



*This document was amended in December 2021 and August 2018 originally to reflect literature that was released since the original publication in August 2017. This document will continue to be periodically updated to reflect the growing body of literature related to this topic.*

## **BLADDER DRAINAGE**

**Key Words:** Urinary retention, incomplete emptying of the bladder, urethral stricture, urethral catheter, Foley catheter, suprapubic tube, hematuria, traumatic Foley catheter removal, Foley catheter malposition

### **Learning Objectives:**

1. Describe the indications for catheter placement (i.e., is the Foley catheter really needed?).
2. Identify various catheter types (including standard 2-way and 3-way urethral Foleys).
3. Outline the standard Foley catheter placement procedure.
4. Discuss tips for managing difficult Foley catheter placement.
5. Recognize common complications of catheter placement.
6. Explain prevention and initial management of traumatic catheter removals.
7. Discuss advantages/disadvantages of suprapubic tubes and the standard procedure for their replacement.

### **Introduction:**

The two fundamental purposes of the bladder are to store and empty urine. If a person is unable to empty their bladder, significant sequelae will result, including but not limited to pain/discomfort, hydronephrosis, renal insufficiency, bladder damage and infection. In settings of urinary retention, obstruction can be relieved with simple drainage of the bladder; this can be accomplished in various ways, all of which must take into account the particular patient's presenting history and clinical situation. Iatrogenic and patient initiated bladder catheterization injuries are a source of significant cost and patient morbidity. Understanding fundamental concepts behind bladder drainage gives the provider the ability to safely manage what can sometimes be an urgent patient care issue.(1-16)

### **1. Indications for Foley Catheter Placement:**

Knowing when to place a Foley catheter is as important as utilizing proper technique for its insertion. Careful patient selection is paramount because catheter placement can be associated with urethral trauma and complications, as we will discuss in ensuing sections. Of note, placement of an indwelling catheter is different from a straight catheterization procedure; the latter involves a catheter that is inserted and then removed for transient decompression and drainage of the bladder or to obtain a clean-catheterized urine specimen. In contrast, an indwelling Foley catheter is semi-permanent to allow for continuous, passive urinary drainage. In general, candidates for an indwelling Foley catheter have the following conditions/ presentations as listed below.

\* Acute urinary retention, defined as the sudden, complete inability to void, is often associated with suprapubic pain and tenderness.

- \* Chronic urinary retention or incomplete bladder emptying is clinically associated with urinary frequency, overflow incontinence, or impaired renal function. It is usually caused by prostatic enlargement, outflow obstruction such as from strictures, or atonic bladder disorders. When present, bilateral hydronephrosis is frequently associated with chronic urinary retention .
- \* Gross hematuria and clot retention have a multitude of possible etiologies, but common causes include prior traumatic Foley catheterizations, prostate enlargement, or a bladder tumor. These patients often require a “3-Way” Foley catheter, which allows for continuous bladder irrigation with simultaneous drainage.
- \* Urosepsis with incomplete bladder emptying.
- \* High voiding pressures (such as from an obstructing prostate , failure of the sphincter to relax, or iatrogenic causes such as anti-incontinence surgeries).
- \* High bladder pressures (patients with neurogenic bladder and high storage pressures)
- \* Bed-bound state if the patient is unable to use a commode/ urinal/ bedpan, such as with altered sensorium or incontinence with skin ulcerations that require topical dryness for healing.
- \* Use in lengthy surgical procedures where it is anticipated that the bladder would otherwise become overdistended and possibly damaged.
- \* Clinical situations where strict fluid inputs and outputs are required and the voiding record cannot otherwise be reliably determined.

**Contraindications to Foley Catheter Placement:**

Urethral catheter placement is absolutely contraindicated in cases of known or suspected urethral injury, such as in the setting of a pelvic fracture. On physical exam, gross hematuria, blood at the urethral meatus, perineal ecchymosis, and a “high-riding” prostate on digital rectal exam are signs that are associated with urethral trauma. A retrograde urethrogram should be performed in these cases prior to any attempt at urethral catheterization. A relative contraindication would be the presence of an artificial urinary sphincter which would need to be deactivated prior to any attempts at urethral catheterization. The most common “contraindication” to Foley catheter placement is actually not having an adequate indication for its insertion in the first place. For example, urinary incontinence by itself is not considered an adequate indication for a Foley catheter in most cases.

