Urinary catheterization 2: technique and managing failure

ABSTRACT

Urinary catheterization is an important procedure that is regularly performed in hospital. All clinicians should have a good working knowledge of urinary catheters and the competence to manage them effectively. This topic is discussed over two articles: the first article focused on indications, and this second discusses techniques and managing failure. Good technique is essential to prevent complications and if problems do occur, these must be managed efficiently to prevent long-term consequences. In some situations, this may require referral to the urology team for more specialized intervention. This article discusses this in more detail to help guide clinicians involved in urethral catheterization.

Urinary catheterization is a common procedure and clinicians will encounter patients requiring catheterization in various healthcare settings. It is important to have a thorough understanding of the procedure, including the technique of insertion, possible complications, and to recognize when to refer for urological intervention.

Techniques

The procedure of urinary catheter insertion can present difficulties and an assistant is therefore recommended.

Catheterization of male patients

After fully explaining the procedure and gaining consent for urinary catheterization, the treatment area should be adequately prepared, and the patient positioned on a firm, flat surface, preferably head down. This discourages contraction of the abdominal, pelvic and sphincter muscles when the catheter approaches the external urethral sphincter, and may help prevent a false passage posteriorly at the bulbar urethra.

The non-touch technique is taught to all those inserting catheters. Catheters in the UK are supplied with protective aseptic sleeves which allow insertion without touching the catheter itself. Hudson and Murahata (2005) showed that the non-touch technique provides a significant advantage in reducing external contamination rates and it is now the recognized method for catheter insertion. This technique is well taught across medical schools and can be found in the *Oxford Handbook of Clinical Medicine* (Longmore et al, 2014).

A sterile field is initially set up and a 'one-handed' technique is used throughout the procedure – one hand touches the unsterile areas on the patient, while the other hand has contact only with the sterile field. First the urethral orifice is cleansed using sterile water. Next, local anaesthesia and lubrication is applied in generous amounts – 2% lidocaine jelly is inserted into the urethral meatus via a syringe and milked proximally down the urethra while occluding the distal urethra. It is recommended to always use at least 20 ml of lidocaine jelly in men to ensure that lubricant reaches the prostatic urethra (often the tightest segment and most difficult to negotiate). The jelly should be left for 2–5 minutes to allow the lidocaine to take effect before attempting catheterization. At this point, before catheter insertion, the first set of sterile gloves is discarded and a new set put on.

When handling the catheter, the end of the sleeve covering the catheter is gradually removed. One hand stabilizes the urethral opening (by holding the penis), while the other hand holds the catheter sleeve. Asking the patient to attempt to cough may help to hold the sphincter open momentarily as the catheter is passed through. The penis should be held vertically straight at 90° with a gentle upward traction to straighten folds that may partially occlude the urethra. When resistance is encountered, the penis can be lowered downwards to assist passage of the catheter through the bend at the bulbar urethra. The catheter is then introduced through the urethra and advanced into the bladder until the 'Y' of the balloon limb is at the external meatus.

It is important to note that catheterization of an empty bladder in male patients is difficult. The urethral sphincter is unyielding when the bladder is empty and it can be difficult to confirm successful insertion when there is no flow of urine. Allow the bladder to fill with urine and use an ultrasound machine (bladder scanner) to check the bladder volume is suitable for catheter insertion. Whenever catheter insertion fails and there is blood at the tip of the catheter, urethral trauma may have occurred, possibly creating a false passage. Subsequent attempts at catheterization are likely to fail or cause more trauma, as the catheter may preferentially pass via the false passage. It is therefore essential to involve the urology team at this stage.

Once urine flows successfully through the catheter, 10 ml of balloon fluid should be introduced to inflate the balloon (further fluid up to 30 ml may be required when inserting a three-way catheter). After the initial passage of urine, 10 ml of urine should be sent for microscopy, culture and sensitivity reporting. The distal end of the catheter can then be attached to a sterile collecting bag and the residual output recorded as the residual urine.

