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REVIEW ARTICLE **OPEN ACCESS**

Foley Catheter: An Overview

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ABSTRACT
Studies have concluded that when a person is unable to pee for medical reasons or on their own, a FC may be used to drain the urine from the urinary bladder into a collecting bag. Additionally, studies have concluded that this may be done either because the person is unable to urinate on their own or because they are unable to urinate. Studies have concluded that after first placing a thin, flexible tube made of rubber or plastic through the urethra and into the bladder, the catheter is removed. Thus, in our review, we have discussed FC, i.e., indication, contraindication, side effects, types, modern day, complications and adverse events.
Key words: *FC, Indication, Contraindication, Side effects, Types, modern day, Complications, adverse events.*

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INTRODUCTION

According to the findings of research, the "placement of a Foley catheter (FC) is a standard therapeutic intervention that is performed to allow for external urinary drainage".[1] Studies have been concluding that , it is "estimated that more than 100 million urinary catheters (UC) are sold each year across the globe; more than 30 million of them are used just in the United States". [2] According to the findings of research, "when the bladder outlet is blocked due to benign prostatic hyperplasia, a stricture of the bladder neck or urethra, acute urinary retention, or a hypotonic neurogenic bladder, a urinary catheterization may be performed to alleviate the pressure".[1] Studies have found that improved "bladder drainage, urine chemical tests, and fluid monitoring are all possible with routine urinary drainage throughout the surgical phase or in the critical care unit".[1] Additionally, research has shown that urinary catheterization(UC) can be used to get a clean sample for culture, drain blood or clots from the bladder, administer therapeutic drugs intravenously, and look at the bladder fluoroscopically or during urodynamic investigations.[1] Various studies have concluded that some patients will have to go through difficult, unpleasant, or traumatic insertions, even though the majority of patients can manage UC with just a small amount of discomfort or difficulty.[3] Several other studies have concluded that this kind of discomfort is sometimes unnecessary, and making several efforts to place a catheter poses a high risk of harm to the urethra, prostate, or bladder.[3] Studies have shown that using the "wrong or less-than-ideal methods to handle difficult UC can lead to a number of bad outcomes, such as bladder distension, reflux, patient discomfort, detrusor damage, unneeded delays in therapy, serious urological complications, avoidable urinary infections, permanent scarring, and longer hospital stays".[3] Several studies have found that knowing the patient's reported symptoms, fully evaluating all of their genitourinary systems, getting a complete urological history, and doing a full physical exam may help avoid a difficult catheterization and make it easier to treat if it does happen.[4] Although it has not yet been validated, a risk prediction model for FUC difficulties that predicts the possibility of requiring substantial urologic instrumentation has been established. [4] Thus, in our review we have discussed about FC.

HISTORY

According to studies, the name of the device was derived from the surname of its creator, a surgeon by the name of Frederic Foley who worked in Boston, Massachusetts, during the 1930s.[5] Studies have further concluded that C. R. Bard, Inc. of Murray Hill, New Jersey, who made the first prototypes and named them in honor of the surgeon, took his initial notion and ran with it. C. R. Bard, Inc. also named them after him. C. R. Bard, Inc. has been operating continuously ever since it first opened its doors.[5] The prototypes were named after him. Furthermore, studies have evaluated and confirmed that there are

currently a number of firms worldwide that manufacture IDCs and in/out catheters made of a variety of materials, including silicone, plastic, and latex. According to studies, many elderly people who have been self-catheterizing for a significant amount of time prefer glass-in/out catheters over plastic ones. This is due to the fact that glass-in/out catheters do not produce any waste throughout their use.[5] Furthermore, studies have shown that glass-in/out catheters are still used today, despite the fact that their usage is exceedingly uncommon. At this time, the vast majority of nations require that plastic in-and-out catheters be discarded in a certain way after usage. In addition to this, studies have also evaluated and concluded that a plan for a multicenter, prospective, randomized controlled, non-inferiority trial is currently under way to compare single-use catheters against reusable catheters in intermittent catheterization for ice of urine retention.[6]

