Year 3 MBChB

Clinical Skills Session

Male and Female Urinary Catheterisation

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Male and Female Urinary Catheterisation

Learning objectives

To understand indications for catheterisation
To understand hazards of catheterisation
To understand the principles of ANTT (Aseptic non touch technique)
To be able to carry out catheterisation safely and within Trust guidelines

Theory and Background

Definition of catheterisation

Urinary catheterisation is the process by which a tube (catheter) is inserted into the bladder for the purposes of draining urine, instilling irrigating fluids or drugs, or for urodynamic investigations.

Royal Marsden Clinical Guidelines (2015)

Revision of anatomy and physiology of the urinary tract

The upper urinary tract includes the kidneys and ureters and lower urinary tract - the bladder and urethra.

Kidneys:

- remove waste products from the body
- remove drugs from the body

- balance the body's fluids
- release hormones that regulate blood pressure
- produce an active form of vitamin D that promotes strong, healthy bones
- control the production of red blood cells

Filtration is the mass movement of water and solutes from the plasma to the renal tubule. About 25% of cardiac output goes through the kidneys and 20% of the plasma volume passing through the glomerulus at any given time is filtered. This means that about 180 litres of fluid are filtered by the kidneys every day, i.e. 60 times the plasma volume. Due to reabsorption and secretion about 1.5 litres are excreted as urine.

Ureters:
Most commonly there is one ureter per kidney but about 1% of the population have a partial or complete duplication. Ureter are narrow muscular tubes (normally 30cm long) that carry urine from the kidney to the bladder. A ureter can have varying diameters along its length and has a thick contractile wall. They are retroperitoneal structures with narrowings at the pelvoureteric junction, as they cross the iliac vessels and as they enter the bladder.

Bladder:
This structure’s primary function is to store urine at a low pressure, it is a hollow organ with a layer of detrusor muscle and lined by transitional epithelium. It can normally hold 400-600ml of urine. Micturition is under central nervous system control.

Urethra:
This is the tube that carries urine from the bladder during urination, the urethra in males is approximately 18-20cm long, and in females is 3-4cm long. The proximal urethra is held closed by the urethral sphincter, and this keeps the
urine in the bladder. In males the urethra passes through the prostate. The sphincters can be damaged during catheterisation leading to continence issues, irritation and / or pain, therefore good catheterisation technique is important. In men the urinary catheter balloon sits on the prostate whereas in women is sits directly on the sphincter. Long term urethral catheterisation in women risks erosion of the urethral sphincter causing problems with leakage around the catheter and even expulsion of the catheter with the balloon still inflated.
Prostate

The prostate gland is about the size of a walnut, and has 2 palpable lobes and 3 zones, the peripheral zone, central zone and the transitional zone. The prostate encompasses the urethra and if enlarged can cause difficulties during catheterisation.

Indications for catheterisation

Each year urinary catheters are inserted in more than 5 million patients, up to 25% of patients in an acute care setting will have a catheter inserted, but this may be for a short period. Approximately half of hospitalised patients who have a catheter in for 7-10 days develop an infection- Catheter Associated Urinary Tract Infection (CAUTI). Abernathy et al (2017) found that 51% of all E.coli bloodstream infections originated from the urogenital tract. Before catheterising a patient consider the need for catheterisation and how long the catheter is required to remain in situ.

Some examples of possible indications for catheterisation:

1. **Acute Urinary Retention:** this is an acute medical emergency where the patient has suddenly lost the ability to pass urine. It is extremely painful and requires immediate treatment with catheterisation.
2. **Chronic Urinary Retention:** is the gradual inability to empty the bladder completely which normally results in a residual volume of more than 1 litre. There will normally be a palpable bladder and this condition may have affected renal function. Refer to the Year 2 CBL where the difference between low pressure and high pressure retention and obstructive uropathy was discussed.
3. **Accurate monitoring of fluid balance in acutely unwell patients:** Consider catheterising patients to monitor hourly urine, ensuring that output is greater than 0.5ml/kg/hr to reduce the likelihood of acute kidney injury.
4. **Pre & Post operatively:** if appropriate.
5. **To perform bladder irrigation:** in patients with clot retention or post surgery-eg transurethral resection of the prostate (TURP).
6. **To enable instillation of drugs;** for example chemotherapy.

7. **Urodynamic studies/ investigations**

8. **Epidural:** although not routinely done, may be required if urinary retention occurs as a consequence

9. **Patients with a spinal injury**

10. **To measure residual urine** (the post void residual volume PVR or the amount of urine left in the bladder following micturition); Larger volumes could indicate lower urinary tract dysfunction and this may be measured in urodynamic testing.

11. **Patient comfort:** This is not done routinely but may be considered eg; maintaining skin integrity in patients with urinary Incontinence who are receiving palliative care.

