

# *Palliative Subcutaneous Tunneled Nephrostomy Tube (PSTN): A simple and effective technique for management of malignant extrinsic ureteral obstruction*

David G. Bell, MD, Marc Anthony Fischer, MD

Department of Urology, Dalhousie University, Halifax, Nova Scotia Canada

---

BELL DG, FISCHER MA. Palliative Subcutaneous Tunneled Nephrostomy Tube (PSTN): A simple and effective technique for management of malignant extrinsic ureteral obstruction. *The Canadian Journal of Urology*. 2002;9(1):1470-1474.

*The establishment and maintenance of effective urinary tract drainage for patients with malignant extrinsic ureteric obstruction is a formidable challenge for the urologist. We have utilized an alternative method of urinary diversion,*

*called Palliative Subcutaneous Tunneled Nephrostomy Tubes (PSTN), for long term urinary tract drainage when intracorporeal stenting has failed or is not tolerated. PSTN provides a simple and effective method of external urinary diversion and preservation of renal function. This technique should be an option in the armamentarium of urologists for management of malignant ureteral obstruction.*

**Key Words:** urinary diversion, nephrostomy, percutaneous, palliative care, urinary catheterization

---

## Introduction

The establishment and maintenance of effective urinary tract drainage for patients with extrinsic ureteral obstruction as a result of advanced abdominal and/or pelvic malignancy is a formidable challenge for the urologist. In most cases, these patients can be effectively treated with

intracorporeal ureteral stenting with frequent stent changes as required.<sup>1</sup> If stenting fails either primarily or secondarily, percutaneous nephrostomy tube placement is an effective solution. The posterior location of these tubes limits patient comfort, necessitates assistance for dressing management and puts the tubes at risk of obstruction and displacement. Limiting patient discomfort and bother related to drainage is an elusive goal although some "low profile" devices are available which may reduce bother from the tubes. We have developed an alternative method of nephrostomy tube placement for long term urinary diversion in patients with secondary

---

Accepted for publication February 2002

Address correspondence to Dr. D.G. Bell, Queen Elizabeth Health Sciences Centre, Victoria General Site, Victoria Bldg., 5 South, 1275 Tower Road, Halifax, NS B3H 2Y9 Canada

## Palliative Subcutaneous Tunneled Nephrostomy Tube (PSTN):

A simple and effective technique for management of malignant extrinsic ureteral obstruction

malignant ureteral obstruction. This method achieves good urinary drainage, eliminates the posterior exit location of the nephrostomy tube and limits the risk of tube displacement. The technique is easy to perform as an outpatient or requires a short hospital stay. We have named this technique Palliative Subcutaneous Tunneled Nephrostomy Tube (PSTN). In this initial report, we describe our materials and techniques, illustrate our clinical experience and outline some technical nuances that we have discovered from our clinical experience.

### Method

Many patients with extrinsic ureteric obstruction secondary to a pelvic or abdominal malignancy present with acute uremia and pain and so our first step is to arrange for nephrostomy tube placement as soon as possible. This allows for treatment and resolution of the plethora of metabolic complications of obstructive renal failure. Once the patient's acute medical condition is improved, we arrange consultations with Palliative Care Services, Home Care Services and Stomal Care Services to assist with management following surgery and to arrange follow up as an outpatient. Stomal Care further assists by choosing an exit site for the tunneled nephrostomy tubes.