In some cases, prophylactic antibiotic (usually 3 mg/kg gentamicin) may be given. Local trusts have specific guidelines regarding when antibiotics should or should not be given during catheter manipulation. Indications

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often include immunocompromised patients, patients with a known urinary tract infection or a history of infection following previous catheter insertion or removal.

Care bundles are a set of evidence-based practices that aim to improve the quality of care given to patients. As part of the urinary catheter care bundle, the information shown in *Figure 1* should be recorded after the insertion of every catheter, either as a sticker in paper notes or as computerised noting. Ideally the 1-hour post-insertion residual should also be recorded. The urinary catheter care bundle is effective in reducing the rate of catheter-associated urinary tract infection (Venkatram et al, 2010). Catheter passports are also beneficial – these are pocket-sized books recording patient information, catheter details, and patient advice regarding caring for their catheter and where to seek help (Codd, 2014).

Catheter
Date: ..... Time: ..... Hospital number: .....
Indication: _____
If long-term catheter then original indication: _____
Consent Y/N Chaperone Y/N
Procedure:
Performed by: _____
Assisted by: _____
Aseptic technique Y/N
Antibiotics
1. Already on _____
2._____For the procedure
3._____Considered not required
Catheter used (apply sticker/barcode)
Residual urine 1 hour post-insertion:_____ Microscopy, culture and sensitivity sent Y/N
Inserted by: _____

Figure 1. Necessary documentation post catheterization.

Catheterization of female patients

The key principles of urinary catheterization of women are the same as for men, with a few slight alterations. Although the female urethra is shorter (approximately 2.5 cm) than the male urethra, similar sized catheters are often used for both because of the known risks of smaller catheters and to avoid inadvertently using the smaller size in men on the ward.

The patient should be positioned supine with knees and hips flexed. Before starting the procedure, the hips should be externally rotated. A water-based antiseptic (chlorhexidine) is used to clean the labia major, labia minora, clitoris, urethral meatus and vagina. There is no proven benefit of using local anaesthesia in women; instead a water-based lubrication jelly should be applied to the tip of the catheter. This should not be applied at the urethral meatus as lubrication of the meatus may cause insertion difficulty; it can spill onto the labia major and labia minora, making it difficult to spread the labia apart with gloved fingers and therefore can cause further distress for the patient.

In older patients with vaginal atrophy and resorption of supporting retropubic fat, the urethral meatus may be pulled slightly behind the pubic bone and may be visualized better in the full lithotomy position.

Complications

Between 70 and 80% of urinary tract infections in hospitals are attributable to use of an indwelling catheter (Zarb et al, 2012). Bacterial colonization of catheters occurs frequently and does not cause symptoms. It is important to only treat symptomatic urinary tract infections in patients with catheters, not all patients with positive urine dipstick tests. Complications of urinary tract infections include pyelonephritis, renal failure and cystolithiasis. Alternative management strategies that avoid urinary catheterization should always be considered.

Intermittent self-catheterization may be a better alternative to a permanent indwelling catheter. This concept was first pioneered in 1972 by Lapides, who demonstrated that it was an effective and safe method to manage those with urinary retention or incontinence (Hunt et al, 1996). Now intermittent self-catheterization should always be considered in patients with neuropathic bladders or bladder obstructive disorders.

Intermittent self-catheterization involves patient education on self-insertion of a catheter followed by immediate removal. Pilloni et al (2005) established that intermittent self-catheterization in patients with voiding dysfunction reported a 'significantly improved quality of life' following the restoration of continence, reduced daytime frequency, nocturia and urgency. A Cochrane review concluded that intermittent self-catheterization did not reduce catheter-associated urinary tract infections (Prieto et al, 2014). However, the potential improvements in quality of life may make intermittent self-catheterization a good alternative to the permanent indwelling catheter. However, limitations of intermittent self-catheterization must also be considered; it is an expensive alternative, and requires good patient hygiene and organization. Therefore certain patients are unsuitable for this treatment, for example the very elderly.

Urinary sheaths fit around the penis in a similar way to condoms, thus avoiding catheterization through the urethra and reducing risk of infection. Use of incontinence pads in women in place of indwelling catheters reduces the rate of urinary tract infections (Selius and Subedi, 2008), although there is a risk of damp skin and pressure ulcers, which can encourage infection. Meticulous nursing is therefore required, particularly in those who are elderly and frail.