**What to consider:**

- Is there a need?
- What are the risks, is there increased infection risk?
- Consider the type of catheter required or if the patient has had catheters previously.
- Consider how long the catheter should remain in situ.
- Consider any medications that the patient is on, eg; Warfarin/ alpha blockers etc.
- Has the patient had any recent trauma, eg; urethral trauma, or pelvic trauma?
- Is the patient at risk of autonomic dysreflexia (see below)?
- Anatomy, eg; urethral strictures/ enlarged prostate.
- Allergies, especially Latex.

**Some complications that can arise from catheterisation:** below are a list of some potentially life altering complications of catheterisation that need to be recognised;

- Infection
- Trauma
- Haematuria
- Creation of a false passage
- Urethral stricture/ abcess
- Epididymitis
- Prostatitis
- Balloon inflated in uretha
- Catheter blockage – due to debris
- Urine bypassing catheter – due to bladder spasms
- Paraphimosis – if the foreskin is not replaced following catheterisation
- **Autonomic Dysreflexia:** This condition is unique to patients with spinal injuries above T6, it is a vascular reflex which occurs in response to stimulus from the bladder or other internal organs below the level of the
lesion, it is potentially life threatening and is considered a medical emergency. The blood pressure increases rapidly, the patient complains of headaches, sweating and they can become bradycardic.

Types of Catheter

1. **Male or Female/ Length:** many trusts often have only male length as inflating the balloon from a female catheter in a male’s urethra causes significant trauma.
   - a. Male catheters are classed as standard or male length and they are often 40-46 cm long
   - b. Female catheters are shorter often 20-26 cm long

2. **Use of catheter**
   - a. Intermittent/ single use catheters often used for self-catheterisation and instillation of drugs many different types available.
   - b. Short term indwelling catheters, these tend to be used for surgical procedures, or urine output monitoring and are in situ for less than 28 days. Some materials used for short term are; silver coated/ plastic/ PVC or PTFE coated catheters, and less commonly Latex or coated Latex.
   - c. Long term indwelling catheters are catheters that stay in for more than 28 days and can stay in up to 12 weeks. They are designed to cause less irritation, they are made from materials like silicone, silver alloy, or hydrogel or polymer coated catheters. Consider that many coated catheters contain latex.
   - d. 3 way catheters, is a catheter with 3 lumens, one for urine drainage, one for balloon inflation and one that allows bladder irrigation or drug instillation. These are often used for patients with clot retention, post urological surgery and much less commonly to instill warmed fluids in a hypothermic patient.
3. **Size of Catheter:** The external diameter of catheters are mostly measured in Charrière or French scale often written as CH/Ch or FR or F. One Charrière is 1/3mm.

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Choosing the right diameter is dependent on a number of factors including patient’s condition/ gender/ previous catheters. However Norton (1996) stated that the smallest diameter that allows urine drainage should be used.

- a. For patients, a general rule is 10-14 Ch for clear urine drainage
- b. 14-16Ch for urine containing debris
- c. Greater than 18 Ch for haematuria or if the patient is passing clots, or if the patient requires a 3 way catheter.

4. **Balloon Size:** Most catheters are marked and inform clinicians how much water should be used. Many catheters now come with a pre- filled syringe of sterile water, if no syringe is available this will need drawing up, using sterile water for injections. Normal Saline cannot be used as it forms crystals in the balloon channel leading to blockage and an inability to deflate the balloon.

- a. Most routine catheters have balloons requiring 10ml of sterile water for injection.
b. Single use or intermittent catheters do not have a balloon—see the female example on right.

c. Some require 15ml
d. 3 way catheters often require 30ml of water to inflate the balloon.

Some examples of balloons;
The balloon has to sit in the neck of the bladder and must not be inflated in the urethra.

Balloons should be inflated with the amount stated on the catheter, otherwise uneven inflation can occur which can cause damage to the neck of the bladder, due to uneven pressure load.

5. **Catheter tips:** Some examples;
   
   a. **Whistle Tip:** A catheter with larger and more openings allowing better drainage of clots and sediment.
   
   b. **Standard Tip:** A straight catheter with drainage holes and a rounded tip.
   
   c. **Tieman or Coudé Tip:** The curved tip can often better bypass obstructions, such as an enlarged prostate.

**Procedure**

Check local Trust policy and adhere to their policy. There will be variation in practice from Trust to Trust.

On first meeting a patient introduce yourself, confirm that you have the correct patient, with the name and date of birth, if available please check this with the name band, written documentation and the NHS/ hospital number/ first line of address.

Check the patient’s allergy status, being aware of the equipment you will be using in your examination, especially Latex, Lignocaine, and Chlorohexidine Gluconate. Ensure the procedure is explained to the patient in terms that they understand, gain informed consent and ensure that you are supervised, with a chaperone in attendance. Don personal protective equipment, apron and sterile gloves.

