Original Article

A clever technique for placement of a urinary catheter over a wire

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Abstract

Objective: The objective was to present a straightforward, step-by-step reproducible technique for placement of a guide-wire into any type of urethral catheter, thereby offering a means of access similar to that of a council-tip in a situation that may require a different type of catheter guided over a wire.

Materials and Methods: Using a shielded intravenous catheter inserted into the eyelet of a urinary catheter and through the distal tip, a "counsel-tip" can be created in any size or type of catheter. Once transurethral bladder access has been achieved with a hydrophilic guide-wire, this technique will allow unrestricted use of catheters placed over a wire facilitating guided catheterization.

Results: Urethral catheters of different types and sizes are easily advanced into the bladder with wire-guidance; catheterization is improved in the setting of difficult urethral catheterization (DUC). Cost analysis demonstrates benefit overuse of traditional council-tip catheter.

Conclusion: Placing urinary catheters over a wire is standard practice for urologists, however, use of this technique gives the freedom of performing wire-guided catheterization in more situations than a council-tip allows. This technique facilitates successful transurethral catheterization over wire in the setting of DUC for all catheter types and styles aiding in urologic management of patients at a cost benefit to the health care system.

Key Words: Prostatic hyperplasia, urethral obstruction, urethral stricture, urinary bladder neck obstruction, urinary catheter, urinary retention

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Received: 20.01.2015, **Accepted:** 09.03.2015

INTRODUCTION

Urologists frequently address difficult urethral catheterization (DUC), which may be due to obstruction, constriction, false passages, urethral stones, urethral strictures, phimosis, anasarca, bladder neck contracture, benign prostatic hyperplasia (BPH), and other more rare causes.[1,2] To facilitate successful catheterization in these situations, a wide variety of catheters differing in style, shape, size, and material have been manufactured (Coudé, council-tip, silicone, etc.). Many techniques have also been described including the use of a vaginal speculum with forceps advancement in the presence of severe anasarca,[3] the use of Peel-away® sheath placed over a resectoscope or cystoscope allowing for catheter access through the sheath once the scope is removed from the urethral lumen,[4] and hydrodistension of the urethra and lubrication of the hydrophilic Foley by attaching a 60 mL catheter tip be the standard of care.[5]

Access this article online	
Quick Response Code:	Website: www.urologyannals.com
	DOI: 10.4103/0974-7796.157959

A council-tip catheter allows for wire-guided placement through an end hole drainage port (lumen) at the tip of the catheter. This provides a direct route for the wire from the drainage port through the lumen of the catheter for advancement of the catheter over the wire. There are situations in which the necessity of a guide-wire is tantamount to the need for varying styles of catheter. Many situations require bladder lavage, such as posttransurethral resection (TUR) of bladder tumor or TUR of prostate (TURP), hemorrhagic cystitis, or gross hematuria, and wire-guidance may be favorable due to the complexity of the situation. The council-tip is furthermore limited by its availability in many clinical settings as the cost of such catheters can be as much as 6–10 times the cost of the more commonly used urinary catheters. This makes it difficult for facilities with budget limitations to electively carry this additional catheter type. A less expensive urinary catheter modified into a council-tip style catheter with a routinely available angiocath, may be a preferred option due to cost, availability, and versatility. We describe a technique that allows for wire-guided catheter placement using any type, size, or style of urinary catheter.

MATERIALS AND METHODS

We present this technique utilizing a 16Fr Foley Catheter, an 18 gauge BD Insyte™ (Becton Dickinson) Autoguard shielded intravenous (IV) catheter (angiocath), and a 0.035Fr (0.89 mm) Radiofocus® Glidewire® [Figure 1]. Please note that any type or style of urinary catheter may be utilized depending on the clinical scenario. Any angiocath sized 18 gauge or larger may be used to accommodate the 0.035Fr glide-wire (hydrophilic guide-wire), but 16 and 18 gauge seem to be most readily available.