**2. The Different Catheter Types:**

Catheters come in sizes that measure the outside circumference in millimeters (mm). which is called the French (Fr) size. The French size as well as the recommended filling volume of the catheter’s retention balloon (in cc or mL) is listed on the plastic cuff of the catheter sidearm (the arm of the Foley where the balloon is inflated). A typical catheter size for an adult patient is 14, 16, or 18 Fr with an associated 5 or 10 cc balloon. In most cases, 5 and 10 cc balloons are exactly the same size so we recommend filling all such catheters with 10 cc of sterile water. Balloons should not be underfilled (i.e. 10cc in a 30cc balloon) as the balloon will not be a spherical shape and catheters may dislodge because of this. The size of the catheter is also denoted by the color of the plastic ring on the balloon port, colors are consistent across catheter brands and types.

Catheter size	10 fr	12 fr	14 fr	16 fr	18 fr	20 fr	22 fr	24 fr
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Plastic ring color	Black	White	Green	Orange	Red	Yellow	Purple	Blue
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Different Catheter Types include:

- 1) Straight Catheters- This is a traditional simple catheter, and often the type that is provided within in-patient catheter insertion kits. Most catheters are made of silicone or latex but some straight catheters are also made from vinyl which tends to be stiffer and more rigid. This is also the type of catheter used for intermittent self-catheterizations and for urethral self-dilations that some patients are asked to perform periodically for urethral strictures.
- 2) Coudé Catheters- “Coudé” is French for the word “elbow,” which is used to describe the curved tip of this catheter. The “Coudé” catheter is particularly useful in men with prostatic enlargement or post-TURP surgery as it allows the tubing to better navigate the natural upwards curvature between the bulbous urethra and prostatic urethra (as opposed to conventional straight catheters, which enter at a straight angle and can cause urethral false passages by trying to tunnel under the prostate). For many, a 16 or 18 Fr coudé catheter is the “go-to” catheter in men with a known history of benign prostatic hypertrophy or any history of prostatic surgery. During placement of a coude catheter the tip of the catheter should be facing pointed towards the ceiling or patient’s face, assuming patient is supine.
- 3) “3-Way” and Hematuria Catheters- These catheters have an extra port for the instillation of irrigation fluid (in addition to the main drainage lumen and balloon inflation ports); they are all thus a type of “3-Way” catheter. The hematuria catheter tends to be more rigid and some even have metal coils spanning the catheter’s circumference to tent open the lumen and facilitate hand irrigation of clots when required. These hematuria catheters also come in larger sizes (22-24 Fr) to prevent obstructions from blood clots; and they have larger associated balloons (approximately 30 cc) to allow for tamponade of the prostate when the catheter is placed on traction. Importantly, as these catheters have three ports, a larger size (20-24 Fr) should be used as the diameter of each lumen is less than the standard two port catheters. In general, hematuria catheters are used when a patient has significant gross hematuria that cannot be easily cleared with hand irrigation alone. Continuous Bladder Irrigation (CBI) is designed to prevent the formation of new, organized clots. The initiation of continuous bladder irrigation, usually in the form of normal saline, requires close monitoring to ensure inputs and outputs are roughly equivalent. CBI should not be started if there is a known, large organized blood clot in the bladder that cannot be evacuated or if the patient has a large bladder perforation.
- 4) Suprapubic Tubes- These urinary drainage catheters require the percutaneous placement of a Foley or similar catheter through the lower abdominal wall directly into the bladder. Although it involves a surgical procedure, placement of a suprapubic tube is often preferred in situations where urethral catheterization is difficult or impossible, or if the patient requires a permanent indwelling Foley. Suprapubic tubes are generally more comfortable for patients than urethral Foley catheters and are easier to change especially in patients with contractures and other bodily deformities. Suprapubic tubes should be heavily considered in women who have a shorter urethral length and can experience urethral erosion with prolonged indwelling urethral catheter use.
- 5) Any catheter can be either of latex (yellow colored) or silicone (clear or blue colored). Silicone catheters should be used in patients with latex allergies or sensitivities. It should be noted that with the some silicone catheters, after inflation of the balloon, upon deflation there

will be an irregular “lip” which can cause discomfort upon removal. Occasionally this may lead to difficulty removing a catheter. In these cases, instilling 1 cc of air into the balloon may soften the “lip” and allow for easier catheter removal.

