

# Management of Non-Deflating Foley Catheter Balloons in Emergency and Urology Clinics: A 5-Year Retrospective Study

## Acil Servis ve Üroloji Kliniklerinde Sönmeyen Foley Kateter Balonlarının Yönetimi: 5 Yıllık Retrospektif Bir Çalışma

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### Abstract

**Objective:** This study aims to discuss the techniques for safely, quickly, and successfully removing transurethral (TU) foley catheter balloons in patients who present to the emergency and urology clinics due to the inability to remove the catheter through normal means, and to contribute options and insights to the literature.

**Materials and Methods:** This retrospective study included patients who presented to the emergency department for the inability to remove the TU foley catheter, patients referred to the urology clinic, or patients consulted from other clinics, between January 2017 and September 2022. The treatment methods applied by the urologist in this patient group, hospitalization durations, voiding status, and any developed complications were recorded based on patient files.

**Results:** A total of 22 patients who had a transurethral (TU) catheter inserted for various reasons and were unable to remove it were included in our study. It was found that 7 of the patients had permanent TU catheters due to comorbidities, while the remaining 15 had TU catheters inserted after acute urinary retention. Among them, 2 cases had the catheter removed by cutting the inflation channel, 1 case with the assistance of a guidewire, 2 cases by puncturing the balloon with a needle under transrectal ultrasound guidance, 10 cases by puncturing the catheter balloon with a needle under suprapubic ultrasound guidance, and 7 cases had their catheters removed by laser under anesthesia. Only 1 patient who had the balloon punctured by a needle under transrectal ultrasound guidance developed fever after the procedure and had a total of 5 days of hospitalization, while the others were discharged either immediately after the procedure or 1 day later.

**Conclusion:** Patients with indwelling foley catheters that cannot be removed rarely present to us; however, these patients often come to us in an agitated state after multiple unsuccessful attempts to remove the catheter. Therefore, it is important to know which technique should be applied to this patient group in a faster, appropriate, and reliable manner as soon as possible.

**Keywords:** balloon, catheter, foley, transurethral

### Öz

**Amaç:** Çeşitli nedenlerle, hastalara takılan transüretal (TU) sondaların normal yolla çıkmaması sonucu acil servise ve üroloji polikliniğine başvuran ve yönlendirilen hastaların kataterini güvenli, hızlı ve başarılı bir şekilde çıkartan teknikleri tartışarak literatüre seçenек ve katkı sunmak.

**Gereçler ve Yöntemler:** Retrospektif olarak dizayn edilen bu çalışma; Ocak 2017- Eylül 2022 tarihleri arasında acil servise sonda çıkmaması üzerine başvuru yapılan, üroloji kliniğine başvuran veya diğer kliniklerden konsülte edilen hastaları içermektedir. Bu hasta grubunda üroloji hekimi tarafından uygulanan tedavi yöntemleri sonrasında hastane yatış süreleri, idrar yapıp-yapmama durumları, eğer gelişmişe gelişen komplikasyonlar hasta dosyalarından alınarak kaydedildi.

**Bulgular:** Çeşitli nedenlerle TU kateter takılan ve çıkarılmayan toplam 22 hasta çalışmamıza dahil edildi. 22 hastanın 7'sinin komorbiditeler nedeniyle TU kataterlerin kalıcı olduğu, geri kalan 15'inin ise akut üriner retansiyon sonrası TU kateter takıldığı öğrenildi. Bunların 2'si sadece şişirme kanalı kesilerek, 1'i kılavuz tel yardımı ile, 2'si transrektal usg eşliğinde iğne ile balonu patlatılarak, 10'u suprapubik usg eşliğinde iğne ile sonda balonunun patlatılarak, 7 hastanın ise anestezi altında laser ile sondasının patlatılarak sondasının çıkarıldığı kaydedildi. Sadece transrektal usg eşliğinde iğne ile balonu patlatılan 1 hastada işlem sonrası ateş olduğu ve toplam 5 gün yatış olduğu diğerlerinin ise işlem sonrası veya 1 gün sonra externe edildiği görüldü.

**Sonuç:** TU sondası çıkmayan hastalar nadir olarak karşımıza çıkmakla beraber bu hastalar bize ulaşana kadar birçok sonda çıkarma denemesinden geçtikleri için ajitasyon ile karşımıza çıkmaktadırlar. Bu bakımdan bu hasta grubuna hangi tekniğin daha hızlı, uygun ve güvenilir bir biçimde bir an önce uygulanması gerektiğinin bilinmesi kanaatindeyiz.