The technique is performed as follows:

- First, a guide-wire must be placed into the bladder. Obtain transurethral access to the bladder using a hydrophilic guide-wire (a procedure common to the urologist), often facilitated by cystourethroscopy
- Prepare the catheter by creating a new opening in the tip of the catheter. This is achieved by advancing the IV catheter (angiocath) through one of the lateral eyelets toward the drainage tip piercing the catheter centered at the tip. Once the angiocath is through the end of the catheter, the auto guard is deployed, and the needle is shielded, leaving the angiocath positioned in the end of the catheter tip [Figure 2]
- The 0.035Fr Glidewire® is then advanced through the angiocath (from the external drainage surface of the catheter) until approximately 2–3 cm of the wire is exposed from the portion of the angiocath exiting the eyelet. While stabilizing the Glidewire®, the angiocath is removed from the catheter leaving only the Glidewire® passed through the tip [Figure 3]
- By carefully retreating the exposed portion of the Glidewire® until it is able to pass easily through the lateral eyelet into the central canal (drainage port) of the catheter. Then advance the catheter over wire until bladder access is achieved.

If the resistance is encountered as the catheter is sliding over the wire, water or saline can quickly be applied to the wire and catheter tip. Since these two contacting surfaces are hydrophilic, simply wetting the surfaces will aid in easing the advancement of the catheter.

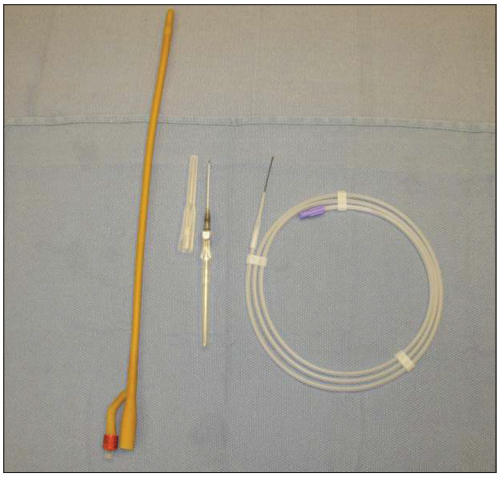

Figure 1: Material list

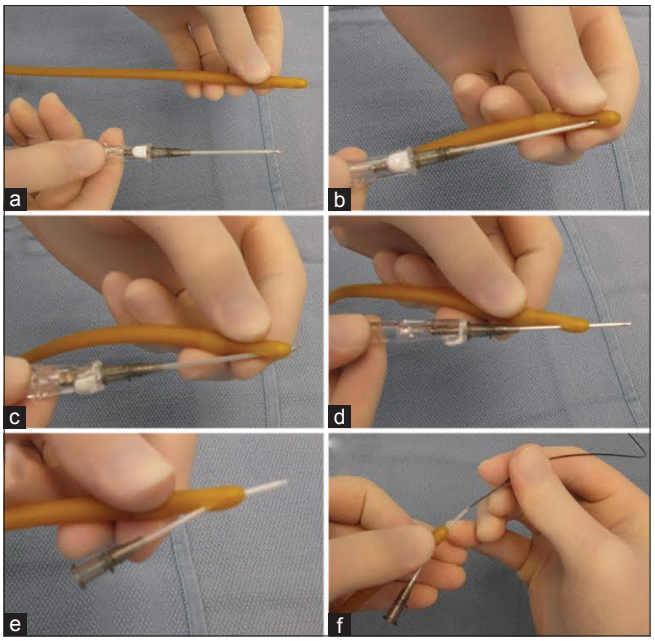

Figure 2: (a) This technique may be performed with any style catheter and an 18 (or larger) gauge angiocath, (b) pass the angiocath through the lateral eyelet of the catheter, (c) advance the angiocath through the center tip of the catheter, (d) ensure the angiocath shaft as well as the needle pass through the tip of the catheter, (e) use the push-button needle shield to retract the needle leaving the angiocath in place, (f) after achieving distal glidewire placement into the bladder, advance the proximal end of the glidewire through the tip of the angiocath

RESULTS

When encountering a difficult catheterization and choosing to use wire-guided access, this approach is preferred due to the versatility and freedom it offers. If the circumstances warrant the use of specific catheter for a patient with additional pathology such as a false passage, BPH or post-TUR and wire-guided placement is preferred, using an IV catheter (angiocath) maintains the structural integrity of the catheter facilitating precise guidance.[4] A three-way irrigation catheter may be advanced over a wire in cases such as hemorrhagic cystitis, hemorrhagic prostatic urethra, and postinstrumentation. Since adopting this procedure, hundreds of catheters have been successfully and safely placed over wire.