MODERN DAY FC

Studies have concluded that, due to its superior mechanical qualities, latex was chosen for this use, and the first prototype of Dr. Foley's catheter was made of it. Studies have further concluded that latex has several desirable properties, including a high stretch ratio, a high degree of durability, and a very high level of water resistance. Furthermore, research has found that the main problem with latex is that it kills cells. For example, in the 1980s, patients who used latex catheters had an outbreak of severe urethral strictures. Studies have also concluded that it was discovered in patients who had used latex catheters. Studies have concluded that the use of latex catheters is directly responsible for this result. Studies have further concluded that the use of latex catheters was directly to blame for the occurrence of these results. Additionally, studies have found that rubber eluates are the main cause of cellular toxicity.[7] Studies have also concluded that, in order to reduce the risk, latex catheters are often coated with silicone elastomer these days.[8] Studies have also shown that hydrophilic coatings are put on a lot of today's catheters to make their surfaces smooth and reduce the amount of friction that happens.[9] In addition to this, studies also concluded that since a significant number of catheters are made completely of silicone elastomer, this is the case. In addition to the fact that they do not cause allergic reactions, silicone catheters offer greater resistance to kinking and superior flow characteristics than latex catheters. On the other hand, silicone catheters do not exacerbate the symptoms of allergic reactions.[10]

Studies have concluded that there has also been an emphasis placed on the fact that the surface of the catheter and the drainage eyes ought to be as smooth as is possibly practicable.[11] Furthermore, studies also concluded that sharp edges on the surface of drainage eyes may cause bleeding from the urethral lining when the catheter is placed or removed. In addition to this, studies have also concluded that rough surfaces promote the production of bacterial biofilm. Thus, there is a possibility that one of these complications will occur when the catheter is either placed in the patient or removed from the patient. In the last few years, studies have shown that there has been some research on catheters that has focused on the creation of antiseptic and antimicrobial coatings with the objective of reducing the prevalence of catheters that are associated with urinary tract infections.[12] Studies have concluded that the results of a randomized controlled trial that was conducted to evaluate the efficacy and cost-effectiveness of an antiseptic- and antimicrobial-impregnated catheter versus a standard-coated catheter in reducing the risk of a urinary tract infection showed no indication of benefit for the antiseptic- and antimicrobial-impregnated catheter.[13] In a previous randomized clinical trial, studies have shown interest towards the use of a catheter that was infused with silver, which resulted in an increase in the number of infections that were identified. In spite of the fact that silver may stop the development of germs, this was the result. [13] Studies have found that some FC have a third channel that can be used to put saline or another irrigating fluid into the bladder when there is a chance that blood clots will form in the bladder, like after surgery when there is bleeding.[14] Additionally, there is a catheter on the market that can be purchased that has two balloons attached to the very end of the catheter. So, studies have shown that the ice at the tip is meant to lower the risk of damage to the urothelium. The drainage eyes poke a small hole in the catheter between the two balloons, with the larger balloon serving as the retention device.[14] In addition to this, studies have also concluded that the dual-balloon catheter may trap more urine in the bladder at the end of the drainage process, which may increase the risk of bladder infection. This is one of the potential drawbacks of using this kind of catheter.[14]

INDICATION

Several studies have found that a “urinary catheter may be inserted to relieve acute or chronic urinary retention, to obtain urine for analysis, to dilate urethral strictures, to splint the urethra after surgery, to perform continuous bladder infusions, to manage hematuria, to drain the bladder after an injury, to maintain the hygiene of an immobile patient, and to decompress a neurogenic bladder”. [15,16] Studies have also concluded that “urinary decompression is also recommended in many critical care settings to

enable accurate measurements of urinary outputs. This procedure is also recommended for use during extended surgical procedures in which the bladder has to be emptied".[1] Studies have also found that a Foley catheter should only be used to measure and collect urine when there is no other way to find out about the person's fluid status or urinary output.[1] Studies have concluded that the placement of a FC is not always necessary just because a patient is located in an intensive care unit.[1] Studies have shown that people who can go to the bathroom and have the right amount of urine left over afterward probably don't need catheters.[1] Various other studies have concluded that this is "especially true if they are not being treated for urinary tract-based sepsis or infection. Patients who are unable to void have acceptable post-void residual volumes".[16] In difficult circumstances, it may be advisable, according to many studies, to avoid significant urological instrumentation by installing a FC unless it is absolutely required to do so. This is especially true if the condition is life-threatening. [3]

CONTRAINDICATION [1]
Several studies have found that when evaluating a patient for UC, a thorough clinical history and physical examination to rule out urethral injuries are required. Studies have also concluded that UC without direct visualization is not recommended in cases of urethral trauma. Studies have also shown that a high-riding prostate and blood at the urethral meatus are both signs of urethral injury. It is very risky to do a FC without being able to see the area clearly with a cystoscope in these situations. Additionally, studies have found that the "absence of blood or a high-riding prostate cannot rule out a urethral injury".[1] Studies have concluded that to assess if a traumatic urethral injury is probable, one must apply clinical judgment while evaluating the patient's mechanism of injury. Studies have concluded that a retrograde urethrogram should be performed if there is any uncertainty.

