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The Challenge of Difficult Catheterization in Men: A Novel Technique and Review of the Literature

Mario Gardi, Giulio Massimo Balta, Marcello Repele, Nicola Zanovello, Giovanni Betto, Simonetta Fracalanza, Wanni Battanello, Bruno Santoni, Silvia Secco, Andrea Agostini, Massimo Dal Bianco

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ABSTRACT

Male urethral catheterization can be difficult and is still a familiar problem for urologists. A laborious male urethral catheterization is often consequent to the presence of a bulky prostate due to benign prostatic enlargement, a condition intimately related to aging with an increasing prevalence in elderly people. The task of passing a urethral catheter in this atypical condition often leads to repeated and unsuccessful attempts, which can cause the patient distress, and are often related to a wide range of complications, sometimes leading to medico-legal lawsuits.

We describe a simple and safe technique only requiring equipment readily available in every urology department. It facilitates the chances of an atraumatic and successful catheter insertion in men suffering from different pathologic or anatomic conditions when a primary attempt of simple transurethral catheterization fails.
The performance of the technique was tested in 76 patients who required bladder catheterization by a urologic consultant because of failed primary attempts. Difficulties were attributable to past transurethral resection of the prostate in 10 patients, past open radical retropubic prostatectomy in 7, and benign prostate enlargement in 59. Successful catheterization was obtained in 65 patients, 5 patients were otherwise catheterized by a rigid catheter, and 6 required a suprapubic catheter or flexible cystoscopy. Complications comprised self-limiting urethral bleeding in 12 patients, urinary tract infection in 4, and false passage in 2.

The technique is well tolerated and increases the likelihood of successful primary urethral catheterization in this set of patients; moreover, a hospital admission that is needed in case of placing a suprapubic catheter is not required.

INTRODUCTION

LMale bladder transurethral catheterization can be difficult and is still a familiar problem for urologists. It can be a challenge involving a urethral stricture, false passages as a result of previous unfruitful attempts at catheterization, prostate cancer, bladder neck contractures following transurethral resection of the prostate, and obliterated anastomosis following a radical prostatectomy. More often a laborious catheterization may be due to a bulky prostate in case of benign prostatic enlargement, a condition intimately related to aging with an increased prevalence in elderly people [1].

The task of passing a urethral catheter in this atypical condition often falls to the more junior and inexperienced members of staff, and may represent a potential cause for a lawsuit [2]. Repeated, rough, and unsuccessful attempts can cause the patient distress and are often related to a wide range of complications, such as urethral damage, including significant bleeding (e.g., in men assuming oral anticoagulants) and the

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CORRESPONDENCE: Mario Gardi, MD, PhD, Urology Unit, Department of Surgery, Ospedale Sant'Antonio, Building G, Via Facciolati, 71, Padova, Italy (mario.gardi@gmail.com)

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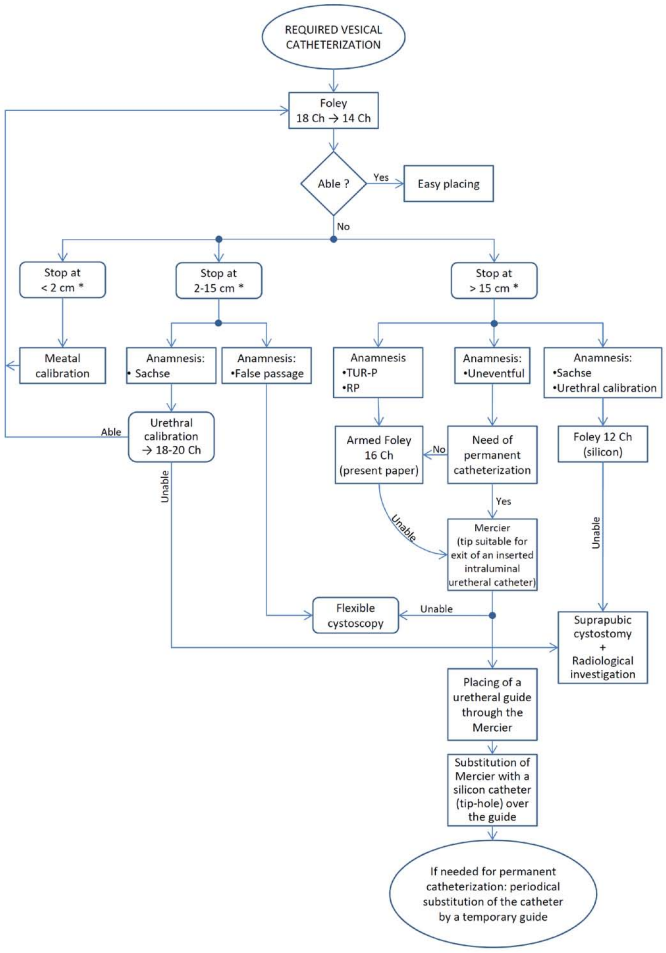
late onset of urethral strictures [3], and more serious morbid conditions such as sepsis, rectal perforation, and Fournier's gangrene. We describe a simple and safe technique that facilitates the chances of atraumatic and successful catheter insertion in men suffering of sub-stenotic vesicourethral anastomosis, bladder neck contractures following transurethral resection of the prostate, or bulky prostate due to benign prostatic enlargement or cancer.

