The LoFric® Catheter: New Technology Improves An Old Technique

Barbara Montagnino

Clean, intermittent catheterization (CIC) was first introduced in 1970 by Dr. Jack Lapides. His initial patient was a 30-year-old woman with multiple sclerosis experiencing urinary symptoms consistent with the disease process (urge incontinence, incomplete bladder emptying, and recurrent urinary tract infection) (Lapides, 1971). Although the patient refused surgical intervention for relief of her urologic problems, she readily accepted a program of periodically emptying the bladder by passing a clean catheter. Favorable results as measured by continence and sterile urine prompted Dr. Lapides and other physicians to offer this alternative treatment to patients. Consequently, CIC as a safe and effective method of managing the nonfunctional bladder was established.

Over the years the basic technique of CIC has remained unchanged. Good hand washing coupled with clean rather than sterile technique is still the accepted practice. Although this is a rather simple procedure, it is not without the risk of significant complications (urinary tract infections [UTI], hematuria, urethritis, and pain). More serious complications are urethral strictures and false passages. Urethral stricture formation is directly related to trauma caused by friction between the catheter and the urethral mucosa (Wyndaele & Maes, 1990). False passages may develop during difficult catheterization. Both of these complications require surgical intervention.

The LoFric® Catheter

In the early 1980s, technology pioneered in Sweden by Astra Tech, Inc. resulted in the development of a new product called the LoFric® catheter. The catheter was designed to significantly reduce the incidence of urethral complications from catheter friction (Vaidyanathan, Soni, Dundas, & Krishnan, 1994; Waller, Jonsson, Norlen, & Sullivan, 1995).

The LoFric catheter is a hydrophilic, nonlatex plastic catheter with a polyvinylpyrrolidone (PVP) coating that absorbs water and binds it to the catheter surface. Sodium chloride (NaCl) is added to the outer layer to bind the water further and counteract premature drying during catheterization. The catheter becomes extremely slippery when soaked in water for 30 seconds. No additional lubricant is needed. The layer of water covering the LoFric catheter is reported to be 20 times more effective than a lubricant applied to a conventional catheter. Therefore, friction produced by the LoFric catheter is reduced by 90% to 95%. The protective coating stays on the catheter through insertion and withdrawal. This unique feature protects the entire urethra from trauma; especially the membranous urethra, which is most susceptible to stricture and where lubricant can not reach. The smooth, slippery coating also allows for less painful catheterization. Patients who find it difficult or even impossible to pass a regular catheter often do very well with the LoFric catheter.

For the past 15 years the LoFric catheter has been used extensively in Scandinavia and Europe. Clinical trial findings and research findings reflect very good results and no serious complaints following prolonged use (Hamiss, Beckingham, Lenberger, & Lawrence, 1994; Waller et al., 1995). In contrast, complications have been reported as high as 20% in patients participating in long-term studies using standard catheters (Wyndaele & Maes, 1990). Since its introduction in the United States in 1996, the LoFric catheter has been pre-
Case Study - The LoFric® Catheter

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K.T. is a 16-year-old boy with neurogenic bladder secondary to myelomeningocele. Urinary incontinence is managed by CIC every 4 hours. K.T. presented to the Spina Bifida Clinic complaining of painful, difficult catheterization. Under general anesthesia, cystoscopy was performed using a size 17 French endoscope. Cystoscopic examination revealed a dense stricture of the bulbomembranous urethra. Placement of a percutaneous suprapubic tube was done as a temporizing procedure. Urodynamic and radiologic studies showed adequate bladder capacity at low pressure. After discussion with K.T. and his mother, it was decided an appendiceal Mitrofanoff continent diversion would be done.

The procedure was successfully completed without complications. Postoperative recovery was uneventful. One month after discharge, K.T. was seen in clinic for stent removal from the Mitrofanoff stoma. The stoma was easily catheterized during this clinic visit. K.T. and his mother were instructed to catheterize the appendi- cal stoma four times daily with a well-lubricated plastic catheter. The suprapubic catheter was to be clamped during the day and unclamped while sleeping. The mother showed understanding of the appendicale CIC procedure by repeat demonstration.

Approximately 3 weeks later, the patient returned to clinic for removal of the suprapubic catheter. At that time the mother reported she had catheterized the stoma several times prior to the visit but had discontinued after having difficulty passing the catheter. Fortunately, she had left the suprapubic catheter unclamped. She had not notified the surgeon or the nurse coordinator in the Spina Bifida Clinic of the problem with catheterization.

