



Letter to the Editor

Reduction of urinary tract infection by modification of Foley catheter: A letter to the Editor



Dear Editor,

Bladder catheterization is one of the most frequent procedures performed in a hospital [1], which is utilized in medical conditions such as urinary retention (rooted in urinary obstruction caused by urinary stones, tumor, urethral stricture, benign prostatic hyperplasia), Urinary Tract Infection (UTI) and inflammation (cystitis, urethritis, and prostatitis), drugs (anticholinergics and alpha-adrenergic agonists), neurological disorders (brain and spinal cord injury, cerebrovascular accident, multiple sclerosis, and Parkinson's disease, and dementia), neurogenic bladder, and abdominal and pelvic surgeries. Bladder catheterization may be performed for therapeutic or diagnostic purposes. Depending on how long the catheters remain in the bladder, there are short-term and long-term catheterizations [3]. The majority of UTIs (70%) are associated with urinary catheterization [2]. Moreover, more than 97% of patients admitted to the intensive care units have catheter-

related UTI [4]. Due to the urine stasis behind the catheter balloon, the risk of catheter-induced bacterial colonization increases from 3 to 10% per day to 100% in case of long-term catheterization. Catheter-related UTI is diagnosed in a patient with fever and bacteriuria within at least two days after catheterization [5]. Besides, repeated attempts at urinary catheterization may be associated with a high risk of urethral injury and bleeding, which in turn accelerates UTI [1]. We currently know that urinary catheterization is performed by inserting a catheter (a hollow tube with an inflatable balloon) into the bladder. In particular, the Foley catheter has disadvantages, as it can cause trauma to the urethra and bladder and lead to UTI; firstly, because the catheter outlet cross-section is higher than the urethral outlet cross-section due to the physical structure of the catheter, and urinary stasis occurs below the urinary output level, which leads to the bacterial colonization in urine and the formation of urinary crystals. Secondly, due to the sharpness of the catheter tip, it causes bladder injury, especially when the bladder is empty. Thirdly, the dilated structure of the balloon appears to occupy the retropubic space, which is another disadvantage of this type of catheter (Fig. 1).

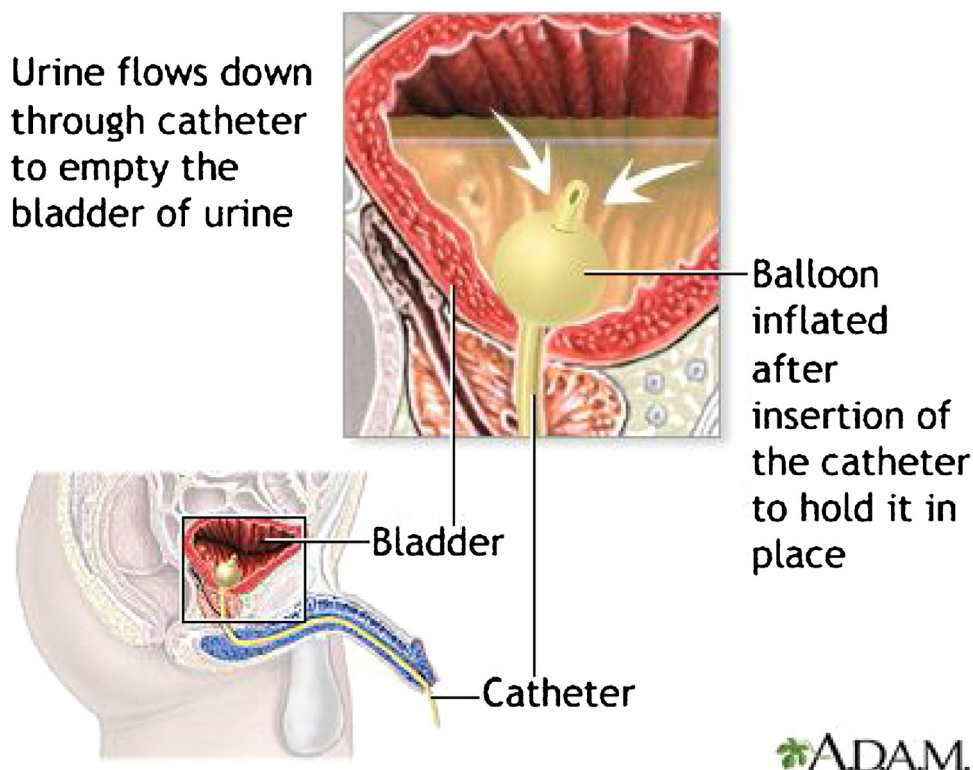


Fig. 1. The physiological function of bladder drainage by a Foley catheter.