METHODS

When catheter placement is required to resolve acute retention or for clinical monitoring, the first step is to focalize on past medical history and physical examination. It's important to know whether a patient underwent prior urological surgeries (such as radical prostatectomy or urethroplasty), endoscopic procedures (such as transurethral prostate resection or cystoscopy), previous urethral stenosis or voiding dysfunctions, assuming medical therapy for benign prostatic hyperplasia or prostate cancer, or reported difficult catheterization in the past. To the same extent, information deriving from previous attempts at catheterization are important. This includes the type and size of the catheter used, the level of a perceived stop during catheter advancement, inflation of the catheter balloon, possible pain by the patient indicating urethral trauma due to expansion of the balloon elsewhere than the bladder, urethral bleeding, the number of attempts at catheterization, and personnel involved (nurses, general practitioner) [3]. Physical examination can show signs of urethral trauma (blood at the meatus) or possible causes of difficult catheterization such as anasarca, phimosis, micro penis, meatal stenosis, penile oedema, prostate cancer, or prostate enlargement. To manage all these possible scenarios, we adopted an internal flow chart to allow the discrimination between different underlying conditions, suggesting different possible solutions for vesical catheterization (Figure 1).

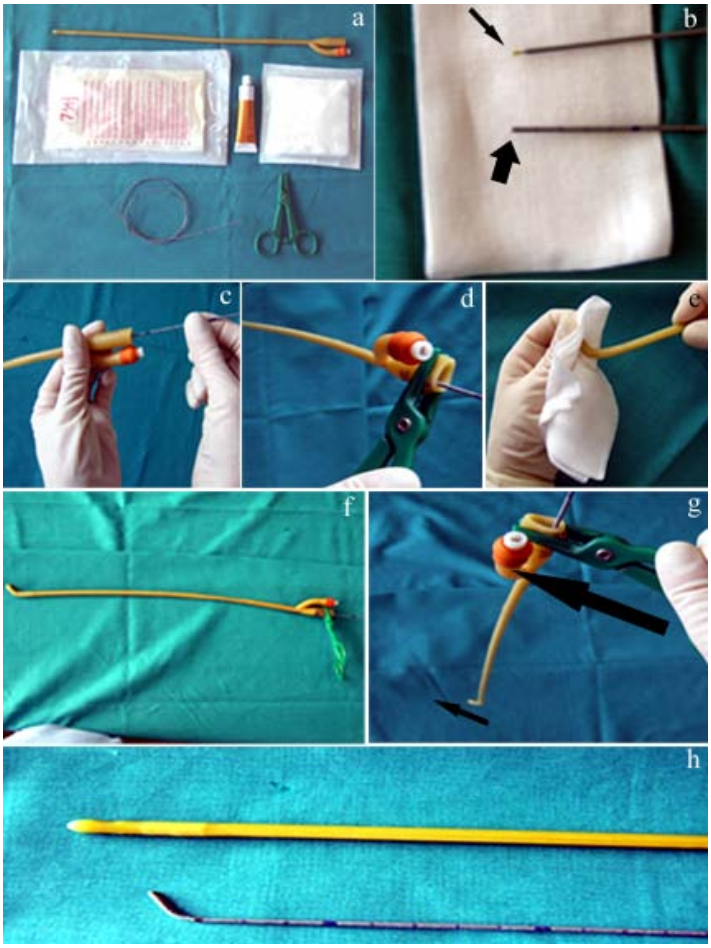
Figure 1. Flow chart adopted to manage vesical catheterization. *Distance from the external urethral meatum; Ch = Charriere unit (1/3 mm). TURP = trans-urethral resection of prostate; RRP = radical retropubic prostatectomy.