**Patient Safety**

- Introduce yourself
- Check the patient’s identity including allergies
- Explain what you want to do
- Gain informed consent from the patient
- Consider an appropriate chaperone
- Adequate exposure maintaining dignity
- Position the patient appropriately – moving and handling
- Wear Personal Protective Equipment as required
- Wash your hands before and after you touch the patient (WHO guidelines)

**General Precautions**

Do not attempt if there is meatal bleeding or suspected urethral rupture following trauma.

The risk of infection or bacteraemia is high with any catheterisation and a urinary tract infection (UTI) in catheterised patients accounts for up to 40% of all hospital infections. (Tambyah and Maki (2000)

Patients at special risk (e.g. heart valve disease or replacement) may need prophylactic antibiotics immediately before catheterisation.

And consequently a strict aseptic non-touch technique (ANTT) is mandatory, this must comply with local Trust policy, and NICE guidance.

**Equipment**

- Sterile Catheter pack (usually contains at least; a gillipot, receiver, gauze swabs, disposable sterile sheet)
- Also required;
- Sterile cleaning solution (0.9% Sodium Chloride)
- Alcowipe for cleaning saline
- Sterile Gloves x 2
- Catheter (ideally contains pre-filled syringe of sterile water)
- Sterile anaesthetic lubricating gel
- Plastic apron
- Drainage bag and stand and tape
Female preparation

Lie the patient supine, with their heels together and drawn up towards their bottoms and their knees apart, place a sterile dressing towel/field underneath the patient.

There must be adequate lighting and a chaperone present. Once the equipment is prepared, wash hands and put apron and sterile gloves on.

Separate labia with the fingers of one gloved hand.

Clean the vulva with a saline solution or as per Trust guidelines, use swabs only once and swab from front to back, then discard, do not reverse direction. Repeat the process until the area is clean, patients may wash with soap and water prior to the procedure if required. Insert anaesthetic gel into the urethra, for amount see manufacturer’s guidelines, allow 3-5 minutes for it to take effect. Change gloves for 2nd sterile pair after decontaminating hands.
**Male preparation**

Lie the patient supine

There must be adequate lighting and a chaperone present. Once the equipment is prepared, wash hands and place apron and sterile gloves on. Take a sterile field and tear a hole in the sterile field, place the sterile field over the penis.

Using a folded swab hold shaft of the penis and retract the foreskin if present, clean with saline solution or as per Trust policy, (again patients may wash with soap and water prior to the procedure). Use sterile swabs & clean from the meatus back to the corona, once the swab has encircled the penis dispose and use a new one.

Take the anaesthetic gel and drop a small amount onto the sterile field. Instil a small amount of gel into the meatus to open it up then insert the tip of the syringe all the way into the meatus so it is flush with the surface of the glans. Instil the remaining gel slowly into the urethra for amount see manufacturer’s guidelines. You may see a few different practices, but you can use the thumb of the hand that is encircling the penis to compress the urethra trapping the gel in the urethra, allow gravity to assist and you need to allow 3-5 minutes for it to take effect. You do not have to hold the gel in for 3-5 minutes.

Change gloves for 2nd sterile pair, after decontaminating hands.

**Catheterisation**

Apply sterile gloves

Insert catheter into the urethra with the non-dominant hand separating the labia or holding the penis. (This is a non-touch technique)

Gently feed the catheter along the urethra using a sterile gloved hand (only touching the plastic wrapping), depending on Trust policy there may be sterile forceps available for use on the exposed catheter length. In males hold the penis up vertically and then drop the hands to get round natures u bend at the prostate, if there is resistance at the prostate, there are several ways to help with this; Coude tip catheter, ask the patient to make as if they are urinating and even a gentle cough from the patient may help negotiate the catheter past the prostate. (Head 2006, Willette et al 2012)

Confirm entry into the bladder by draining urine and advance catheter to the hilt in males, in females once drainage confirmed advance a further 3-4 cm to ensure that the balloon is in the bladder.

You may connect the bag at this point (in some Trusts it is already connected), or may take a sample for urinalysis, this may be sent for MSU. If this is a change of catheter then do not dipstick the urine as it will be colonised, if there
is clinical suspicion of infection a CSU should be sent and empirical antibiotics given according to local guidelines or microbiological advice. Please follow Trust policy.

Be aware that with acute retention, urine evacuates very rapidly once the catheter is successfully placed so you may wish to have a receptacle to collect urine or a bag available. 

Inflate the balloon by instilling the recommended volume of sterile water in the pre-filled syringe (or the amount stated on the catheter) which is found in the catheter pack. Gently pull tubing until you feel the balloon sitting in the neck of the bladder.

Connect the catheter to a drainage bag and replace the foreskin in male patients (if present) to prevent paraphimosis (see below).

Dispose of equipment and decontaminate hands.