After discussion with K.T. and his mother, K.T. was examined under anesthesia and dilatation of the Mitrofanoff stoma was attempted. The stoma was unable to be catheterized with a 7.5 French cystoscope. A new suprapubic catheter was placed. A discussion was held with K.T. and his mother regarding stoma revision and the importance of complying with the recommended plan for catheterization. Subsequently, K.T. missed several clinic appointments and returned approximately 2 months later.

During the clinic visit, the staff decided to try the LoFric® catheter, which had been recently introduced to the pediatrician and urologist on the spina bifida team. Using a 12 French straight LoFric catheter, the attending urologist attempted urethral catheterization on K.T. The LoFric catheter went in easily with no complaints of discomfort from the patient. The suprapubic catheter was removed several days later after the patient and family demonstrated a willingness to comply with urethral catheterization using the LoFric catheter. For the last 10 months, K.T. has been catheterizing on a regular schedule and with no problems using the 12 French LoFric catheter.

As with most patients with spina bifida, K.T. has a history of multiple surgical procedures. Had this catheter been available to the health care team earlier, major surgery may not have been necessary. Thus, the LoFric catheter may be the answer to complex catheterization problems.

scribed for many patients who have difficulty using a regular catheter as well as for patients who wish to prevent complications from catheterization.

Indications

Neurogenic bladder. Patients with neurogenic bladder typically perform CIC several times daily to manage urinary incontinence and protect the upper urinary tract from damage. As a consequence of the long-term nature of their catheterization program, these patients are at particular risk for complications due to urethral trauma and recurrent UTI (Wyndaele & Maes, 1990).

Wyndaele and Maes (1990) reported urethral complications to be as high as 20% in patients using regular catheters with lubricating gel. However, in a retrospective study following 30 spinal-cord injury patients practicing CIC using LoFric catheters for 7 years, no urethral complications were found in any of the patients. Furthermore, the incidence of UTI was also lower than reported in long-term studies using conventional catheters, with 40% of the patients using LoFric catheters maintaining sterile urine for the entire 7 years of followup (Waller et al., 1995).

Recurrent UTI. Most patients practicing CIC experience bacteriuria. Patients who use the LoFric catheter experience fewer problems with infections because the LoFric catheter decreases the development of infection in 2 ways. First, bacteria do not adhere to the catheter’s slippery surface; therefore, ever-present bacteria in the distal urethra do not get introduced into the bladder. Second, with regular use of the LoFric there is a markedly decreased incidence of inflammation and abrasion in the urethra, which prevents bacteria from colonizing on the damaged mucous membrane of the urinary tract (Vaidyanathan et al., 1994).
Intact urethral sensation. In the patient with normal or partial urethral sensation on CIC, the LoFric catheter allows for a more comfortable catheterization experience. Many patients with medical conditions that require CIC (for example, prune belly syndrome, posterior urethral valves, multiple sclerosis, atonic bladder, and urethral stricture) have urethral sensation and complain of discomfort when catheterizing.

Less discomfort during catheterization increases compliance with the catheterization program and enhances the patient’s quality of life (Sutherland, Kogan, Baskin, & Mevorach, 1996). This is an important factor when children perform CIC.

Urethral strictures. Internal urethrotomy is the standard treatment for urethral strictures. However, recurrence of stricture at the excision site has been reported to be as high as 25% to 50% necessitating repeat surgery. To avoid formation of new scar tissue, dilatation of the affected area of the urethra is necessary. As shown in one clinical study, patients who underwent internal urethrotomy for urethral strictures were able to prevent stricture recurrence by dilating with a LoFric catheter once weekly for 12 months (Harris et al., 1994). Patients with stricture disease have normal urethral sensation; therefore, making the dilation process as painless as possible increases compliance. Self-dilation with the LoFric catheter is safe and effective in preventing stricture recurrence in the long term (Harris et al., 1994).

Previous surgical procedures of the urethra, bladder, neck, and continent urinary diversion. Urethral irregularities often develop following surgery on the urethra and bladder neck. Passing a regular catheter may be difficult or impossible. This is especially true of patients with bladder extrophy who typically have a very tortuous urethra after epispadias repair and bladder neck reconstruction. They generally have full or partial sensation in the urethra and often find catheterization painful as well as difficult. In these patients, using the LoFric catheter to catheterize transurethrally may avoid additional surgery to revise the urethra or create a continent urinary diversion.