Catheterization is an aseptic skill that requires appropriate training and material. The present technique only requires equipment readily available in every urology department. Aside from the normal material used in a classical catheterization procedure, our technique in particular involves the use of a common Foley catheter (16 Fr) in flexible latex supplied with an autostatic inflatable balloon at the internal tip. We use an additional ureteral catheter (4 Fr) formed of an external removable plastic sheet with one blind tip (see arrow in Figure 2b), containing a straight cylindrical metal stylet coming out from the other tip (see arrow in Figure 2b) and a plastic Klemmer and two 5 mL tubes of lubricant gel (Figure 2a).

The first step consists of assembling the device in a sterile manner as follows: Insert the lubricant gel into the single lumen of the Foley catheter until the gel itself comes out from the tip holes. Insert the blind tip of the ureteral catheter into the lumen of the Foley catheter until it reaches the Foley tip (Figure 2c) and then clamp with the Klemmer the proximal extremity of the Foley, so fixing the Foley catheter and the ureteral catheter contained within (Figure 2d). Using gauze, fold the Foley tip reinforced by the inner ureteral catheter to give it the appearance of a Mercier catheter extremity (tip the extremity with an angle of 45 degrees with respect to the major axis of the catheter). Because of the internal partially metallic mandrel, the given shape will be maintained after the force is applied (Figure 2f and Figure 2g). The Klemmer is now oriented to maintain the same direction of the folded tip so that the tip orientation is known every time the catheter is inserted (Figure 2f and Figure 2g). The preparative phase to subsequent catheterization is completed.

Figure 2. The schematic passages of our technique. a) Material used to prepare our self-assembled catheter. b) The catheter is formed of an external removable plastic sheet with one blind tip (thick black arrow) containing a straight cylindrical metal stylet coming out from the other tip (thin black arrow). c) After the lubricant gel is introduced, insert the blind tip until it reaches the Foley tip. d) Clamp with the Klemmer. e) Using gauze, fold the tip to give it the appearance of a Mercier catheter. f) Because of the internal mandrel the given folded shape will be maintained after force is applied. g) The Klemmer is now oriented to maintain the same direction of the folded tip. h) After insertion, release the Klemmer and extract the ureteral catheter.



After application of common cleaning of the external male genitalia, insert around 10 mL of local anesthetic gel (Lidocaine hydrochloride, 2.5%) into the urethra and then hold the glans penis firmly to prevent the gel being released. Gently press the underside of the penile shaft in a downward direction to favor the distribution of lubricant in the direction of the posterior urethra. Wait a few minutes for the anesthetic to work. Next, wearing a second pair of sterile gloves, retract the foreskin, and hold the penis upright in the non-dominant hand at about 60 to 70 degrees of inclination, supporting with gauze wrapped around it. Just before you begin the catheterization, suggest that the patient take a few more slow deep breaths. This facilitates the relaxation of the urogenital diaphragm and avoids contraction of the external voluntary sphincter due to fear or muscular tension. This passage is useful when attempting to overrun the posterior urethra to reach the bladder. Grasp the catheter near the tip and insert it slowly, eventually by using additional sterile gauze to transfer to a pushing movement of the catheter. Continue to insert the catheter until its bifurcation. After complete insertion, release the Klemmer and extract the ureteral catheter (sheet and metal stylet together). The Foley catheter recovers its original straight tip shape (Figure 2h). Usually, urine doesn't come out immediately because of the gel obstructing the tip of the catheter. By palpating the bladder you will force urine to open the catheter tip holes. Just in case, aspiration by a syringe can help you with this purpose. Only when there is evidence of correct placement of the catheter into the bladder, you can inflate the Foley balloon, retract the catheter on the bladder neck, and cover the glans penis with its prepuce when present.