The procedure is performed with fluoroscopic guidance with light general anesthesia. The side that is to have the nephrostomy tube tunneled is elevated in the oblique position on the fluoroscopy table and prepped and draped in standard manner. (Figure 1) The patient receives a dose of urinary tract specific antibiotic, usually an aminoglycoside. Initially a nephrostogram is performed to facilitate anatomic orientation and ensure proper catheter placement. Under fluoroscopic guidance, a 0.038" Teflon coated guide wire is passed through the nephrostomy tube into the renal pelvis or ureter and the nephrostomy tube is removed. (Figure 2) The nephrostomy tract is then dilated to 14Fr with Amplatz dilators in a manner similar to that performed in percutaneous nephrolithotomy. (Figure 3)

We employ a 12Fr Ultrathane Multitip Drainage Catheter™ (Item # ULT120-38-80-P-65-MDC; Cook Urological, Bloomington, Indiana, U.S.A.) for tunneling. This catheter is pliable, inexpensive and is available in a wide variety of lengths to suit any patient. Following transection of the distal end of the catheter below the leur lock hub, the proximal tip is passed over the guide wire and directed into the renal



Figure 1.

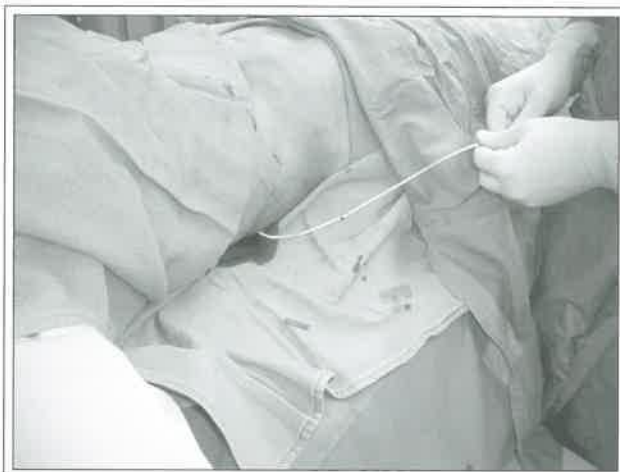


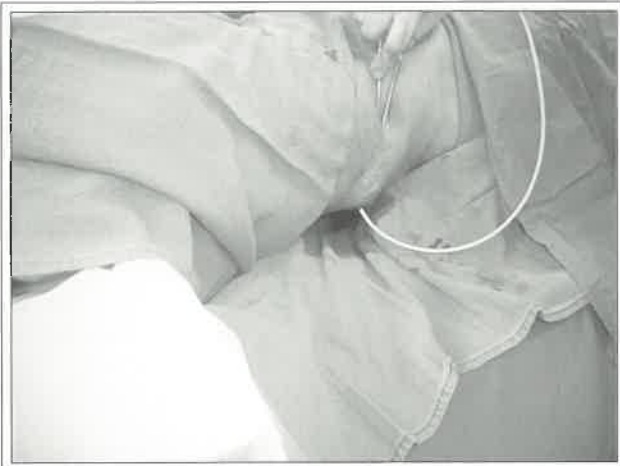
Figure 2.



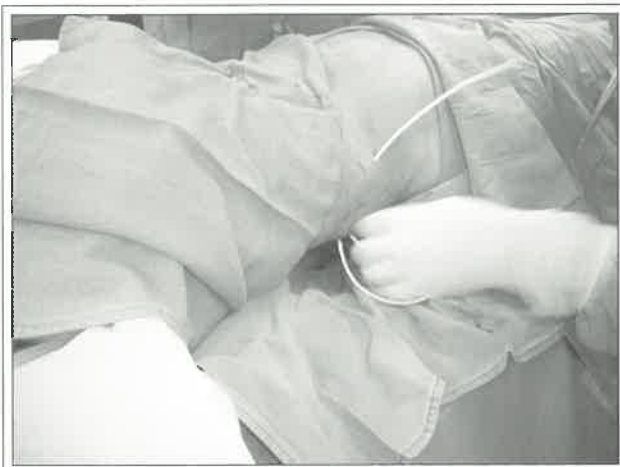
Figure 3.