Patients with continent diversions will also benefit from using the LoFric catheter. This method of CIC carries with it the risk for developing problems in the catheterizable channel or stoma site, which can lead to additional surgical procedures. Stricture, stenosis, prolapse, or bleeding occur most often. Frequently, these patients have also undergone bladder augmentation and must irrigate the augmented bladder to remove mucus. In this author’s experience, some patients using LoFric catheters are able to use a larger size LoFric catheter than their regular catheter which facilitates faster, more complete bladder emptying of urine and mucus. This decreases the risk of UTI and bladder stone formation while also protecting the mucosa of the catheterizable channel and stoma site from trauma.

Intravesical therapy. The LoFric catheter is also beneficial in patients undergoing instillation of chemotherapy. Intravesical therapy is often used in the treatment of superficial bladder tumors. The most commonly instilled agent is bacillus Calmette-Guerin (BCG) (Black, Hawks, & Keene, 2000). Correct instillation procedures for BCG therapy are essential in preventing side effects. Massive systemic spread of BCG from the bladder is possible when there is severe epithelial inflammation or a fresh bleeding wound in the urethra or bladder. Almost all cases of BCG sepsis are due to traumatic catheterization, increased bladder pressure during instillation, or large areas of damaged or inflamed bladder mucosa (van der Meijden, 1995). The protective coating on the LoFric catheter provides for a nontraumatic catheterization decreasing the risk of side effects due to systemic absorption through mucosal damage. Catheterization with the LoFric catheter is also less painful for these patients who generally have intact urethral sensation.

Patient Benefits
Avoidance of surgery. Patients using LoFric catheters may decrease the likelihood of requiring surgical procedures that interfere with life in general and necessitate time away from school or work. Patients using the LoFric catheter for CIC have a

Patient Instructions for Use of the LoFric Catheter
The LoFric catheter is easy to use. Follow these steps:
1. Peel open the package about 2 inches.
2. Fill the package with tap water or as directed by your physician.
3. Remove the blue tab and affix package to a dry surface.
4. Let catheter soak in water for at least 30 seconds.
5. Remove catheter from package and catheterize as usual. No additional lubricant is needed.
6. If the catheter is too slippery to easily manage, empty package of water and tear off approximately 5 inches of the bottom of the package. Grasping the catheter by the remaining paper package makes for a handy, non-slippery hold on the catheter.
7. The LoFric catheter is designed for single use only. After use, the sodium chloride content of the surface layer is diminished, therefore increasing the friction rate between the catheter and the urethral mucosa (especially upon withdrawal). Thus reusing the catheter could cause injury to the urethra and/or increase the risk of infection.

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reduced risk of developing urethral complications, such as strictures and false passages, which typically require expensive surgical procedures for correction. Post-operative urethrotomy patients have less chance of recurrent urethral stricture formation when following a once weekly self-dilation program using the LoFric catheter.

Less antibiotic use. Patients using the LoFric catheter may reduce their incidence of UTI, which decreases the need for use of expensive antibiotics. This is of particular importance today, as there is much concern about the development of drug-resistant organisms due to the overuse of antibiotics.

Enhanced quality of life. Patients reported a high level of satisfaction when using the LoFric catheter (Sutherland et al., 1996). Less discomfort when performing prescribed catheterization results in higher quality of life for patients (especially children) on catheterization programs. Preventing complications such as UTI and additional surgeries will also improve quality of life for the patient and the family.

Limitations

One-time use. The catheter is designed for one-time use only. After the catheter has been used, the sodium chloride content of the surface layer is diminished. Hence, injury could occur with reuse because of the decreased lubrication and increased friction.

Cost. Because the LoFric catheter can only be used one time, there is increased cost for the patient. A new catheter must be used for each catheterization procedure. With standard CIC using traditional catheters, the catheter is cleaned and reused at a later time which decreases the cost for the patient. However, the increased risk of complications and cost of treatment may offset advantages to catheter reuse. All advantages and disadvantages must be considered when determining the cost benefit ratio of either method. When complex catheterization problems are encountered, the LoFric catheter should be considered as a possible alternative for treatment.

Summary

The design of the LoFric catheter has been explained. Conditions in which selection of the LoFric catheter may be appropriate have been identified and advantages and disadvantages have been outlined. It is up to the patient and health care team to determine which catheter selection is best for each patient circumstance. The LoFric catheter should be considered for patients with complex catheterization problems.

References