A cost analysis was performed by comparing prices of the different types of catheters from different suppliers, as well as the cost of the additional materials required for the technique [Table 1]. The cost of a standard catheter is significantly less than the cost of a council-tip catheter. There is a convincing cost advantage in utilizing this technique over a council-tip catheter, in addition to the clinical advantage observed.

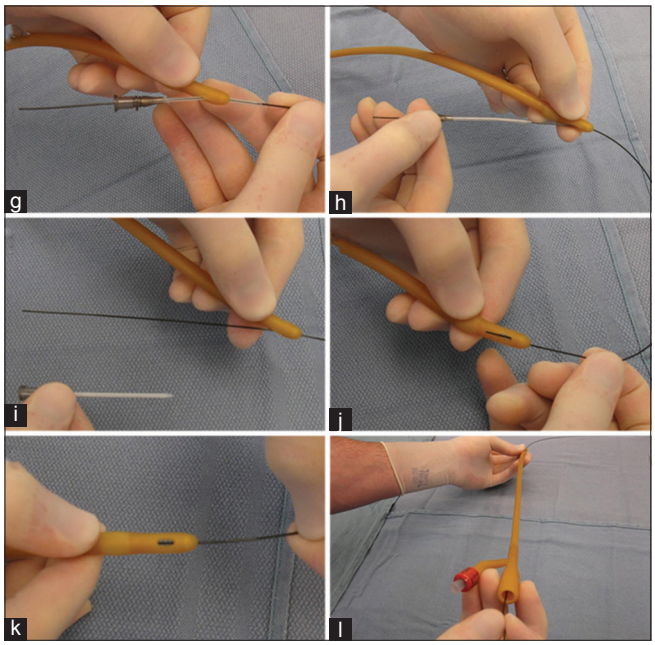

Figure 3: (g) Pass the glidewire through the full extent of the angiocath, (h) remove the angiocath, (i) maintain the position of the glidewire through the tip of the catheter and out of the lateral eyelet, (j) slowly withdraw the glidewire until it enters back into the lateral eyelet of the catheter, (k) maintaining the glidewire's position within the central tip of the catheter, redirect it to advance through the catheter lumen, (l) with the catheter successfully positioned over the glidewire, guide the catheter into the bladder over the glidewire

DISCUSSION

Other techniques of creating a "council-tip" have been described in the literature, however, limitations exist. Cutting the catheter tip transversely can result in a blunt, misshapen tip to a Foley and alter the shape of a Coudé tip causing loss of the structural integrity and sleek shape. A vertical cut is often technically difficult and still alters the integrity of the catheter's tapered structure creating a flap at the tip of the catheter. Both cuts may also increase the likelihood of resistance and catch on a stricture or urothelial flap. In addition, if a cut is made and a catch or abrasive surface is left on the catheter, the thin layer of urothelium (3–5 cells, depending on the volume) may be traumatized during insertion, negating the effectiveness of the technique.

A new technology is now available that enables direct visualization of the urethra while passing a catheter. One such system (DirectVision System; PercuVision, Westerville, Ohio, USA) consists of a microendoscope that inserts into 1 lumen of a three-way/trilumen Foley catheter. The microendoscope is connected to a camera and light emitting diode, transporting light to the catheter tip and an image back to the liquid crystal display monitor for real-time visualization of the urethra during catheter placement. This option, while improving outcomes of a DUC, may be cost-prohibitive based on frequency of DUC seen in a given population and equipment cost. A thorough cost analysis would be advised for individual care facilities to determine the feasibility of such devices. This technology is also mainly targeted for safe placement of initial catheter placement by nursing staff or nonspecialists. A urologist would still typically handle a difficult catheterization, and these scenarios routinely require wire access and dilatation regardless.