### **3. Standard Technique for Adult Foley Catheter Placement:**

Standard sterile technique for placing a Foley catheter involves the following steps.

1. Identify yourself and explain to the patient what you are about to do and why.
2. Based on the requirements of your facility, you may need to identify a nurse or caregiver to serve as a chaperone for catheter placement. This caregiver can also assist for the procedure and help ensure the patient remains comfortable. Additionally, place an absorbent pad underneath the patient to help prevent soiling the bedding and sheets.
3. Wash your hands and ensure you have properly identified the patient.
4. Make sure you have the right type and size Foley catheter kit, then open it up. Some kits may have extra cleaning pads, soap or prep solution. If so, they should be used to clean the patient’s genitalia at this point. You may use non-sterile gloves for this preliminary cleaning and to reduce the foreskin in an uncircumcised male.
5. Put on a pair of sterile gloves and drape the patient. Start with laying a sterile sheet between their legs and putting on an overlying cover drape with a hole in it, which is centered on the external genitalia. (This second, central drape can be difficult to place and maintain in female patients.)
6. Make sure you have all necessary supplies ready and at hand. For example, open and place the lubricant on the sterile field so it is accessible to the catheter. Remove the cap to the syringe with sterile water and secure it to the balloon port. Open any packaging on the Foley or antiseptic solution applicators. Do not use an antiseptic prep to which the patient has a known allergy and use only pure silicone catheters for patients with latex sensitivity.
7. With your non-dominant hand, separate the labia in a woman or place the phallus on stretch in a male. From this point on, all catheter insertion activities will be done with just one hand.
8. With your dominant hand, clean off the urethral meatus with betadine or the antiseptic cleaning agent provided. This is usually performed three times. Wipe from high to low in a woman; in a male, start at the meatus and, with a circular clockwise/counterclockwise motion, extend the wiping outwards and down the shaft. Do not let go of the penile shaft with your non-dominant hand until the catheter has been completely advanced into the bladder.
9. Grab the catheter near the tip and copiously coat the tip of the catheter with sterile lubricant and advance the tip of the catheter into the meatus.
10. For a male, pull up on the phallus while holding it at 3 and 9 o’clock. It is helpful to initially hold the phallus relatively perpendicular to the patient’s body and then angle the penis downward towards the feet after the catheter has traversed the pendulous urethra.
11. Advance the catheter by grasping it near the urethral meatus and pushing it in gently; about 1 inch at a time, then repeat until fully inserted; in a female this is about 1 inch past the return of urine and in a male this is until the hub is at the meatus. (If the catheter is grasped too far away from the penis, the Foley will buckle and not advance.) There may be some resistance at the level of the membranous urethra or prostate. Most of the time, this can be managed by slow, steady pressure and gently rotating the catheter right and left until the tissues relax and the catheter can pass. Do not force the catheter if it will not pass easily with just gentle pressure.
12. Look for at least some urine return. Press on the lower abdomen/suprapubic region, if there is no urine return, irrigate the catheter using a catheter-tip syringe and 50-60 cc of sterile water or

normal saline. Never inflate the catheter balloon until you have confirmation the tip of the catheter is in the patient's bladder.

13. Inflate the catheter balloon with sterile water (usually 10 cc). We do not use normal saline to inflate the catheter balloon, as salt crystals could theoretically precipitate in the balloon, valve or balloon channel making deflation of the balloon difficult when removing or replacing the Foley.

14. If there is strong resistance to balloon inflation or if the patient indicates pain, stop and check the position of the Foley. This can be done clinically by catheter repositioning or by irrigation of the drainage port.

15. Gather some slack on the catheter and secure it to the patient's leg. Reduce the foreskin in an uncircumcised male. Failure to reduce the foreskin can result in paraphimosis.

### **Important Points:**

\* Never inflate the balloon in a man if the catheter is not fully inserted to the hub. The catheter should stay in place without being held manually. If it tends to push itself out, it may not be properly in place in the bladder.

