the kidneys much more clearly while treatment with a fine-bore laser fiber passing through a special channel in the ureteroscope is much easier.

Further enhancements include the use of Narrow Band Imaging (NBI) technology, which provides improved visual contrast of the mucosal surface structures and fine capillary network of the mucous membrane which makes it easier to detect suspicious malignant changes.

More recently the introduction of high-definition TV (HDTV) with the endoscopy system has delivered much higher definition images with increased levels of contrast, details and color than conventional images.

Extracorporeal Shock Wave Lithotripsy (ESWL) is a well known treatment for urinary stones. However, depending on the size, site and number of urinary stones, it can also be managed with ESWL, Ureterorenoscopy (URS), Percutaneous Nephrolithotomy (PCNL), open surgery; or a combination of these treatments.

Urolithiasis is the most common reason for ureteroscopy. Stone-free rates in the distal ureter exceed 97 per cent after ureteroscopy, and 75 to 90 per cent after ESWL.

Ureteroscopy is more invasive than ESWL, while ESWL is likely to require more than one treatment session, and is not as widely available as ureteroscopy.

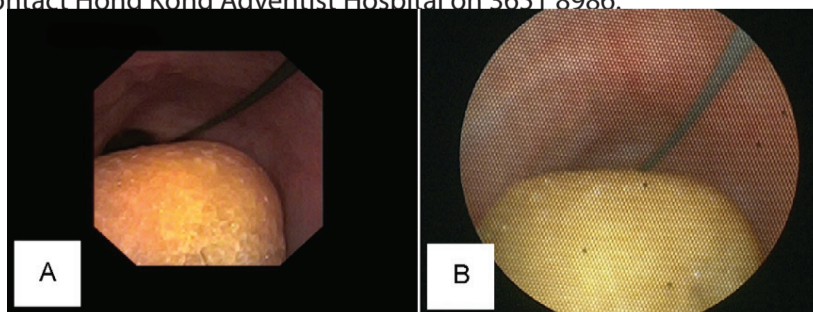
ESWL is the preferred treatment for proximal ureteric stones (ones close to the kidneys), while ureteroscopy and PCNL are salvage procedures carried out after unsuccessful ESWL. Ureteroscopy with holmium laser lithotripsy produces excellent stone-free rates of more than 92 per cent in the treatment of proximal ureteric stones.

The introduction of better designed flexible ureteroscopes has given the surgeon much improved visibility and as a result the use of endoscopic renal surgery is expected to increase tremendously.

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Pictures A and B show the difference in quality in an image of an upper ureteric stone taken with a flexible videoscope and one using a fiberoptic endoscope. Image A has been taken with a videoscope, while B has been taken with a fiberoptic endoscope and clearly shows the moiré (honeycomb) effect.



Narrow Band Imaging (NBI) technology shows more details of the mucosal capillary pattern of this cancer tumor in the upper urinary tract.