**Figure 4.**



**Figure 5.**

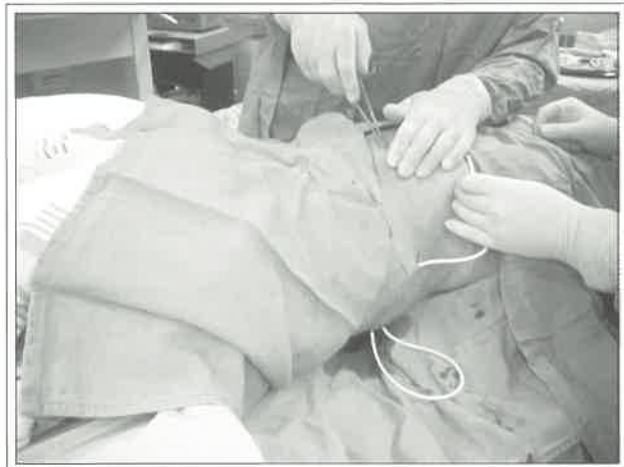


**Figure 6.**

pelvis. At this point, we sometimes perform an antegrade nephrostogram to make certain the catheter tip is well placed in the renal pelvis. (Figure 4) A 1 cm wide skin incision is then made approximately 10 cm anteromedial to the exit site of the nephrostomy tube, in the direction of pre-marked stomal site. From this anteromedial incision, a Kelly Clamp or Serotte Clamp is passed subcutaneously in a posterolateral direction until it exits at the site of the nephrostomy tube. (Figure 5) The PSTN is then grasped with the clamp and pulled gently until it runs subcutaneously to the anteromedial skin incision. (Figure 6) The tube is now tunneled subcutaneously to this point. This procedure is repeated with two or three more progressively anteromedial skin incisions until the tube exits from the pre selected stomal site. (Figure 7)

If the patient requires bilateral PSTN, the procedure is repeated on the opposite side exiting in close proximity to the contralateral tube to allow use of a single urinary appliance. Skin incisions are closed with interrupted absorbable suture. A stomal appliance is fitted over the stomal site. We do not routinely anchor tubes at the stomal exit site but rely on the tube's intrinsic coil in the renal pelvis and friction from the subcutaneous tissue for retention.

If an established PSTN tube requires changing, a 0.038" Teflon guide wire or "super stiff" dilating guide wire is passed into the renal pelvis through the existing catheter under sedation and fluoroscopic control. The old tube can then be removed and the new tube advanced into the tunneled tract and renal pelvis with relative ease. We currently perform tube change every 3 or 4 months as we found that tubes changed at 6 weeks were still patent.



**Figure 7.**

## Clinical experience

To date, we have performed this procedure on 27 renal units in 15 patients with malignant ureteral obstruction due to pelvic or abdominal tumors. Both male and female patients with malignancies including prostate, ovarian, cervical and bowel have benefited from this intervention. Our operative time has progressively decreased and we routinely perform bilateral tube placement (including anesthetic time) in less than 60 minutes. Most patients are discharged the first postoperative day, once stomal care instruction has been completed. Complications have included stomal concerns from urine irritation and an occluded tube related to subcutaneous kinking, which was remedied without requiring a second general anesthetic. To date, only two patients have had a displaced tube, one presenting with pyonephrosis. We have changed these tubes on a 4 monthly basis under intravenous sedation and fluoroscopic guidance. This involves cannulation of the PSTN tube with a guidewire and replacement with a new tube. Patient and family satisfaction with this technique was high, particularly with respect to freedom of mobility and comfort.

## Comment

Extrinsic ureteric obstruction secondary to malignancy is most quickly and effectively managed with long term indwelling ureteric stent placement. However, it has been demonstrated that stenting has a high rate of failure in this group of patients.<sup>1</sup> Percutaneous nephrostomy tube placement is indicated for treatment of patients that fail or cannot tolerate ureteric stents. Other authors have suggested that intracorporeal subcutaneous urinary diversion provides an alternative to chronic stenting and is a useful salvage procedure for those that have failed or are not able to tolerate stenting. These techniques offer a simpler and less invasive option to other reported methods including ileal diversion or cutaneous ureterostomy. Ahmadzadeh<sup>2</sup> and Desgrandchamps and associates<sup>3</sup> express similar experiences with subcutaneous tunneled diversion utilizing various forms of specialized nephrostomy tubes. These authors commented on the usefulness of the subcutaneous tunneled approach and favored nephrovesical diversion. We feel that our technique