\* Always expect some urine return if the catheter is in the bladder. Even an empty bladder generally has at least a little urine. If there is no urine return, and the catheter is inserted to the hub, irrigate the catheter lumen with normal saline (as this is safer than sterile water if it extravasates).

\* Balloon inflation needs to be routine; if it is unusually difficult or hard, deflate it, as you may not be in proper position.

\* Once the balloon is inflated, the catheter should be somewhat mobile when pushed further into the bladder. If you cannot move the catheter even a little, the balloon could be in the prostate or pendulous urethra.

\* Always replace the foreskin in an uncircumcised male after the catheter is placed and secured. Failure to do this could lead to paraphimosis, a painful surgical emergency condition.

\* A bladder scan or a bladder ultrasound are ancillary tests that can be used to confirm final catheter positioning and that the bladder is empty.

The New England Journal of Medicine has free public access videos on standard sterile male and female catheter insertion that are very helpful and follow the same procedure as outlined above.

Female: <http://www.nejm.org/doi/full/10.1056/NEJMvcm0706671>

Male: <http://www.nejm.org/doi/full/10.1056/NEJMvcm054648>

### **4. Managing Difficult Foley Catheterizations:**

There are several potential problem areas when attempting to place a Foley catheter that can present difficulties, but there are simple solutions to most of these problems which are outlined below.

#### **Finding the Urethral Meatus: Female**

Identification of the female urethral opening can be troublesome at times due to body habitus, morbid obesity, atrophic vaginitis and retraction of the urethral opening into a tight vaginal introitus. Obesity and body habitus issues can be overcome by the use of Trendelenburg positioning, use of stirrups, good lighting and having sufficient help to provide elevation and exposure of the vaginal area. In many cases, just painting the vaginal area with antiseptic will cause a brief "winking" of the urethral opening which identifies it for catheterization. A vaginal

speculum can sometimes be helpful. A half of a speculum is especially useful in patients with vaginal prolapse. By pushing the prolapsed vaginal tissue into the expected anatomical position, the urethral meatus can be more easily identified. In some elderly ladies, the urethral meatus has retracted into the vagina which is now too tight for a speculum and the opening cannot be directly visualized. In such cases, the urethral meatus can be identified by touch. It will still be at the 12 o'clock position in the vagina and will feel like a button-hole in your lab coat. A coude catheter facing upwards can then be directed at this opening by touch alone. If continued difficulty, one can insert a finger vaginally and then slide a coude catheter over the finger with the tip facing upwards.

### **Finding the Urethral Meatus: Male**

In some obese men, a buried penis may seem a difficult obstacle but this can usually be managed by having an assistant press hard downwards with both hands around the base of the penis. This will depress the fat and subcutaneous tissue exposing the penis for catheterization.

Difficulty in locating the urethral meatus in males is typically from either edema or severe phimosis. Edema can be significantly reduced by continuous manual pressure for about 20 minutes or, preferably, by wrapping a thin (1 inch) elastic "Ace" wrap or similar over a gauze pad around the penis for a similar period of time. This continuous pressure gradually reduces swelling and edema allowing for better visualization. (The same technique can be used to reduce the edema from a paraphimosis allowing it to be reduced manually.) A tight phimosis may not allow direct visualization of the urethral meatus. In such cases, a small catheter or coude tipped Foley can often be passed through the phimosis and then manipulated into the urethral meatus by touch. In the unlikely event that the phimosis is too tight to allow any catheter, then a bedside surgical dorsal slit procedure may need to be done by a urology team member.

### **Distal Urethral Strictures and Meatal Stenosis in Men**

You've found the urethral opening but you cannot get the catheter into the meatus or it only goes 1-2 cm and then stops. Most likely you are dealing with a stricture of the meatus (meatal stenosis) or the very distal urethra (fossa navicularis). The first thing to try is a 12 French Silicone Foley catheter. Silicone catheters are relatively stiff and have narrow walls providing a reasonably good drainage lumen even from such a small catheter. Once passed, the catheter can be changed to a larger size every 24-48 hours which will gently dilate the stricture painlessly. If not successful, then some type of dilation procedure will be needed. In general, dilation with balloon dilators or metal sounds should be left to the Urologists, but there is one technique that can be tried before giving up.

