

## Brief Synoptic Note on Urinary Catheters in Bladder

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### About the Study

Urethral catheters have been used to drain the bladder from 3500 years ago. Treatment of acute urine retention was known and recorded in ancient Egyptian papyrus since 1500 BC as they used transurethral bronze tubes, reeds, straws, and curled-up palm leaves. The word catheter is inspired by the ancient Greek term "kathetér" which means "to thrust into or to send down". The style of the urethral catheter developed over time and the current familiar balloon based self-retaining catheter was designed by Dr. Frederic Foley in 1929. Before that time, catheters were only used to treat acute urinary retention but now Catheters are used for a number of indications which will be explored in more depth.

The main use of urinary catheter overages was in urine retention (acute or chronic) but now we are using them for various reasons in different specialties. Starting with urology in addition to the previous indication, urinary catheters are used as a treatment for urinary incontinence in males and females. 3-way catheter is used for bladder irrigation in patients with severe haematuria and clot retention, with neurogenic bladder patient indwelling catheterization are used to protect both kidneys from vesical-ureteric reflux [1], injection of intravesical medication like mitomycin or BCG in case of bladder cancer as part of the investigation of bladder function as in urodynamic or in case of bladder injury to perform cystogram to insure the bladder integrity. In the intensive care unit and Coronary Care Unit (CCU), catheters are needed to hourly monitor patients' urinary outputs which would be vital in their management [2]. Moreover, orthopedic patients with limited mobility may need a catheter post operatively. In addition to that catheters are used to assist in the management of perineal or sacral wound in incontinent patients to keep the patient dry which will promote healing, and neurologically impaired patients may need a catheter if other methods of toileting are contraindicated.

### Types of catheters

As catheterisation became more common, different catheter types were developed in response to different indications for catheterisation and different challenges that can be encountered during catheterisation. Different diameter sizes are used to suit most of the patients' urethral diameter and length including all ages [3]. Sizes are starting from 6 FR up to 24 FR and each size has an associated colour near the balloon part

according to international standards for labelling catheters to make it easy to differentiate. There are several catheter types in common use today which we have outlined below:

- **Single lumen catheters:** These do not remain in the bladder and are removed as soon as they have been used. They may be used for intermittent self-catheterisation or for the administration of drugs into the bladder.
- **2-way catheters:** These contain 2 channels; one to inflate the balloon and one to drain the urine.
- **3-way catheters:** These contain an extra channel to allow irrigation from outside in case of haematuria.

### Routes of catheter insertion

The two most common routes for urinary catheter insertion are urethral and suprapubic. For the urethral route, local anesthetic or other lubricant gel is placed into the urethra and the catheter will be inserted into the bladder through the urethra. For an indwelling urethral catheter, the catheter is secured by the inflation of a water-filled balloon (typically 10 ml but can vary depending on catheter specifications). Urethral catheters may be intermittent, short or long term [4]. For intermittent catheterisation, the patient or carer is taught to pass a catheter which is removed immediately after the bladder has been emptied. Whether an indwelling catheter is short or long term will depend on the indication for the catheter and the catheter material. Typically, a latex catheter may remain in place for up to 4 weeks. A silicone (or other long-term catheters) may remain in place for up to 12 weeks before being exchanged [5].

Suprapubic catheters are inserted through the abdomen into the bladder and left *in situ*. Suprapubic catheters can be inserted under general, epidural, or local anaesthesia. There are several indications for suprapubic catheterisation including urethral stricture or injury, traumatic hypospadias from a prolonged urethral catheter [6], bladder neck fibrosis following radiotherapy for prostate cancer, more suitable option for long-term catheter, and patient preference. Although suprapubic catheter has got a lot of indications, it has some contraindications including uncorrected coagulation abnormalities due to the high risk of bleeding, previous abdominal or pelvic surgery due to potential bowel adherence of bowel to the bladder which will increase the risk of bowel perforation, and pelvic cancer with or without radiation due to possible adhesions [7].

Catheter insertion is aimed mainly to empty the bladder, but every way of catheter insertion has its advantages and disadvantages. Intermittent catheterisation has the advantage of not having an indwelling catheter and may help preserve patient comfort, body image, and sexual function [8]. A further advantage of intermittent catheterisation is that it is used only when needed with lower rates of urinary tract infection. There are also potential disadvantages of urethral injuries, strictures, bladder perforation, recurrent bladder stone formation, and rare presentation of a missed catheter inside the bladder.

## Conclusion

Urinary catheters are a very important part of medical management almost 25% of hospital admitted patients will need a urinary catheter at some stage for their treatment. There are a few tips to guarantee the highest success rate of blind catheter insertion. Firstly, we should start by injecting 10-15 ml lubricant anesthetic gel into the urethra and wait for 3-5 minutes before catheter insertion as this will anesthetize the urethral mucosa which will facilitate catheterization. Secondly, elongate the penis in the upright position at 60 degrees which is the line of the normal anatomical curve of the urethra. For that we think even with the great evolution in urinary catheters, there is still a greater space for more innovation. Catheters may also be classified according to their tip, as there is a rounded tip with a distal lateral opening to drain clear urine, whistle tip which contains the distal wide opening and allows draining of viscous fluid but increases the risk of trauma.

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