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A new model for suprapubic catheterization: the MediPlus Seldinger suprapubic catheter

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Insertion of a suprapubic catheter is one of the essential skills that all surgeons should master. It provides an alternative way to drain the bladder in cases where urethral catheterization is contraindicated or deemed difficult. It also has a role in elective cases where long-term drainage of the bladder is required. In this article, we discuss the MediPlus suprapubic catheter kit, which offers a new and potentially promising technique for safe introduction of the catheter into the bladder.

KEYWORDS: bladder • catheter • guidewire • retention • Seldinger • suprapubic

Suprapubic catheterization (SPC) is a surgical procedure traditionally performed in the operating theater, either under general or local anesthesia, using blind or ultrasound-guided percutaneous trocar puncture. In recent years, suprapubic catheters have become more prevalent than indwelling urethral catheters for those requiring long-term catheterization, such as patients with neurological disorders, intractable incontinence or bladder outlet obstruction who are unfit for transurethral resection. In our experience, SPC is superior to urethral catheterization with regard to patient satisfaction, comfort and nursing care [1,2].

For safe placement of a suprapubic catheter, the bladder must be adequately distended. Distention of the bladder can be very difficult in patients with a small-capacity neurogenic bladder [1,3], and blind percutaneous insertion of conventional wide-bore trocars can result in bowel perforation [4,5]. Until recently, SPC with blind trocar has remained the predominant technique used in the UK. However, recently a new SPC introducing kit, based on the Seldinger technique, has been developed (MediPlus Ltd, High Wycombe, UK) that allows controlled entry of the trocar into the bladder over a guidewire and is designed to reduce the potential hazards of the blind technique.

The new kit uses the Seldinger technique for safe insertion of the suprapubic catheter. With the patient supine and the suprapubic area thoroughly cleaned, local anesthetic is infiltrated

2 cm above the pubic symphysis in the midline. In the elective setting, the bladder is filled with a target volume of greater than 350 ml sterile water either using the flexible cystoscope or a urethral catheter. Clearly, the bladder will be palpable or percussable in an emergency scenario. A small incision approximately 1 cm in length is made in the skin to allow easier insertion of the trocar later on. The bladder is then punctured using the 18-gauge needle, with the knowledge that inadvertent bowel injury by the needle may still occur in rare cases. After confirming the position of needle in the bladder by aspiration or flexible cystoscopy, the floppy end of the three-stage 0.035 inch guidewire is introduced through the needle. The needle is then removed leaving the guidewire in the bladder. The trocar and sheath are introduced over the guidewire through the incision until safely in position in the bladder. The guidewire and trocar are then removed from the outer sheath and a 14 Fr silicon catheter (a 16 Fr catheter is also available if required), which is part of the kit, is inserted into the bladder through the peel-away sheath.

Technical aspects

The Mediplus guidewire is made up of three parts. The first is the 'floppy tip', then a more rigid section, with the third part being a solid section with two reference black marks printed on it. When the guidewire is inserted into the bladder, the floppy tip is protective against

injuring the posterior wall of the bladder with the guidewire, thus reducing the risk of exiting the posterior wall of the bladder, as can be the case with existing methods. The second, more rigid section allows the user to feel resistance on the guidewire in the bladder, thus providing a good reference as to how far they have inserted it. The third section features two reference points that are used to identify the location of the sections relevant to the patient's anatomy. The first mark is used when the 18-gauge needle is used. It alerts the user that the solid section is at the tip of the needle. The second mark indicates to the user that the solid section is level with the tip of the outer sheath of the trocar. The solid section enables the trocar to be introduced into the bladder without issue. The silicon catheter has an additional advantage in that the balloon is flush with the shaft. Some users have commented on the ease with which the catheter can be removed from the patient as less 'cuffing' of the balloon is seen. Bladder distension with a urethral catheter is an advantage but not a necessity prior to starting the procedure as many patients already have a urethral stricture or a large prostate, which impede the introduction of the catheter. Adequate distension can be checked with a bladder scan prior to urine aspiration, if in doubt.

Discussion

The MediPlus SPC kit has the potential to improve the outcome of SPC with regards to patient safety and ease of insertion. Although trainees acquire basic skills and knowledge during their training, learning SPC insertion has traditionally been an 'on-the-job' experience. The MediPlus kit has the advantage of offering a high degree of control and accuracy during placement owing to the Seldinger technique. In a recent study, Vasdev and coworkers evaluated patient safety and the clinician's perception of the Mediplus kit, asking six members of the urology staff (residents and specialists) to use the system when they next needed to insert a SPC [6]. At each use the clinician was asked to complete a short questionnaire rating their confidence in the new device compared with the standard technique across five domains using a simple scale. Overall, users of the device expressed greater confidence in application, patient comfort and safety of the new device compared with standard trocar placement. This was in agreement with previous assessment of a similar device that had not been previously marketed in the UK [7]. Although encouraging, it must be understood that the study by Vasdev *et al.* was not conducted in a prospective or retrospective series of patients, or comparing the new method with the standard in pair. Nevertheless, given the current drive to minimize risk, these devices may appear to represent a significant advance over standard methods and merit consideration for routine use. It is anticipated that SPC insertion using this technique will be able to be reproduced in a safe and reliable manner, to improve

patient safety. Given the current drive to minimize risk these devices appear to represent a significant advance over standard methods and merit consideration for routine use. The technique is also now being trialed by the authors in an emergency urology practical skills course – the UroEmerge™ Course, using a purpose-built training device to assess its impact on training and use in clinical practice [8]. It is anticipated that SPC insertion using this technique will be able to be reproduced in a safe and reliable manner, to improve patient safety. However, it must be remembered that this technique has yet to be confirmed in randomized, controlled studies to assess efficacy and safety compared with other methods that have been in clinical use for many years now.

Bowel perforation is a well-recognized complication of suprapubic cystostomy [3–5], and the risk of bowel injury is higher in patients with a history of previous lower abdominal surgery, as the bowel frequently adheres to the scar. Placement of percutaneous suprapubic catheters using the MediPlus Seldinger technique is simple, with a single trocar being used for dilation of the track. SPC insertion using a blind technique can be hazardous, especially in patients with a small contracted bladder or when leakage occurs during attempted bladder filling. It is possible that patients may leak and lose the distended bladder during a blind trocar insertion. The Seldinger technique is less likely to cause bowel perforation than blind insertion as it keeps the track preserved even in the presence of minor leaks and enables the trocar to be introduced safely over the guidewire.

The MediPlus SPC kit is a new and potentially promising technique for safe introduction of the catheter into the bladder. It has the potential to replace the existing SPC kits because of the ease of insertion and patient safety, if confirmed in future studies.

Financial & competing interests disclosure

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Key issues

- A suprapubic catheter is a common method for urinary bladder drainage when using a urethral catheter is not possible or it is contraindicated.
- Blind suprapubic catheter insertion with the use of trocar is associated with posterior bladder wall and bowel injury.
- MediPlus suprapubic catheter uses the Seldinger technique for suprapubic catheter insertion.
- The design of the MediPlus suprapubic catheter has the theoretical advantage of avoiding bladder and bowel injury.
- The MediPlus SPC kit is a new and potentially promising technique for safe introduction of the catheter into the bladder.
- It has the potential to replace the existing suprapubic catheter kits owing to the ease of insertion and patient safety, if confirmed in future studies.

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