**Anahtar kelimeler:** balon, katater, foley, transüretal

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## Introduction

Indwelling Foley catheters, filled with approximately 10 cc of isotonic saline solution, are commonly used in patients for various reasons. To remove these catheters, the saline solution in the balloon needs to be drained. However, in rare cases, it may not be possible to deflate the balloon, which is a known complication of Foley catheterization.

It is estimated that 15% to 20% of patients in the hospital have a TU catheter [1]. The failure of a Foley catheter balloon to deflate can be caused by a faulty valve mechanism, blockage of the inflation channel, or crystallization of the fluid inside the balloon [2]. After multiple unsuccessful attempts, patients usually seek assistance from urologists in an agitated state. Over the years, various techniques and methods have been reported to address this issue, including over-inflation of the balloon, injection of ether or chloroform into the inflation channel, and insertion of a guidewire into the inflation channel [3-5]. Additionally, there are techniques such as needle puncture of the balloon under ultrasound guidance [4,6-8].

When the balloon does not deflate, the initial approach often involves over-inflating the balloon until it bursts. However, a study has shown that in 83% of cases where the balloon burst, significant fragments were left behind [9]. Chemical agents like ether and chloroform are no longer used to deflate the balloon as they can cause damage to the bladder mucosa.

Another method that can be used in a patient with an indwelling catheter that cannot be removed, is to cut off the path to the balloon. In these cases, the deflation of the balloon is expected through the backflow of the saline. If this method is not successful, that means a problem in the valve part of the balloon, it is necessary to consider invasive procedures, such as needle puncture of the balloon under suprapubic/transrectal ultrasound guidance or laser puncture of the balloon under cystoscopy.

The goal of successful management is to remove the catheter in a safe manner as soon as possible, alleviate patient agitation, and minimize complications. The aim of our study is

to contribute to the literature by identifying the most reliable and least complication-prone techniques for managing patients who have indwelling catheters that cannot be removed, and have undergone various attempted methods.

## Materials and Methods

This study is a retrospective study conducted between January 2017 and September 2022 at the Erzurum Regional Training and Research Hospital, involving patients who presented to the Emergency Department and Urology Clinic with non-deflating TU foley catheters. The study was approved by the Local Ethics Committee of Health Sciences University Erzurum City Hospital (Approval date and number: 2022/17-168). All procedures performed in this study involving human participants were conducted in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. An informed consent was obtained from all the patients.

The medical records of the patients were obtained from the hospital archives, and it was found that 16 (73%) patients were referred to the Urology Clinic through the Emergency Department or other clinics, while 6 (27%) patients directly sought the Urology Clinic for catheter removal or replacement. All patients were male. The age range of this patient group varied between 55 and 89 years, and the length of hospital stay ranged from 0 to 5 days. Upon reviewing the treatment methods applied to these patients, it was observed that non-invasive techniques such as over-inflation and bursting of the catheter balloon, cutting the inflation channel, and sending a guide wire through the inflation channel were used. In addition, invasive procedures such as needle puncture of the catheter balloon with the assistance of suprapubic ultrasonography (USG), needle puncture with the assistance of transrectal ultrasonography (TRUS), and endoscopic laser balloon puncture under anesthesia were performed.

**Table 1.** Removal methods for non-deflating TU foley catheter balloons

Method	Number of patients applied (n)	Number of success removal (n)
Cutting inflation channel	22 (100%)	2 (9%)
Bursting with a guidewire applied through inflation channel	20 (90%)	1 (4%)
Using a needle under the guidance of suprapubic USG	11 (50%)	10 (46%)
Using a needle under the guidance of TRUS	3 (13%)	2 (9%)
Endoscopic laser intervention	7 (32%)	7 (32%)

TRUS: transrectal ultrasound; USG: ultrasonography

## Results

The medical records obtained from the hospital archives were reviewed, and it was observed that all of these patients were male. The age range of the patients was between 55 and 89, with an average age of  $72 \pm 5$  years. Among the 22 patients, 7 (31%) were under permanent catheterization, while 15 (69%) had temporary catheterization due to acute urinary retention. The average age of patients under permanent catheterization was found to be  $75 \pm 3$  years, while it was  $64 \pm 6$  years for patients with temporary catheterization. It was determined that all patients under permanent catheterization had at least one neurological, cardiac, or endocrinological condition, while the group of patients with catheterization due to acute urinary retention did not have any additional diseases recorded. All of these patients were initially subjected to the method of cutting the inflation channel of the Foley catheter and waiting for a certain period. It was found that only 2 (9%) patients had the Foley catheter come out without any additional procedures after the deflation of the balloon. Subsequently, for the remaining patients, a guide wire was passed through the cut inflation channel. It was recorded that in only 1 (4%) patient, the Foley catheter came out by bursting the balloon with the help of the guide wire.

