Learning objectives
What you should know
- What is the bladder catheterization
- The purpose of the bladder catheterization
- Know the necessary materials for the bladder catheterization
- The technique of the bladder catheterization in men
- The technique of the bladder catheterization in women
- What incidents might appear

What you should do
- Prepare the necessary
- Perform the bladder catheterization for men
- Perform the bladder catheterization for women
- Enumerate the possible complications

Definition
The bladder catheterization is the procedure through which a catheter (probe, tube) is introduced through the urethra in the urinary bladder. The catheter allows the evacuation of the urine from the bladder. The procedure performance must strictly respect the aseptic measures.

Indications
The bladder catheterization is necessary or useful in various situations:
- Acute urine retention usually produced by:
  - Prostate adenoma or cancer
  - Bladder tumors
  - Intra-bladder bleeding (obstruction through clots)
  - Urethral strictures
- Evacuating the bladder during surgeries and after them:
  - Gynecological surgeries
  - Long surgeries
  - Urological surgeries at the level of urethra, prostate and bladder
Monitor diuresis:
- In the post-surgery period
- For patients with altered excretory function (shock, dehydration, kidney failure)

Patients’ care:
- Patients in coma
- Patients with urinary incontinence

Taking a urine sample:
- The urine sample for urine culture can be contaminated by cutaneous germs at women; sampling by bladder catheterization eliminates the risk of contamination
- This procedure is usually not necessary for men, because the risk of contamination is lower

Intra-bladder administration of certain medicines:
- BCG (bacillus Calmette-Guérin) – in bladder cancer
- Mitomicyn C – in bladder cancer

The bladder lavage:
- For example: fragmentation and elimination of the blood clots in case of intra-bladder bleeding

Contraindications
- Traumatic urethra lesion
  - The urethra lesion is suggested by
    - The injury mechanism (pelvic injury, „in saddle” fall
    - Bleeding through the urethral meatus or perineal hematoma
  - In such situations we make retrograde urethrography
    - If the urethral lesion is not confirmed (the urethra is intact) you can perform the catheterization
    - If the urethral break is confirmed, then surgical reparation is necessary; the catheter will be placed during surgery and kept until the healing of the urethral suture
- Sometimes the bladder catheterization cannot be performed because of a tight urethral stenosis (prostate adenoma, urethral stricture)
  - Pushing the catheter by force would lead to bleeding or creating a false path (getting the catheter through the urethra wall or through the prostatic parenchyma)
In these situations the bladder catheterization is replaced by puncture and suprapubic catheterization of the bladder.

- In case of patients in coma, it may be necessary to evacuate the urine through the catheter.
  - Placing a permanent catheter has urinary infection risk.
  - To reduce the infection risk other options can be used:
    - Discontinuous bladder catheterization
    - Using a special condom (with an extension where the collecting bag is attached)

**Anatomy and physiology elements**

- At men the urethral meatus is situated at the level of the gland, the urethra is long and it has three parts:
  - Spongy urethra – surrounded by a spongy body.
  - Filmy urethra – with a role in voluntary continence.
  - Prostatic urethra – with a role in involuntary continency.
- The urethral obstruction appears at the level of the prostatic urethra most frequently.
- At women the urethra is short, the urethral meatus is situated at the level of the vaginal vestibule, posterior of the clitoris, anterior of the vagina.

**The urinary catheters**

The urinary catheters are made of rubber or plastic, simple or autostatic.

- The simple catheters (Robinson, Nelaton, Tiemann) are used for unique or discontinuous evacuation of the bladder; they are not suitable for permanent catheterization because their fixing (with adhesive strip) is difficult and unsafe.
- The autostatic catheters have a fixing mechanism:
  - Balloon – which is swollen with physiological serum (Foley catheter)
  - Collar – close to the catheter head (Pezzer catheter, Malecot catheter); these catheters are placed during surgeries and are not used for catheterization.
**Figure 1.** A. The balloon of the Foley catheter ensures the fixing in the bladder. B. Pezzer catheter

- The Foley catheter is used most often for bladder catheterization
- It’s made of silicone rubber and it has an inflatable balloon which ensures the fixing of the catheter
- It has 2 lumens:
  - The urinary lumen, through which the urine flows
  - The accessory lumen, which inflates /deflates the fixing balloon
- The Foley catheter
  - Has a rounded head, and 2 lateral holes next to the head through which the urine flows
  - At one end it has a larger part where the collecting bag is attached
  - Swelling the balloon is made with the syringe through a catheter extension, with an internal valve
- There are also Foley catheters with 3 paths, used for urinary lavage:
  - A path for irrigation, through which the washing liquid is introduced (sterile physiological serum, drug solutions)
  - The evacuation path, through which the urine/lavage liquid is eliminated
  - The path for inflating the balloon
- Robinson și Nelaton catheters
  - Are made of plastic or rubber
  - Have a straight head, rounded and with lateral holes
- Tiemann catheter
  - Is made of plastic or rough rubber
  - Has a curved and 1-2 lateral holes
  - It is used for intubating the patients with tight uretral stenosis, which does not allow the passage of other catheters
  - The thickness (diameter) of the catheters is expressed in Charriere units:
    - 1 Ch = 0.33 mm
- On the Foley catheter and on its packaging you can read:
  - The size of the catheter in Charriere scale
  - The maximum volume of physiological serum with which the volume is inflated (in milliliters)
• The Foley catheters are packaged sterile in double packaging:
  o The exterior packaging is made of nylon and waxed paper the interior packaging is made of transparent nylon
  o The interior packaging allows the handling of the catheter even when we do not use sterile gloves, touching just the packaging, not the catheter (this technique is not described here)