TYPES [17]
1. "Coude Catheter
2. Council Tip Catheter
3. 3-way , Triple Lumen Catheter
4. In /out Catheter"

SIDE EFFECTS
Several studies have found that very "shortly after having a catheter inserted, the bladder will get colonized by germs, with a daily incidence of 3–10%; after four days, between 10–30% of patients will have bacteriuria".[18] Studies have found that a lot of unnecessary and possibly harmful antibiotic prescriptions are made based on the discovery of asymptomatic bacteriuria. Studies have concluded that this is true even though having a catheter makes bloodstream infections of urinary origin more likely.[18] Although there is minimal evidence of their effectiveness, the industry is transitioning to silver-coated catheters in an effort to lower the incidence of urinary tract infections. Studies have concluded that the fact that FC have a propensity to get coated with a biofilm over time, which has the potential to block drainage, is an additional concern.[18] Furthermore, studies have concluded that this results in a greater volume of urine that is left standing in the bladder, which is another factor that leads to UTI.[18] Studies have concluded that , in the event that a FC gets obstructed, it will either need to be replaced or flushed. Studies have also concluded that , at this time, there is not a sufficient amount of relevant evidence to determine whether or not washouts are useful or detrimental. [19]

COMPLICATIONS [1]
Several studies have found that patients who have difficulty during catheterization or who make several unsuccessful attempts at FC placement cause significant discomfort, worry, and the possibility of developing long-term consequences. Studies have also concluded that the likelihood of developing a post-instrumentation infection is raised when the urethra is subjected to both instrumentation and trauma. Several other studies have shown that after putting in a urinary catheter, if pressure is kept on it even when resistance is met, it could make a false urethral passage, weaken the bladder neck, or puncture the urethra or the bladder. Studies have concluded that a traumatic injury to the prostate, the bladder neck, or the urethra may result in hematuria, infection, and scarring. Rectal perforation has also been seen after the patient had previous surgical procedures or radiotherapy. Studies have also found that the trauma from failed catheterizations can cause urinary tract infections, Fournier gangrene, or the growth of peri-urethral abscesses in people who don't have strong immune systems or who have trouble moving around.[1] According to several studies, urethral stricture disease may eventually develop after instrumentation-induced urethral trauma. Additionally, studies have found that patients who are confused, have dementia, or have had a brain injury may try to remove their Foley catheters traumatically

by tugging on them. Studies have also concluded that this may cause the catheter to get dislodged from the patient's body. Additionally, studies have shown that if the balloons are removed in their entirety, this may cause a major traumatic injury to the urethra, resulting in bleeding, discomfort, infection, scarring, and strictures. Studies have also shown that a cystoscopy should be done if the balloon is broken, missing pieces are missing, or the catheter can't be found. This is to make sure that no pieces of the balloon have been left behind in the bladder, where they can harden and form bladder stones. Furthermore, studies also concluded that this is because bladder stones may be caused by fragments of the balloon that have been left behind in the bladder.[1]

ADVERSE EVENTS DUE TO FC

Studies have found that an adverse event is defined as any negative medical occurrence, unintended disease or injury, or any unfavorable clinical signs in subjects, users, or other individuals.[20] Studies have also concluded that if an adverse event is deemed serious, it must meet certain criteria. Studies have also found that these criteria include: causing death; a significant decline in health that led to a life-threatening illness or injury or permanent impairment of a body structure or function; needing to be hospitalized or staying hospitalized longer than planned; or needing medical or surgical intervention to prevent a life-threatening illness or injury or permanent impairment of a body structure or function.[14] Furthermore, studies have concluded the list of adverse events which are as follows:-[14]

1. “Bacterial Colonization
2. Antibiotic Resistance
3. Chronic Infection
4. Kidney &Bladder Damage
5. Bladder Stone Problem
6. Pseudopolyps
7. Septicaemia
8. Urethral Trauma
9. Balloon Fragment
10. Commentary”

CONCLUSION

According to several studies, the urinary bladder is anatomically specialized to accommodate urine without generating undue pressure, allowing humans to void it at suitable intervals. So, according to studies, if a patient has urinary retention or requires urgent urine drainage, the use of a urinary catheter is essential. In addition to this, studies also revealed that while UC is mostly uneventful, complications may occur that result in patient pain and have long-term consequences. In addition to this, studies have concluded that, to provide the best possible treatment for patients, it is crucial for doctors to have the ability to accurately assess the underlying cause of difficult catheterization and choose procedures that are most likely to result in successful catheter placement.

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