Check on patient 15 minutes after catheterisation to record residual volume of urine and, if the patient is unable, ensure that the foreskin has not retracted due to swelling.

**Troubleshooting**

In the male:
The penis should be held at a slight stretch to pull the urethra straight, in most cases this is done routinely, but if you are having problems ensure that you apply a slight stretch vertically to the penis inserting the catheter vertically down into the urethra gently are far as it will go and then move the penis down towards the legs to a more horizontal position, this helps negotiate the kink in the urethra. If this fails, call senior help. Do not apply excessive force. Always replace retracted foreskin to avoid paraphimosis (condition where the foreskin cannot be returned over the glans (penis) once it has been retracted).

Always replace retracted foreskin to avoid **paraphimosis** (condition where the foreskin cannot be returned over the glans (penis) once it has been retracted).

If no urine obtained insert catheter up to the bifurcation and **DO not inflate the balloon unless urine is draining**, call for help if required.

In the female:
If catheter is misplaced into the vagina (this is used as an anatomical marker), leave in situ until correct placement of a new catheter

**DO not inflate the balloon unless urine is draining**, call for help if required.
**Paraphimosis Treatment:**
Follow trust guidelines, however paraphimosis requires prompt treatment, the condition can cause gangrene or necrosis of the glans in severe cases.
Consider-
- Lubricating anaesthetic gel
- Cold compress for short periods
- Glucose concentrate soaked gauze with lignocaine lubricant for 1 hour (Fu et al 2016)
- Dorsal slit, by experienced clinician
- Emergency circumcision

**Ultrasound/ Bladder Scan**
Currently the use of ultrasound to confirm urine is present or the amount of urine present is recommended as part of some Trust’s policies prior to catheterisation (Be aware of local Trust policy and ultrasound manufacturer’s guidance.)

**Securing the catheter/drainage bag**
The catheter bag must be positioned to allow free drainage and valves must not be allowed to touch the floor, but it must be positioned below the level of the kidneys and bladder. All patients should be given a support strap which is fixed to the upper thigh and secures the catheter so that the catheter bag does not pull directly on the bladder neck. Ensure the catheter is secured either to a bag and stand or to patient’s leg as per Trust policy, it must not be taut and the position should be changed frequently to avoid pressure sores. All tubing should avoid having kinks as this can cause pooling and may lead to infection. Smaller bags may be attached to the patient’s leg.
Changing the catheter/drainage bag

Adhere to current Trust policy & manufacturer’s instructions.

Leakage of urine from around the catheter

This is often known as bypassing, there are multiple causes, some are listed below, if you are unsure, always request help from a supervisor or senior member of staff.

Some causes;
- Kinked tubing
- Restrictive clothing
- The patient is constipated
- Confusion of the patient
- Irritation caused by the balloon- (the balloon may be reduced slightly to observe for improvement)
- Blocked catheters, eg; infection/ blood/ sediment etc.- (the catheter will most likely need changing)

General catheter care

This should comply with current Trust policies e.g;

Encourage good meatal care

A good fluid balance should be maintained

Routine catheter change – as per Trust policy. Maintain the closed system and empty the bag to maintain flow. The bag should be emptied minimally using ANTT to reduce infection, some Trust’s request sterile gloves be used.

ANTT

Antibiotic care – prophylaxis, see NICE guidance.

Documentation:

Each trust will have different documentation charts or ways of recording, however as a minimum document the information below;

- Catheter Type
- Catheter Size
- Balloon Size
- Batch No
- Expiry Date
- Date of insertion
- Reason for catheterisation
- Any difficulty on insertion
- Residual Volume (after 15 minutes)

**Catheter Passport**

NHS Improvement have developed a catheter passport and this should be given to all patients who have catheters inserted. It documents important information about the catheter and is a multidisciplinary team document.

**Taking a catheter specimen of urine (CSU) from catheterised patient.**

A CSU should only be taken if the patient is showing signs of a catheter associated urinary tract infection (CAUTI). Do not take urine from the bag for testing, please use the needle free port. Clean the port with alcohol and allow to dry before taking sample, (please see Shepherd 2017). Do not dipstick urine from catheterised patients, within 24 hours of catheterisation all patients will be colonised and so dipstick will almost invariably be positive. Follow Trust guidance.

Below images supplied and permission granted by B. Braun Medical Ltd

![Needle free collection port](image)

This is a really good free resource and you may consider completing it, it is an on line education package, however it may take a while; [https://www.nationalcathetereducationprogramme.org/courses/the-secret-life-of-catheters](https://www.nationalcathetereducationprogramme.org/courses/the-secret-life-of-catheters)

**Further reading / information**

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   FRCS(Eng); Harper, Simon J.F., MB, ChB, BSc, FRCS, MD; Saeb-Parsy, Kourosh, MA, MB, BChir, FRCS, PhD;