**Necessary materials**
• Two sterile fields, of which one is fenestrated
• Sterile clip (Péan, anatomic clip)
• Sterile gloves
• Sterile lubricant
  o Most often we use lidocaine gel
    ▪ This is packaged in a sterile plastic vial
    ▪ By squeezing the vial the gel is released
  o Instead of this gel we can use a sterile oil
• 3 sterile pads
• Non-irritative antiseptic for the mucosa (for ex. Betadine)
• A syringe with sterile physiological serum for filling the balloon
• Filling the syringe in such a way as to preserve sterility; the technique is described below:
  o The operator wears sterile gloves; the help handles the non-sterile instruments
  o The help opens the syringe
and needle packaging; these are taken over by the operator

- The help holds the vial of physiological serum. The operator punctures the vial lid
- The operator aspires the serum into the syringe
- The help fixes the needle while the operator is detaching the syringe from the needle by spinning it slowly

- The Foley catheter
- The collecting bag – is packaged sterile and has …
  - … a piece for attaching to the catheter
  - … an anti-reflux valve
  - … a device for evacuation, provided with an opening / closing mechanism

**Patient preparation**

- The patient is explained the procedure
- Obtain the patient’s verbal consent
- The patient is required to adopt the position:
  - Man: in dorsal decubitus
  - Woman: in dorsal decubitus with the inferior limbs flexed and apart in abduction
- Sanitizing the urethral meatus involves:
  - Oiling the meatus and the gland with betadine – for men
- Oiling the vaginal vestibule with betadine – for women

**Materials preparation**
- The person who performs the catheterization washes hands, then puts on sterile gloves
- The help opens the packaging of the other materials and presents them to the operator, and the operator takes them over
- Apply a sterile field on the working table where you place the other sterile materials:
  - A fenestrated field
  - A sterile clip (Péan or anatomic)
  - 3 pads
  - A vial with lubricant
  - A syringe of 20 ml with a needle of 18 - 21 G in which the serum for the balloon will be aspired
  - Collecting bag

![Figure 9. Preparing the materials](image)

- Attach the collecting bag to the catheter
  - It is not compulsory, but it makes the procedure easier (the urine drains directly into the bag)
- Aspire the serum into the syringe to fill the balloon – the technique described above
The bladder catheterization for men

- Apply the fenestrated field over the patient’s pelvis
- The one who performs the procedure stays on the patient’s right
  - The penis is held with the left hand
  - The catheter is introduced with the right hand
- The penis is held with the left hand at approx. 45° (traction at zenith)
- Remove the foreskin
- Attention! The left hand becomes non-sterile. Do not touch other materials until you finish introducing the catheter.

- Oil with betadine the urethral meatus and the foreskin:
  - The pad with antiseptic is held with the right hand with the fingers or with a sterile clip
  - Oil the urethral meatus and the gland three times, with three successive pads, first
the meatus and the gland from the meatus to the periphery

- Apply the lubricant
  - Insert the head of the lubricant vial in the urethral meatus and introduce the lubricant in the urethra by compressing the vial
- Alternatively the lubricant can be applied on the tip and along the catheter
- Introduce the Foley catheter:
  - Grab the catheter at 3-4 cm from the head either with the right hand or with a sterile clip
  - The head of the catheter is introduced through the urethral meatus
  - The catheter is introduced progressively (about 2-3 cm at one push)
  - After the urine appears, the catheter is pushed 3-4 cm more for the balloon to be entirely in the bladder

- The urine drips through the catheter and accumulates in the collecting bag
- Inflate the catheter balloon:
  - The syringe with physiological serum is attached to the balloon tube pushing until it overcomes the valve resistance, then the liquid is injected
  - The volume introduced should not exceed the balloon capacity, which is written on the collecting piece of the catheter
- Pull the catheter gently until you sense resistance (the balloon stops at the level of the col
- Reposition the foreskin
Figure 15. Inflating the balloon. Pulling the catheter. Repositioning the foreskin

- Remove the sterile field
- Fix the collecting bag at the patient’s bag
- Remove the gloves, then cover the patient with the blanket or the sheet; make sure the patient is fine; wash the hands
- Note in the observation sheet:
  - The procedure, maybe also the catheter used (type, size)
  - Incidents – if it is the case
  - The volume if physiological serum which was introduced in the balloon