In the clinical setting, contemporary urethral dilatation is performed with dilating instruments over a wire, although some still prefer the use of fillaforms. After dilating over a wire, use of this technique also allows for the catheter of choice to

Table 1: Cost analysis

Manufacturer	Catheter type	Cost of catheter	Cost of angiocath	Cost of glidewire	Total cost of catheterization
Covidien	18Fr two-way council-tip	$31.20/1 count	N/A	$30.00	$61.20
Covidien	18Fr Foley	$3.20/1 count	$0.48	$30.00	$33.68
Bard	18Fr Coude	$9.44/1 count	$0.48	$30.00	$39.92
Bard	18Fr Foley	$3.35/1 count	$0.48	$30.00	$33.83
Bard	18Fr three-way Foley	$28.62/1 count	$0.48	$30.00	$59.10

Prices listed were from a search of different suppliers using the mean cost per unit. The Radiofocus® Glidewire® has a range of cost from $25.00 to $36.00 with the mode being $30.00. The cost of the angiocaths has been calculated based on bulk pricing with individual angiocaths ranging from $0.48 to $0.63 contributing minimal relative cost

be placed over that same wire, while maintaining its position within the bladder.

This technique also offers the urologist with an additional tool when a council-tip catheter is not available. This facilitates wire-guided catheter placement with traditional catheters and readily available equipment, reducing the cost.

Proper catheter placement is critical, as failed attempts at catheterization may lead to iatrogenic injury. Forcing a catheter past the point of resistance can cause injuries ranging from a mucosal tear and bleeding to more serious false passages (perforations), which are associated with infection, urethral stricture, and subsequent surgical management.[6-9] Repeated and unsuccessful attempts may result in stress and pain for the patient, injury to the urethra, which potentiates urethral stricture formation requiring surgical reconstruction, and problematic subsequent catheterization. Improper insertion of catheters also can significantly increase healthcare costs due to added days of hospitalization, increased interventions, and increased complexity of care.[5,10]

We utilize this technique in any patient that we feel advancing a catheter over wire would be of benefit. We no longer stock council-tip catheters in our institutions since we have found this technique to be simple, easily reproducible, and materials needed are readily available. We routinely conclude TURP procedures by placing a catheter over wire in this fashion after placing a wire through the resectoscope sheath into the bladder before removing the sheath to avoid misplacement of the catheter due to the TUR defect. No adverse outcomes have been observed, and no mortality or morbidity has been attributed to catheter placement with this technique.

CONCLUSION

Complicated urinary catheterization is a commonly encountered urologic problem. The technique presented offers a step-by-step approach for improving success in catheter placement over a wire. Equipment needed is typically available on the hospital floors and in the operating room. This approach offers patients better care, with less pain and complications, while minimizing hospital resources, sparing the facility of the need to stock additional supplies.

While council-tip catheters offer a means of simple advancement over wire, they are limited by the lack of versatility for situations that call for a different style of catheter such as a Coudé, three-way or Foley catheter of different size. Furthermore, they may be cost prohibitive or simply not available to the urologist.

Coudé catheters offer greater transurethral access in the setting of BPH traversing the S-shaped bulbous urethra with rigidity to advance beyond an obstructing prostate, however, the lack of a guide makes this tool more difficult in the case of a stricture or false passage.

A three-way catheter is useful when bladder lavage is necessary, but again offers little ability to navigate obstacles in the urethra. In addition, the majority of urologists prefer large caliber three-way catheters to prevent a clot obstruction of the catheter, and this may be the cause for assistance in advancing beyond stenotic regions of the urethra.

This technique is also helpful in safely placing a drainage catheter at the conclusion of a TURP where a thorough resection thins the prostatic urethra and may undermine the bladder trigone in resection of the median lobe. The wire can be placed through the cystoscope/resectoscope followed by placement of the catheter over wire.

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How to cite this article: Abbott JE, Heinemann A, Badalament R, Davalos JG. A clever technique for placement of a urinary catheter over a wire. Urol Ann 2015;7:367-70.

Source of Support: Nil, **Conflict of Interest:** None.