RESULTS

We tested the described technique in 76 male patients in our hospital requiring transurethral bladder catheterization by a urologist consultant because of a primary failed attempt. Indication of bladder drainage was, in 51 cases, acute retention of urine; other indications were pre-/intraoperative needs in 16 cases and clinical monitoring in 9 cases. The median age was 56.3 (range: 48 to 82), and in all patients there was at least 1 attempt of bladder transurethral catheterization (mean: 1.6) by a non-urologic physician. In most of these patients urological anamnesis was uneventful, thus difficult catheterization was attributable to a bulky prostate due to benign prostate enlargement. Other patients had a history of surgical interventions of the genitourinary tract; 10 patients in particular reported transurethral resection of the prostate and 7 patients reported open radical retropubic prostatectomy. In all cases the difficulty to pass a common Foley catheter (16 Fr) was verified by the urologic consultant. In 65 cases the described technique led to successful passage of the catheter into the bladder, while in 11 cases it was unfruitful. The subsequent management in the latter cases involved the use of a Mercier catheter with a tip hole allowing the passage of a ureteral catheter or a guide wire. This maneuver solved the problem in 5 patients, with concomitant pressure exerted by an assistant in 2 out of 5 cases. For 6 patients it was also unfruitful, and they underwent the successful placement of a suprapubic cystostomy (4 patients) or a flexible cystoscopy (2 patients). The technique was generally

Table 1. Clinical features of included patients and their results.

General Data	
- age (years)	56.3 (48-82)
- previous attempts (number)	1.6 (1-3)
Urological Anamnesis	N (%)
- past retropubic open radical prostatectomy (N)	7 (9)
- past transurethral resection of prostate (N)	10 (13)
- uneventful (N)	59 (78)
Indication for catheterization	
- acute urinary retention	51 (67)
- pre/intra-operative needs (non-urological surgery)	16 (21)
- clinical monitoring (hospital setting)	9 (12)
Outcomes	
- successful	65 (85,5)
- unfruitful	11 (14,5)*
Complications	
- urethral bleeding (self-limited)	12 (16)
- urinary tract infections	4 (5)
- false passage	2 (2,5)
- rectal injury	0 (0)

*Subsequent adopted measures were the use of a Mercier catheter with a tip hole allowing the passage of a ureteral catheter or guide wire (5), placement of a suprapubic cystostomy (4), or flexible cystoscopy (2).

well tolerated by all patients and no major complications occurred. We observed urethral bleeding in 12 patients, which stopped by itself in less than 30 minutes in all of these patients. Two patients developed signs and symptoms of urinary tract infection requiring the administration of antibiotics. Finally, in the 2 patients who underwent flexible cystoscopy, a false passage was documented. Table 1 summarizes patient characteristics and results.

DISCUSSION

The task of passing a urethral catheter often involves the active role of junior and inexperienced members of staff, potentially representing a source of medico-legal lawsuits for a urologist [4-9], especially when rough and unsuccessful attempts cause the patient distress and complications [2]. In the last few years, malpractice claims burst up to impressive figures, and almost every physician experienced/will experience some kind of claim, at times, in a formal legal setting [10-12], as demonstrated by the expanding role of legal medicine and the growth of guidelines in the field [13-15].

In this scenario, we described a simple technique for difficult, male, bladder transurethral catheterization, reporting its clinical outcome as a contribution to the body of evidence on this issue [16]. The technique is suitable for all male patients in whom there is no contraindication to urethral catheterization, and it can be performed at the bedside or during office activity, ensuring safety at all times. The technique does not add morbidity compared to simple catheterization and increases the likelihood of successful primary urethral catheterization in the case of acute retention of urine or the need to monitor diuresis in clinical settings. Moreover, it doesn't require hospital admission, as in the case of placement of a suprapubic catheter. The required experience to place this self-assembled catheter is the same involved for the use of Mercier catheters, and we did not observe a different incidence of complications due to the adoption of this composed device.