had several advantages when compared to intracorporeal nephrovesical bypass. Other authors have also utilized various nephrovesical diversions,<sup>4-7</sup> however, these methods are more invasive than a subcutaneous diversion and require more extensive surgical manipulation at a time when patients can least afford to be undergoing such stress. Furthermore, changing of these nephrovesical diversion tubes is a more significant undertaking than would be required for our method of diversion.

Our experience to date has highlighted some important aspects that portend success and minimize complications of PSTN. First, we feel that it is important to provide urinary diversion and allow for resolution of the cardiac, hematologic, fluid balance and electrolyte abnormalities that exist to be resolved before PSTN placement is performed. The reduced capacity of these patients can afford little more surgical stress. Second, during the tunneling procedure, we try not to get away with the fewest number of incisions to bring the tunneled nephrostomy tube to the stomal site. Doing so actually reduces the duration of the procedure and makes the operation easier for both patient and urologist. Finally, with the patient in the oblique position, the length of the tube that is needed to reach the stomal site increases when the patient is returned to the supine position. It is a wise precaution to allow approximately 15 cm of extrinsic tube from the exit incision at the stomal site, for excess tubing may always be trimmed shorter later.

While PSTN is an alternative to use of other forms of urinary diversion, it must be stated that this technique should clearly be limited to use in patients that have failed intracorporeal stenting, either placed retrograde or in an antegrade fashion following nephrostomy tube placement. Placement of two stents in the same ureter have been described for malignant ureteric obstruction that has failed primary stenting.<sup>8</sup> In situations where stenting has failed or is not tolerated, nephrostomy tube placement and PSTN has proven to be an effective method of urinary drainage. In our opinion, the most significant advantage of PSTN is the anterior placement of the urinary drainage apparatus, which should improve patient comfort and reduce the risk of tube displacement. In the future, we plan to objectively assess the advantages of PSTN, with a questionnaire to compare comfort levels and patient preferences of this method and standard nephrostomy tube drainage.

## Conclusion

The PSTN provides a simple and effective method of urinary diversion and preservation of renal function in patients with malignant ureteric obstruction. We think this technique should be in the armamentarium of every urologist as an option for managing the challenging clinical scenario of malignant ureteral obstruction. □

---

## References

1. Docimo SG, De Wolf WC. High failure rate of indwelling ureteral stents in patients with extrinsic obstruction: experience at two institutions. *J Urol* 1989;142:277-279.
2. Desgrandchamps F, Cussenot O, Bassi S et al. Percutaneous extra-anatomic nephrovesical diversion: preliminary report. *J Endourol* 1993;7:323-326.
3. Ahmadzadeh M. Clinical experience with subcutaneous urinary diversion: new approach using a double pigtail ureteral stent. *Br J Urol* 1991;67:596-599.
4. Donovan MG, Barrett DM. Ureteral Prostheses. *Semin Urol* 1984;2:158-166.
5. Varady S, Friedman E, Yap WT et al. Ureteral replacement with a new synthetic material: Gore Tex. *J Urol* 1982;128:171-175.
6. Lingham K, Paterson PJ, Lingham MK, Bockley JF, Forrester A. Subcutaneous urinary diversion: an alternative to percutaneous nephrostomy. *J Urol* 1994;152:70-72.
7. Desgrandchamps F, Cussenot O, Meria P et al. Subcutaneous Urinary diversions for palliative treatment of pelvic malignancies. *J Urol* 1995;154:367-370.
8. Rotairu P, Yohannes P, Alexianu M et al. Management of malignant extrinsic compression of the ureter by simultaneous placement of two ipsilateral ureteral stents. *J Endourol* 2001;15(10):979-984.