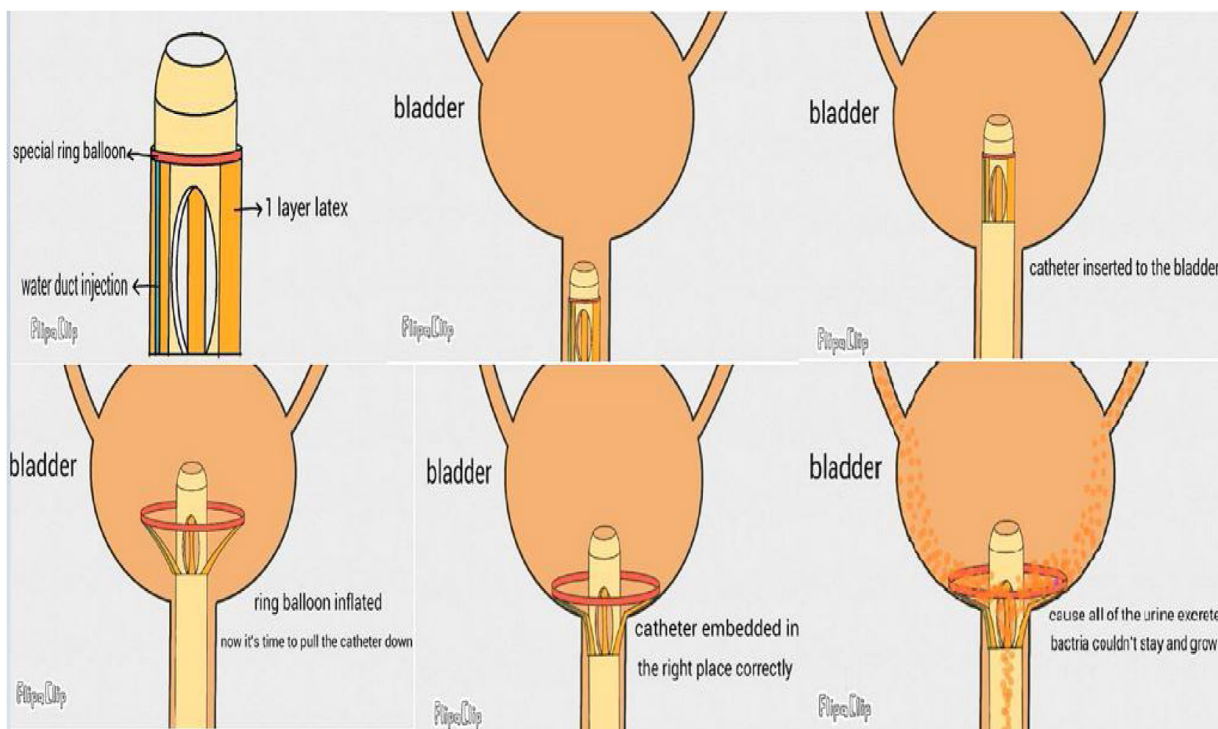


Fig. 2. Insertion of a new urinary catheter into the bladder, inflation of the ring balloon, and urination.

Considering the disadvantages of Foley catheters in reducing and preventing complications, we decided to design a new type of urinary catheter, the features of which are as follows:

This urinary catheter is made up of a body made of latex or silicone rubber (like common types of Foley catheters), a special ring balloon, a port for balloon inflation, and three latex layers at the head of the catheter. In this catheter, instead of using a balloon inflating in all directions, a special ring balloon is used, which inflates like a ring and has a limited inflating volume. Thus it occupies much less space compared to common types of Foley catheters (Fig. 2). This factor causes the level of urinary drainage to be much lower than that in common types of Foley catheters and minimizes urinary stasis. By inserting this type of urinary catheter, urinary bacterial colonization would be prevented as a result of the reduction in the catheter outlet cross-section, which in turn reduces the UTIs (Fig. 2). Another noteworthy point about the common types of Foley catheters is that these catheters have a spear-shaped tip, which traumatizes the mucosa of the bladder and urethra. However, in this new urinary catheter, this problem is tackled by adding a drain hole and creating a particular physical shape for the tip of the catheter (Fig. 2).

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Consent

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Author contribution

Navid Faraji: Reviewed the literature and wrote the manuscript.
 Rasoul Goli: Supervised the writing process and revised the manuscript.

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