Different methods have been described since 1979 in order to overcome difficult transurethral catheterization in different clinical situations (Table 2). Many of them involve the use of a cystoscope, which led to the placement of a guide wire into the bladder after passing the stricture. Nowadays the flexible cystoscope is readily available in urology departments, but it is rarely available in non-urological departments, such as the emergency room or intensive care departments. Moreover, it requires connection to a light source and a water flux, and its use often implies the presence of an assistant. These aspects limit the use of any cystoscope-based technique at the bedside. The most popular method to manage difficult catheterization is the glide-wire technique, first described by Freid and Smith [10]. A hydrophilic-coated glide wire is introduced through the urethra and advanced with gentle, steady pressure until the obstruction is overcome and the wire reaches the bladder. After that, an open-ended ureteral catheter is passed over the wire, the guide wire is substituted with a Teflon-coated guide wire, and finally a Graham catheter is placed over the ureteral catheter guide wire, or alternatively the urethra is dilated until 18 Fr to pass a 16 Fr Foley catheter. The technique was further revisited by others, introducing minor modifications such as the use of a Foley catheter with a cut tip to be passed over the

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Table 2. Literature review on the issue.

Year	Author	Pts	Clinical setting	Maneuvers and tips
1979	Walden [17]	3	Patients affected by anasarca	Vaginal speculum to visualize the glans and long forceps to advance the catheter
1985	Jordan et al. [18]	-	Intraoperative consult	Abundant jelly, Coude-type catheter 16-18 Ch, urethrography, urethroscopy, and then filiforms under direct vision with (a) a council tip over a stylet attached to the filiform or (b) use of a balloon urethral dilatator or suprapubic catheterization
1989	Krikler. [19]	-	Difficult catheterization in patients without false passages or diverticula	Flexible cystoscope to bypass the stop using a guide wire, ureteral catheter placed following the guide wire, Foley with a cut tip is placed following the ureteral catheter
1992	Lowe et al. [20]	20	False channels, undermined bladder neck after TURP, early loss of catheter after RRP	Sheath placed over a cystoscope reaching the bladder, remove the cystoscope, and pass the Foley within the sheath.
1993	Cancio et al. [21]	-	Difficult catheterization	Abundant jelly, a Coude-type catheter 20-24 Ch for BPH, and 14-16 Ch for strictures, eventually using perineal pressure.
1994	Beaghler et al. [22]	54	Unfruitful previous attempts in patients with reported weak urinary stream and urinary retention	Flexible cystoscope to visualize the obstruction, that is bypassed by a guide wire, sequential dilatation (Nottingham dilatators) to allow the passage of a Council-type catheter over the guide wire
1995	Blitz [23]	8	Difficult catheterization in patients with previous endoscopic prostate or urethral procedures	Flexible cystoscope to bypass the stop and reach the bladder, a guide wire is then inserted through the cystoscope, the cystoscope is removed and a Foley with a cut tip is placed following the guide wire
1996	Freid et al. [24]	20	Unfruitful catheterization with cystoscopy not available	Guide wire is inserted to reach the bladder, ureteral catheter over it, substitution of the guide wire with a Teflon-coated guide wire. After this: (a) Graham catheter is passed following the ureteral catheter containing the Teflon guide wire, or (b) dilatation to 16-18 Ch and then pass a Council-type catheter.
1998	Harkin et al. [25]	30	Unfruitful catheterization (single attempt) in absence of major urethral trauma	Foley catheter is placed through the urethra by simultaneously instillation of saline solution by a catheter tip syringe attached to the Foley.
1998	Rozanski et al. [26]	2	Undermined bladder trigone after TURP or TUIP	Short rigid urethroscope passed through a modified Foley catheter (22 Ch). This combined system reaches the bladder under vision. The urethroscope is then removed.
2000	Lachat et al. [27]	21	Intraoperative consult	Guide wire reaches the bladder, a Foley (6 Ch) with a cut tip is advanced over the wire.
2004	Zammit et al. [28]	-	Unfruitful initial attempts with a Foley catheter 16 Ch	Hydrophilic guide wire is advanced into the bladder, and then: (a) a Foley with a cut tip is advanced over the guide, or (b) a ureteral catheter is placed over the guide, with subsequent dilatation and placing of a Foley with a cut tip (12 Ch).
2005	Athanasopoulos et al. [29]	-	Urethral strictures	Hydrophilic guide wire followed by a 14-16 Ch ureteric access sheath.
2007	Mistry et al. [30]	30	Acute retention after unfruitful attempts for catheterization by using 12-18 Ch urethral catheters	Hydrophilic catheter (12-18 Ch), guide wire passed through it and its substitution with a Council-type catheter.
2008	Chelladurai et al. [31]	-	Urinary retention due to ureteral stricture	Flexible cystoscope to visualize the obstruction that is bypassed by a guide wire; sequential dilatation over the guide to allow the passage of a catheter on it
2009	Athanasopoulos et al. [32]	10	Difficult catheterization for urethral stricture	Flexible-tip hydrophilic glide wire is placed to reach the bladder under fluoroscopic control and a ureteral access sheath with its trocar (14-16 Ch) follows the guide under fluoroscopy. Upon removing the trocar, a Foley (12 Ch) is then placed and the sheath extracted.
2009	Liss et al. [33]	6	Difficult catheterization	A stiff guide wire is placed with its floppy end within a Foley and proximally clamped to the catheter to obtain a single system.