Among the patients who failed the previous procedures, it was observed that 11 (50%) of them did not undergo general anesthesia and opted for local anesthesia. For these patients, the primary plan was to perform a minimally invasive procedure using a needle under the guidance of suprapubic ultrasonography (USG) (46%) to burst the balloon of the Foley catheter. It was recorded that all except 1 patient had the Foley catheter come out after this procedure. In the case where this procedure failed, TRUS was used, and a prostate biopsy needle was inserted to burst the balloon of the catheter. 2 patients had wounds and infections in the suprapubic region, and an attempt was made to burst the balloon using a TRUS-guided needle (9%). It was successful in one patient but unsuccessful in another due to patient non-compliance. Both this patient and the remaining 6 patients underwent endoscopic laser intervention (32%) under general anesthesia to burst the balloon of the catheter. The applied methods and results are summarized in **Table 1**.

For the 7 patients who were followed with a permanent Foley catheter, the catheter was reinserted and externalized. For all patients who underwent non-invasive procedures, the catheter was externalized after the procedure. For patients who underwent invasive procedures, they were followed for one day and then the catheter was externalized. It was found that only one patient who had their catheter removed using a transrectal USG-guided needle developed fever after the procedure and was externalized on the 5th day after antibiotic therapy.

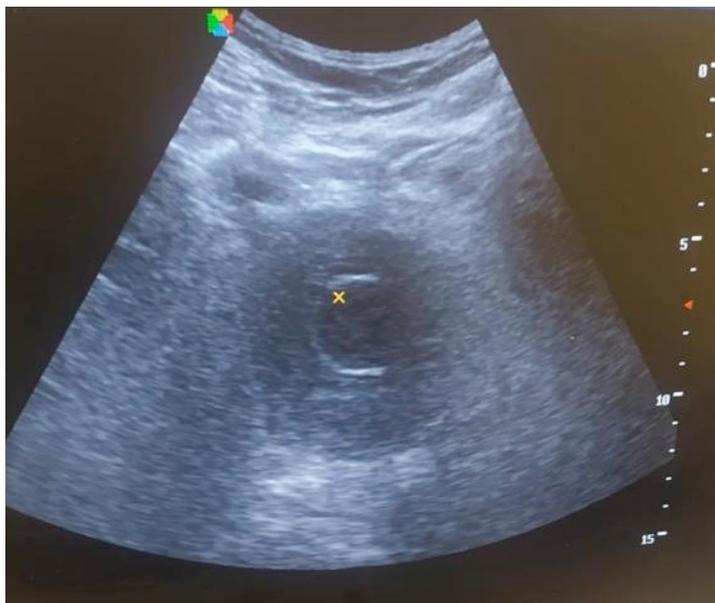
## Discussion

Indeed, it is known that transurethral (TU) catheters are not only used for urological patients but also for various other patients, particularly during hospital stays in intensive care units and clinics for monitoring purposes. Although the insertion and removal of TU catheters are minimally invasive procedures, sometimes the removal of the catheter is not straightforward due to crystallization of the fluid in the catheter balloon or a

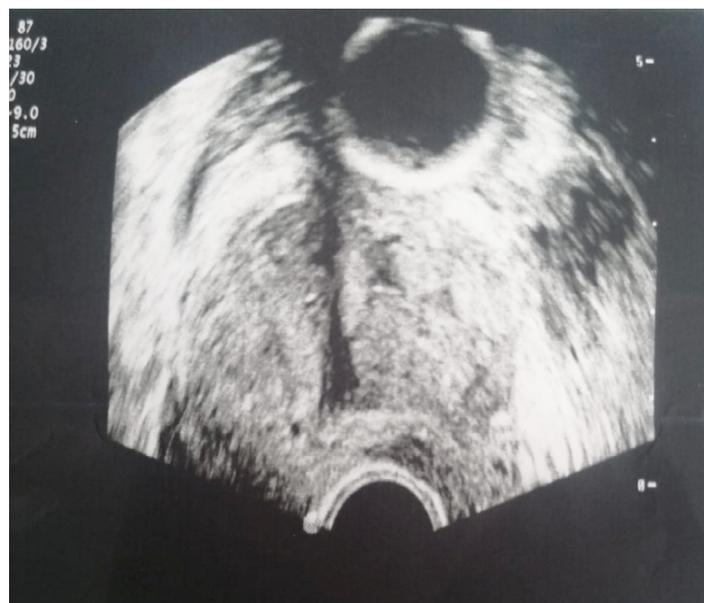
malfunctioning valve channel. In such cases, patients undergo multiple maneuvers and methods in other clinics in an attempt to remove the catheter, but when these attempts fail, they become agitated and seek consultation with a urologist. It is necessary to resolve their problem promptly and effectively in a rational, practical, and efficient manner in order to alleviate their agitation.