An 0.035" guide wire is frequently able to slip through the narrowed distal passage. If so, then this can be followed with a "12 French Nottingham" or similar ureteral dilator available from most operating rooms and Urology emergency carts. If this dilator can pass the obstruction by just one or two centimeters, it should then be possible to pass the 12 French Silicone Foley catheter. The guide wire can also be used to help stiffen the silicone catheter, if necessary. If this fails, you will probably need to call Urology for help.

### **Proximal Urethral Obstruction in Men**

Proximal urethral obstruction in men could be from previous infections, instrumentation, surgery, scarring, trauma, false passages or cancer. Rarely is it due to BPH alone. When encountered, the most important thing to remember is not to force the catheter too hard! The

natural tendency is to push harder and try to make it go in, but this is only likely to create a false passage and make it more difficult to actually get the Foley safely into the bladder.

The optimal solution at this point is to use a Direct Visual Imaging Foley Catheter System such as “Percuision”, if available. This instrument uses a specially designed catheter that includes a fiberoptic light source and camera. This is attached to a mobile cart with a processing unit and monitor so the operator can visually see the progress of the catheter and whatever the difficulty or obstruction might be. Most of the time, this is sufficient to allow successful passage of the catheter. Since “Percuision” is just a standard Foley catheter placement procedure albeit with improved visualization and imaging, it can be used by nurses, mid-levels, hospitalists, residents, general physicians or anyone who is authorized to place a Foley catheter. Its use will substantially reduce unnecessary patient urethral trauma, pain, bleeding, length of stay and catheter associated urinary tract infections (CAUTIs). If no “Percuision” unit is available, the first thing to try is usually a 16 or 18 French coude catheter. This catheter has a slightly rounded ball tip and a curve. To insert, the curve should always be facing upwards or ventrally. Most of the time, this orientation will allow safe passage but again it should not be forced.

The urethra can be prepped with 10 – 20 cc of Lidocaine Jelly or plain lubricant injected via Toomey syringe. A gentle rocking or twisting motion, right to left and back again, along with slow, steady pressure is generally the most successful technique for passage in difficult cases. If this fails, try a 12 French Silicone catheter. (Latex catheters of this size are too floppy for easy insertion and lack adequate internal lumen size compared to the pure silicone.) If even the silicone catheter won't pass, there is likely to be a significant blockage and you may wish to call for some Urology help or try passing an 0.035” guide wire. The guide wire will either pass into the bladder or will encounter an obstruction and come back out the urethra. If the guide wire can't pass, you are done and will need to call for assistance.

If the guide wire passes, you can try sliding the 12 French Silicone catheter over the guide wire. This can be accomplished with the “Blitz Technique” by using an 18 Gauge angio-cath to punch a hole in the Foley tip. The angio-cath is passed through the distal catheter eyelet and then pushed out through the solid Foley tip. With the metallic needle removed, the plastic angio-cath sheath will just allow passage of an 0.035” guide wire which can then be directed through the catheter lumen. Irrigating the catheter lumen with water will help the guide wire pass through more easily. Then the catheter can be advanced over the guide wire and into the bladder. If this is not successful, remove the catheter and use a “12 French Nottingham” or similar ureteral dilator; then repeat the attempt with the 12 French Silicone Foley. If still not successful, call for Urology help.

### **What Can Urology Do That We Can't Do?**

About 2/3 of the time, the techniques described above will allow safe passage of a Foley catheter into the bladder. But when they don't work, Urologists have some additional tools and techniques to use such as Catheter guides, Filiforms and Followers, Heyman Dilators, Van Buren Sounds (solid metal), Goodwin Sounds (metal sounds with holes to fit over guide wires), balloon dilators, flexible cystoscopy and suprapubic cystostomy kits. These tools can cause great damage and harm if not used properly by experienced surgical professionals and are best left to the Urologists.