Pts = Patients; BPH = Benign Prostatic Hyperplasia; Ch = Charriere unit (1/3 mm), TURP = transurethral resection of prostate; TUIP = trans-urethral incision of prostate; RRP = radical retropubic prostatectomy.

wire [13,14], the use of an ureteric access sheet to be passed over the wire [15,18], or the use of a hydrophilic non-autostatic small catheter in order to place the wire into the bladder [16]. In general, authors using the guide wire technique have reported high success rates. Limitations are that 2 or more passages are needed compared to our methods, and the fact that it is never possible to check the vesical position of the wire, it could be a problem in case of false passage. Another proposed technique is the so-called "Liss maneuver" [19]. A 0.035-inch super stiff guide wire was placed floppy end first down a 18 Fr Foley catheter lumen; the guide wire was then clamped proximally to the body of the catheter at its point of exit. The body of the wire increased the catheter body stiffness while the tip of the catheter, holding the floppy end of the wire, showed no significant increase in stiffness. This method is similar in the concept to the one described in this article. We believe, however, that giving a Mercier-like shape to the tip of the catheter provides more chances to pass the catheter, especially in the case of a bulky prostate due to benign prostate enlargement, because of the anatomical fitting.

The advantage of using the described technique is the chance to easily position a flexible latex catheter supplied with an autostatic inflatable balloon in a single passage by temporarily adapting its tip and reducing its deformability. In this way we are not obliged to substitute a Mercier-type catheter by introduction of a guide to allow subsequent substitution with a Foley catheter modified with a tip hole, or a council catheter [3]. By these tricks, we can afford the task of a difficult catheterization in male patients with a bulky prostate, abating the number of unfruitful attempts and unnecessary passages of other catheters and guides, and the resulting likelihood of complications derived from the repeated procedures.

The armed Foley technique here described was fruitful in a defined clinical situation, such us a bulky prostate, bladder neck stricture from past transurethral resection of the prostate, and stenosis of the vesicourethral anastomosis after radical prostatectomy. As other methods, it seems to be more suitable to manage difficult catheterization in different situations, such as strictures of the anterior urethra. We propose an algorithm in order to manage difficult transurethral catheterizations, taking into account this novel method.

CONCLUSION

We described a simple and safe technique to allow catheter insertion in men suffering with different pathologic or anatomic conditions when a primary attempt at simple transurethral catheterization fails. The technique is safe and well tolerated by patients, increasing the overall likelihood of successful primary urethral catheterization without the need for hospital admission.

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