Various techniques have been applied to patients with a retained catheter from the past to the present. One of the primary techniques involves overinflating and bursting the catheter balloon, where the bladder is first filled with 200 cc of isotonic solution to minimize bladder injury [10]. However, the main complication of this technique is the risk of catheter balloon fragments remaining inside and the potential for bladder rupture, which has led to the abandonment of this method [1,11]. Similarly, the injection of chemical substances (such as ether, toluene, benzene, chloroform, etc.) into the balloon has also been abandoned due to the risk of bladder cystitis. Some authors suggest that performing bladder lavage after balloon dissolution can minimize the risk of developing cystitis [12]. These methods are not widely preferred in today's practice. It is possible to cut the inflation channel of TU foley catheter and wait for the balloon to deflate spontaneously after a certain period. However, this method is not highly favored by both patients and doctors due to the need for patients to wait for a certain period, the continuation of their agitation and low success rates as shown in our study. If the balloon still does not deflate after these methods, another approach is to insert a guidewire through the catheter inflation channel valve and attempt to burst the balloon. In a study, the use of a hydrophilic guidewire with a rigid tip was employed to deflate the catheter balloon, and it was observed that the balloon deflated immediately or within a few minutes after the removal of the guidewire [9,13]. However, complications and failure of this procedure may arise due to the risk of crystallization of the water inside the catheter balloon and potential injury to the bladder and urethra caused by the rigid tip of the guidewire. All of these procedures, although considered non-invasive for patients, are generally evaluated to have a low success rate.

If the catheter still hasn't been removed using the previous methods, it is necessary to consider more minimally invasive procedures. To alleviate the patient's agitation and increasing anxiety as quickly as possible, the least invasive and fastest method should be chosen. The first option is to use a needle to deflate the catheter balloon under the guidance of suprapubic ultrasound, with the application of local anesthesia [8,14] (**Figure 1**). In this technique, after visualizing the catheter balloon under USG guidance, the plan is to enter the suprapubic area with a needle to deflate the balloon. It is important to note that the mobility of the catheter balloon within the bladder can be a disadvantage during the procedure. To prevent this, the catheter can be gently pulled back from the urethral meatus to ensure that the balloon remains fixed at the bladder neck. In rare cases, it is also possible to deflate the catheter balloon using a needle through a TRUS probe (**Figure 2**). With the guidance of TRUS, an 18 G Tru-cut needle is directed towards the catheter balloon through the prostate in an attempt to deflate the balloon [15]. In this technique, despite the potential disadvantages of the catheter balloon being mobile and a higher risk of intestinal and bladder injury compared to other procedures, as well as the possibility of infection and the risk of bleeding in patients with coagulation disorders, the success



**Figure 1.** Imaging of the catheter balloon with suprapubic USG



**Figure 2.** Imaging of the catheter balloon with transrectal USG

rate of these methods is high. The disadvantages of this technique include patient non-compliance, lack of equipment (TRUS), the minimal invasiveness of the procedure, and the subsequent risk of developing an infection requiring antibiotic therapy. Despite all these methods, if there is patient non-compliance or if the patient requests the procedure under general anesthesia, a final approach can be performed using cystoscopy. Through the side of the indwelling catheter, instruments such as a thin rigid URS or flexible cystoscope can be used to enter and deflate the catheter balloon using a laser [16]. However, it should be noted that for this technique, the conditions of an operating room and the risks and complications of general anesthesia must be taken into consideration.

## Conclusion

Patients presenting with an indwelling catheter that cannot be removed have typically undergone various manipulations in primary care or emergency departments, leading to agitation and anxiety. However, we can solve this problem quickly, efficiently, and without complications by applying the above-mentioned techniques.

**Ethics Committee Approval:** The study protocol was approved by the Local Ethics Committee of Health Sciences University Erzurum City Hospital (Approval date and number: 2022/17-168).

**Informed Consent:** An informed consent was obtained from all the patients.

**Publication:** The results of the study were not published in full or in part in form of abstracts.

**Peer-review:** Externally peer-reviewed.

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