### **5. Common Complications of Foley Catheter Placement Per Urethra:**

Catheter-associated urinary tract infection (CAUTI) is a catheter-associated complication, in which the duration of catheterization generally determines the development of bacteriuria. The 2009 Infectious Disease Society of America guidelines define CAUTI in patients with indwelling urethral, indwelling suprapubic, or intermittent catheterization by the presence of symptoms or signs compatible with UTI and no other identifiable source of infection. There must also be at least  $10^3$  colony-forming units (CFU)/mL of at least 1 bacterial species in a single catheter urine specimen or in a midstream voided urine specimen from a patient whose urethral, suprapubic, or condom catheter has been removed within the previous 48 hours. The best way to limit CAUTI is to limit the need for catheterization, including catheter removal as soon as it is no longer required. An indwelling urethral catheter should be inserted using aseptic technique and sterile equipment. Disconnection of the catheter junction should be minimized and the drainage bag along with its connecting tube must be kept below the level of the bladder. If concern for a CAUTI exists, a urine culture should be obtained from a freshly placed catheter prior to the initiation of antimicrobial therapy. If the catheter can be discontinued, a culture should be obtained from a voided midstream urine specimen, prior to the initiation of antimicrobial therapy. Importantly, as indwelling urinary catheters become colonized very easily, the incidence of bacteriuria is 3-7% per day with nearly 100% of patients having bacteriuria by 30 days. Urine cultures should only be obtained if patients have symptoms indicative of an infection.

Paraphimosis results when the phimotic male preputial tissue (foreskin) is left retracted behind the glans, resulting in painful glandular edema and distal penile strangulation. Usually it is challenging to reduce the foreskin in many cases, secondary to the edema. This condition is best avoided by ensuring the foreskin is reduced back over the glans, immediately after catheter placement on all male patients who are uncircumcised. This is extremely important to remember and make it a routine part of every catheterization procedure. Should a paraphimosis occur, reduction of the glans will need to be performed. This can usually be done manually. If there is substantial edema and swelling preventing a manual reduction, using an elastic wrapping around the edematous portion of the penis, as described previously, is quite helpful. Ultimately, if manual reduction is not possible, an emergency dorsal slit procedure can be performed to permanently open the strangulating ring of the phimotic foreskin and relieve the ischemia.

Bladder perforations rarely happen during routine Foley catheter placement, although when it occurs it is a very significant adverse event. Intraperitoneal bladder perforation can result in peritonitis, manifesting with guarding and a rigid abdomen on physical exam. One should be suspicious in cases of continuous bladder irrigation where the inflow volume does not closely match the outflow volume. If suspicious, a cystogram X-ray would confirm the diagnosis. Bladder perforation may require exigent surgical repair and should be evaluated urgently by a urologist.

### **6. Prevention and Management of Traumatic Foley Catheter Insertions and Removals:**

It is always disconcerting to urologists when they are called to correct a Foley catheter problem that was preventable. These include mal-positioned Foley insertions by health care personnel as well as complete or incomplete traumatic catheter removals, usually by disoriented or confused patients.

## **Diagnosis and Management of Traumatic Foley Placement or Removals**

The first indication of an incomplete insertion or Foley malposition is usually a lack of urinary drainage. Lack of urine drainage could be from low urine production (dehydration, excess anti-diuretic hormone, acute tubular necrosis, renal failure, etc.) or from catheter issues such as kinking, blood clots or a full drainage bag as well as Foley mal-positioning. A bladder scan can be used to determine if a Foley is not draining as there should not be any significant bladder residual if the catheter is working properly.

If there is any doubt about the final position of the Foley, a formal bladder ultrasound is usually conclusive. Simple irrigation with a Toomey syringe and 50 cc's of sterile water or saline will often clarify any catheter issues. Failure to easily irrigate fluid through the catheter is an indication of a problem. If fluid irrigates in only and cannot be extracted, most likely there is a clog in the catheter somewhere and it should be removed and replaced. If the Foley is mal-positioned, often the irrigation fluid will leak out around the catheter. If this occurs, the Foley should be replaced although it can be repositioned without replacement in some cases.

Another obvious indication of improper Foley catheter positioning is the "long catheter sign". This is just the visualization and exposure of too much of the Foley being visible beyond the tip of the penis. Normally, this should be no longer than the maximum span of your fingers from the tip of the thumb to the pinky with the hand spread completely out, which is typically about 9 inches or 23 cm.