Bladder catheterization for women

- The operator stays on the patient’s right
  - With the left hand he reveals the urethral meatus
  - With the right hand he introduces the catheter
- With the left hand he separates the labia
  - In this way the vaginal vestibule is exposed and the urethral meatus can be seen
  - Attention! The left hand becomes non-sterile; you won’t touch other materials until you finish introducing the catheter.
- Oil with betadine the vaginal vestibule and the urethral meatus
- The pad with antiseptic is used with the right hand – with the fingers or a sterile clip
Insert the Foley catheter
- Grab the catheter at 3-4 cm from the head either with the right hand or with a sterile clip
- The head of the catheter is introduced through the urethral meatus
- The catheter is introduced progressively (about 2-3 cm at one push)
- After the urine appears, the catheter is pushed 3-4 cm more for the balloon to be entirely in the bladder
- The urine drips through the catheter and accumulates in the collecting bag

Inflate the catheter balloon:
- The syringe with physiological serum is attached to the balloon tube pushing until it overcomes the valve resistance, then the liquid is injected
- The volume introduced
should not exceed the balloon capacity, which is written on the collecting piece of the catheter

- Pull the catheter gently until you sense resistance (the balloon stops at the level of the bladder col
- Fix the collecting bag at the patient’s bag
- Remove the gloves, then cover the patient with the blanket or the sheet; make sure the patient is fine; wash the hands
- Note in the observation sheet:
  - The procedure, maybe also the catheter used (type, size)
  - Incidents – if it is the case
  - The volume if physiological serum which was introduced in the balloon

**The bladder lavage**

- Consists in introducing a liquid in the bladder and evacuating it immediately through the bladder catheter
- The lavage is made for:
  - Evacuating the blood clots
  - Evacuating debris (pus, necrotic tissue )
  - Taking cells for cytological exam (rarely)
  - Reducing bacteria for patients with low urinary infection (rarely)\(^1\)
- The lavage can be made using a common Foley catheter or (preferably) a Foley catheter with 3 paths
- The lavage with Foley catheter with 2 paths
  - Introduce 100 - 200 ml of solution (with a 50-60 ml syringe or a physiological serum bag and an infusion set) respecting the aseptic rules
  - Evacuate the liquid
  - Repeat the procedure until you obtain a clear liquid – in case of bleeding or detris; for the other situations you should use a total of 500 ml solution
- Lavage with Foley catheter with 3 paths
  - The lavage liquid is introduced on the entrance path
  - The liquid gets out through the evacuation path

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\(^1\) Use physiological serum, acetic acide 0.25% or a solution combined woth neomicine – polimixine B (40 mg/ml – 200000 U/mL), but the efficiency of the method is reduced.
**Incidents and accidents. Complications**

- The impossibility of performing the bladder catheterization
  - A tight urethral stenosis can make the catheterization difficult or impossible
  - You should try a Tiemann catheter; if it does not work you should make a suprapubic puncture and percussive cystostomia
  - Forced introduction of the catheter can lead to a „false path”

- Urinary infection
  - It is essential to respect the aseptic procedure strictly
  - The permanent catheterization has high infection risk; the risk is higher for women

- Urethra lesion
  - Can cause bleeding
  - During healing can lead to urethral stricture

- Urethra perforation and creating a false path
  - The catheter can get into the prostatic parenchyma in case of urethral stenosis

- Bleeding
  - In case of prostate and urethra lesion

- Paraphimosis
  - The impossibility of putting back the foreskin after catheterization
### Assessment / self-assessment form

<table>
<thead>
<tr>
<th>Stage / Criterion</th>
<th>Correct</th>
<th>Incorrect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explain the procedure to the patient; request consent</td>
<td></td>
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<tr>
<td>Put on sterile gloves</td>
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<tr>
<td>Apply a sterile field on the table</td>
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<tr>
<td>Place on the sterile field</td>
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<tr>
<td>- A sterile fenestrated field</td>
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<td>- A sterile clip</td>
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<td>- 3 sterile pads</td>
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<tr>
<td>- The lubricate vial</td>
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<tr>
<td>- A 20 ml syringe with needle (for the balloon)</td>
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<tr>
<td>Collecting bag</td>
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<tr>
<td>Aspire the physiological serum in the syringe to fill the balloon up</td>
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<tr>
<td>- Introduce the syringe needle in the vial held by the help</td>
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<td>- Aspire the serum into the syringe</td>
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<tr>
<td>- Detach the syringe in time while the help is fixing the vial</td>
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<tr>
<td>Attach the collecting bag to the catheter</td>
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<tr>
<td>Expose the urethral meatus with the left hand</td>
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<tr>
<td>- Remove the foreskin at men</td>
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<tr>
<td>- Separate the labia for women</td>
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<tr>
<td>Desinfection of the urethral meatus</td>
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<tr>
<td>- The meatus and the gland for the man</td>
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<tr>
<td>- The meatus and the vaginal vestibule for women</td>
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<tr>
<td>Introduce the catheter</td>
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<tr>
<td>Inflate the catheter balloon</td>
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<tr>
<td>Withdraw the catheter until the balloon is fixed on the bladder col</td>
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<tr>
<td>Respect the sterility during the procedure!!</td>
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</tbody>
</table>