Catheters can be inserted or changed in most patients using an aseptic technique alone, with a short course of prophylactic antibiotics only given if indicated by individual trust or practice guidelines. Prophylactic antibiotics are not used routinely before catheterization.

Urinary catheterization can be challenging in a patient with an enlarged prostate and the

CURRICULUM CHECKLIST

This article addresses the following requirements from the general internal medicine training curriculum:

- Providing continuity of care to medical in-patients, including management of comorbidities and cognitive impairment.

KEY POINTS

- Always ensure catheter insertion is performed using an aseptic technique.
- Recognize complications of catheterization quickly and be able to manage them appropriately.
- Urgent referral to urology is needed in certain cases, such as persistent bypassing, failed catheterization, concerns of a false passage, urethral trauma, meatal stenosis or severe phimosis.

clinician may encounter resistance when the catheter has been inserted about 16–20 cm. The use of a Coudé catheter (with a curved tip) or a larger sized Foley catheter may ease insertion. However, if catheter insertion still fails, immediate referral to a urologist is required to avoid complications from urethral trauma, including false passage formation and future stricture formation. Urologists may use flexible cystoscopy to aid catheter insertion or resort to suprapubic catheterization.

Table 1 lists the indications for suprapubic catheterization. However, complications may be associated with suprapubic catheterization insertion, which can occur both intra- and postoperatively. For example, Ahluwalia et al (2006) reported a 2.4% risk of bowel injury and 1.8% 30-day mortality rate. *Table 2* details specific contraindications to use of a suprapubic catheter.

Catheter blockage is more common in long-term catheters following the build up of sediment in subclinical bacteriuria. Initial management involves flushing the catheter to clear the obstruction; if this fails the catheter should be changed. Commercially available flushing solutions include normal saline, 3.23% citric acid and 6% citric acid. A Cochrane review by Shepherd et al (2017) reported no significant difference of effect between these solutions. If the catheter keeps blocking, it should be changed regularly and good hygiene encouraged. Increasing the size of the catheter may reduce frequent blocking. A valve (e.g. the Flip-Flo valve) attached to the catheter allows intermittent emptying of the bladder and may reduce blockages. Persistent catheter blockages over time may require further investigation and urological referral to consider insertion of a suprapubic catheter.

'Bypassing' is the term for leakage of urine from the urethral meatus around the catheter which may be caused by catheter blockage (managed as above). If this does not resolve the problem, it may be caused by bladder spasm or mucosal irritation. A smaller catheter with a smaller balloon may benefit the patient and an anticholinergic (e.g. oxybutynin) can be prescribed to help reduce bladder spasm. Persistent bypassing of the catheter is an indication for urology referral to exclude other causes, such as bladder calculi. This and other reasons for urology referral are listed in *Table 3*.

Table 1. Indications for suprapubic catheterization

Urethral injuries
Urethral obstruction
Masses obstructing the bladder neck
Benign prostatic hypertrophy
Prostate cancer
Long-term catheterization
Failed urethral catheterization
Severe bypassing
Frequent expulsion of catheters, secondary to bladder contractions
Dementia (i.e. risk of catheter being pulled out)

Table 2. Contraindications to suprapubic catheterization

Absolute	Haematuria
	History of bladder cancer
Relative	Previous abdominal surgery

Table 3. Occasions to refer to urology

Severe phimosis
Meatal stenosis
Urethral traumatic perforation or secondary to stricture
Trauma
Persistent bypassing
High pressure chronic retention
Failed catheterization
Acute urinary retention
Failed trial without catheter
Those with long-term catheters to be considered for a suprapubic catheter, operative management or intermittent self catheterization

Conclusions

Urinary catheterization is required in numerous clinical settings. It is important to learn the correct aseptic technique for insertion and to adhere to this diligently to prevent infection. Complications may also arise from catheterization, so it is essential to be able to recognize these and to know when to involve the urology team. **BJHM**

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