If the Foley has been traumatically removed, usually by a confused patient or by accident, the most important thing to do immediately is to examine the catheter balloon for any missing pieces. Such balloon fragments or pieces can stay in the bladder and will form bladder stones if not removed. If the balloon is still intact, then at least there is no worry about missing balloon pieces. In general, it is recommended that a Foley catheter be replaced after complete traumatic removals, especially if there is significant bleeding. A 3 way catheter is almost never required as the bleeding is usually from the urethra and will usually stop with a simple Foley catheter replacement. If there is significant bleeding around the catheter, this can be managed by a penile tourniquet around the distal portion of the penis. A rolled up dressing sponge or 4 x 4 pad works well as it safely spreads out the tension from the tourniquet. It should not be secured by a complete knot but only by a single half hitch throw to avoid unnecessary tension from the tourniquet. It should be removed after 12-24 hours which almost always stops the bleeding.

After traumatic extractions, replacement Foley catheters are typically left in place for 7-14 days. If bleeding is not excessive, replacement of the catheter is not mandatory as sometimes trying to replace the Foley can cause additional trauma. The original reason and purpose of the catheter needs to be reviewed before reaching a final decision to leave the Foley out. Use of antibiotics is optional in these situations but a short course of 3-7 days would not be unreasonable.

## **Prevention of Traumatic Foley Catheter Removals**

The most important step in preventing traumatic Foley catheter extractions is to first identify those patients at risk. Patients who are confused from dementia or anesthesia are probably most at risk, but other risk factors include any altered mental state, seizures or head trauma. Obviously, any patient who has previously traumatically removed his catheter is at increased risk to do it again! Patients with Foley catheters are also at risk when being moved from the OR table to a bed or gurney. If the catheter and catheter bag are not secured properly, the Foley can

be accidentally ripped out! Traumatic catheter removals can take place anywhere, but the ICU and Recovery Rooms are particularly prone to these events and should take extra precautions.

Traditional preventive measures require a physician's order and include arranging for a "sitter" to constantly observe the patient, sedation or physical restraints. There are significant negatives to these measures. A "sitter" is very labor intensive as it ties up staff and is quite expensive. Sedation is not always a good choice medically for patients on multiple medications or where their neurological status needs to be closely monitored. Physical restraints can anger or confuse patients, may not always be adequate and carries additional burdens of documentation.

Once a patient has been identified at risk, there are several useful and practical steps that can be taken by nursing services even without a physician's order. These include the following:

1. Secure the Foley catheter and tubing with tape directly to the underside of the upper leg as well as to the inner thigh. Not only is the catheter out of sight of the patient, but this makes it harder even for a very determined patient to get his fingers completely around the catheter until he works the tape off. (Without a firm grip completely around the catheter, most patients will be physically unable to pull them out!) This will also give staff sufficient time and warning to intervene and prevent any patient self-injury. Some nurses have expressed concern about the possibility of a pressure sore or ulcer developing on the underside of the thigh where the catheter might be causing some skin compression, but this appears unlikely as none have been reported.
2. A second covering using a wide 3 inch or larger "Ace" type elastic wrap can be applied around and over the upper thigh further covering the catheter and interfering with the patient's ability to pull on his Foley.
3. Use of a brief type diaper can delay patient self-harm by acting as an additional barrier to protect patients trying to grasp their Foley catheters inappropriately.
4. Use one or more "decoy" catheters. These can be taped to the outside of diapers or other coverings. Patients can play with these harmlessly all they want without any risk of injury. Nurses love this option because it really works well and it's such an obvious solution!
5. Place the pants on the patient or put each leg through the arm hole of an upside down hospital gown. Again, it provides an additional barrier the patient must work through to access the catheter.

It is recommended that nursing staff be instructed in these measures and encouraged to utilize them when appropriate, particularly in high-risk patients, to help minimize these painful and harmful events.

### **7. Suprapubic Tubes and How to Change Them:**

Suprapubic tubes (also known as suprapubic catheters/SPT), require a bedside procedure or minor surgery for initial placement. These catheters can be placed via open surgery but are increasingly done in percutaneous fashion. There are a number of commercially available kits, which come with most of the supplies necessary for a bedside percutaneous placement.

Percutaneous suprapubic tube kits are most appropriate for patients with acute retention, found to have palpable distended bladders on exam, where urethral access to the bladder for a standard Foley is diminished. Suprapubic tubes may be preferred over urethral catheters in settings of pelvic/orthopedic trauma where the return of normal urethral voiding may be delayed for long periods of time. They are also recommended as the route of choice when bladder drainage is

required and a urethral catheter cannot be passed (i.e., severe urethral stricture, prostate cancer or bladder neck contracture). Other advantages of suprapubic tubes include increased patient comfort in patients who need permanent catheterization, ease and comfort of exchange especially in those with extremity contractures and challenging external genitourinary anatomy; in addition, suprapubic tubes offer lessened morbidity in patients at risk for traumatic self-removal of catheter, prevention of penile trauma, urethral stricture formation, prostatic bleeding, penile erosions, urethral erosion and development of a patulous urethra in women, and less interference with sexual activity. A 2015 Cochrane Review examined urethral and suprapubic routes for short-term catheterization in hospitalized adults; the study found, albeit admittedly based on low-quality evidence, that suprapubic catheters reduced the number of participants with asymptomatic bacteriuria, re-catheterization, and pain compared to indwelling urethral catheters. Evidence regarding symptomatic UTIs was inconclusive.

Suprapubic tube placement can have a significant adverse outcome, such as a bowel perforation, if not performed correctly. These catheters are contraindicated in the setting of bladder cancer, unavoidable bowel loops in the anticipated field of passage, uncorrected coagulopathies, presence of a subcutaneous vascular implant in the suprapubic area (i.e., vascular graft), and abdominal wall cellulitis or abscess. Only someone knowledgeable in surgical suprapubic tube placement should perform this procedure/surgery.

Replacement of a suprapubic tube within the first two weeks of placement should only be performed by personnel knowledgeable of these catheters (usually the person that placed it initially). A newly formed cystostomy tract is very easy to lose if the catheter is not replaced quickly and correctly. Subsequent to the first change, if done carefully, almost anyone can successfully replace suprapubic tubes. The catheter should be replaced with a same-size catheter used previously and 5-mL or 10-mL balloons should generally be utilized. One should prepare and cleanse the suprapubic site with the old catheter in place. The old suprapubic tube balloon is then deflated and removed. Briefly examine the old suprapubic tube to visually identify the distance between the catheter tip and its exit point at the skin (the internal portion might be lighter in color compared to the external portion which will be darker due to oxidation). The cystostomy site should then be prepared, cleansed and prepped with antiseptic solution. Lubricating jelly is applied to the new catheter tip and an attempt should be made to pass the catheter in a distance, similar in length to the placement of the previous suprapubic tube. If passed too far beyond the bladder neck, the balloon may be inflated in the prostate or urethra; if not passed far enough, the balloon may be incorrectly inflated in the suprapubic tract itself, not the bladder. There should not be any pain when inflating the retention balloon. Pain with inflation of the retention balloon or feeling resistance during balloon inflation are usually indicators that the catheter may not be in the correct position. Irrigation of the catheter just after placement confirms correct placement if the catheter can be irrigated easily. This also rinses out debris and mucus from the bladder.

It is not uncommon to see granulation tissue at the cystostomy tract on the lower abdominal wall. Silver nitrate sticks can be used to cauterize this tissue to prevent bleeding. Mucous-like drainage around the catheter at the suprapubic site is usually of no concern, unless associated with overlying erythema or other signs of infection, and can be managed with routine hygiene measures. If a suprapubic tube is removed (in planned or unplanned fashion), it should

be replaced quickly as the suprapubic tract, even when mature, can quickly close within hours and prevent simple replacement, necessitating another surgical procedure to replace it.

### **Summary:**

Familiarity with the fundamental principles underlying bladder drainage is important to all medical providers caring for patients in clinical environments where catheters are being placed, replaced, and removed. Placing a catheter in a patient for bladder drainage comes with inherent risk; the catheter should be necessary, of limited duration if possible and should be managed in a safe, appropriate fashion specific to that patient's clinical presentation. While urologists should always be a resource for questions related to catheters, patients receive better care and suffer less morbidity when the entire medical team has good understanding of how and when to safely achieve bladder drainage.

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