JOURNAL OF ENDOUROLOGY CASE REPORTS
Volume 6, Number 1, March 2020

Pp. 4–6
DOI: 10.1089/cren.2019.0052

The Use of a Polytetrafluoroethylene Membrane-Covered Stent in the Management of Urine Extravasation After Radical Cystectomy and Ileal Conduit Formation

Nieroshan Rajarubendra, MBBS, MD, FRACS,[1] Andrew Owen, BSc, MBBS, MRCP, FRCR, FRANZCR,[2] and Richard Grills, MBBS, FRACS[1,3]

Abstract

Radical cystectomy for urothelial carcinoma is a challenging operation that is associated with significant morbidity and mortality rates. In the literature, the complication rates have been described up to 68%. We describe a unique method of managing a ureteroileal anastomotic leak in a patient with limited ureteral length. The use of polytetrafluoroethylene-covered ureteral stents has been described in the management of ureteral strictures, but this is the first time they have been used in the treatment of a urinary leak after radical cystectomy.

Keywords: ureteroileal, bladder cancer, PTFE-covered stent

Case Presentation

History and physical examination

A 78-YEAR-OLD MAN with a background of ischemic heart disease was seen with irritative voiding symptoms and recurrent Pseudomonas urinary tract infections. On further evaluation, a large 6 cm bladder mass was seen on ultrasonography and biopsy confirmed high-grade muscle invasive urothelial carcinoma. Staging confirmed organ-confined disease and the patient subsequently underwent an open radical cystoprostatectomy, pelvic lymph node dissection, and ileal conduit formation. Postoperatively, he was slow to progress with an initial ileus and then followed by day 7 passage of feculent material in the drain. Emergency laparotomy revealed small bowel anastomotic leak as well as breakdown of the ureteroileal anastomosis. A new small bowel anastomosis was performed after resecting the region with the leak and an end colostomy was also performed. The distal ends of the ureters were ischemic and were maximally excised allowing for a new ureteroileal anastomosis. Bander ureteral stents were placed and brought out through the conduit to reduce the strain on the anastomosis.

In the following days, he developed another urine leak demonstrated by high drain creatinine. A computed tomography (CT) scan showed extravasation of contrast from the anastomotic site (Fig. 1). Attempts were made to divert the urine with bilateral nephrostomies and maximal drainage of the conduit with a Foley catheter, but the urine leak persisted. Unfortunately, he did not have enough length of ureter to redo the ureteroileal anastomosis, and so exchanging the stents was planned. For the first time for a urine leak, polytetrafluoroethylene (PTFE)-covered stents were deployed over the anastomotic sites.

Intervention

Bilateral 7 mm × 12 cm Uventa™ (TaeWoong Medical)-covered ureteral stents were inserted across the anastamotic defect through an antegrade approach (Fig. 2). Stenting was accompanied by urinary diversion through the pre-existing bilateral nephrostomies. At day 7 postinsertion, a conduitogram revealed a small persistent urine leak from the conduit around the stents and into the peritoneal cavity. To minimize any ongoing leak, 7 mm occlusion balloons were inflated within the inferior ends of the stents and were left *in situ* for 3 weeks. On the subsequent conduitogram, the leak had resolved (Fig. 3).

Outcome and follow-up

After the covered stent placement, the urine leak resolved as drain volumes reduced and analysis of the output was consistent with serous fluid. The nephrostomies were removed 3 days later and he was discharged to a rehabilitation center.

He was seen at 8 weeks and his blood tests demonstrated normal renal function. At 6 months follow-up he was well, had normal renal function, and a CT urogram showed patency of the stents with no evidence of hydronephrosis (Fig. 4). However, at 10 months, he presented with urethral discharge and work-up demonstrated urethral recurrence. He

[1]Department of Urological Surgery, University Hospital, Barwon Health, Geelong, Australia.
[2]Barwon Medical Imaging, Barwon Health, University Hospital Geelong, Geelong, Australia.
[3]Department of Surgery, Deakin University, Geelong, Australia.

FIG. 1. CT axial view showing extravasation of contrast from the ureteroileal anastomosis. CT, computed tomography.

underwent urethrectomy and penectomy for high-grade urothelial carcinoma invading into corpora and penile skin of the glans. He was seen 1 year after surgery and was managing well with stable renal function, a normal CT urogram, and no evidence of cancer recurrence. The patient, however, passed away 16 months after surgery because of an acute coronary event.

Discussion

The undertaking of radical cystectomy and urinary diversion is associated with considerable morbidity and mortality rates. The patients who undergo this surgery are usually elderly with the associated comorbidities. It is important for the physician to not only minimize these complications but also have the ability to manage and rectify situations when adverse events occur.

The incidence of urinary leak has been reported as high as 7.7%.[1] This can present as high drain output, urinoma, paralytic ileus, and electrolyte imbalance. The principles of management involve diverting the urine with stents, nephrostomies, and catheters. Also, adequate drainage of the intra-abdominal leak is needed to minimize bowel irritation and reabsorption. However, despite all these measures, our patient continued to have urinary extravasation.

Unfortunately for our patient, the remaining ureteral lengths would not have been enough for a second operation to redo the anastomosis. As a result, this novel method of using a covered stent was employed as all other options were exhausted.

The use of PTFE stents has been employed for the management of malignant ureteral strictures. These stents are made of Nitinol mesh that is covered with a PTFE membrane. These stents are placed in position under florescence and deployed with balloon expansion, this allows for the stent to adapt to the contour of the ureter. These stents are permanent and their use should be considered when other options have been exhausted.

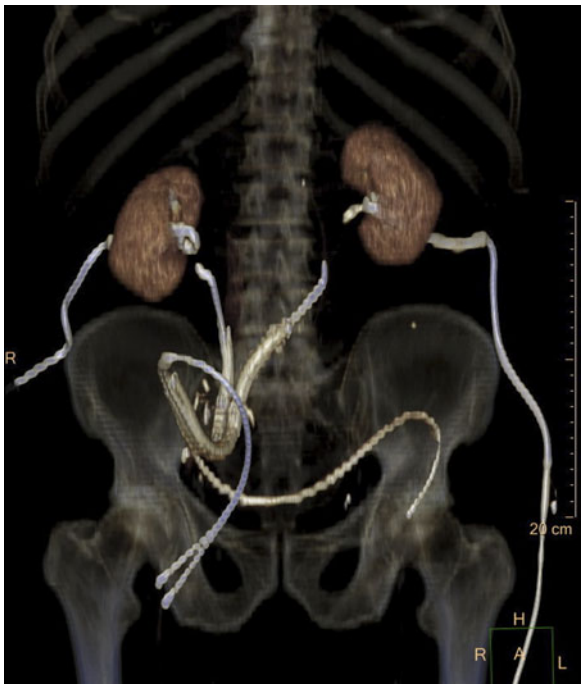

FIG. 3. Volume rendered image from a CT IVP showing the stents *in situ* as well as bilateral nephrostomies and bilateral occlusion balloons within the stents.

The use of PTFE-covered stents has been shown to be superior than noncovered metal stents. In a canine model, a covered stent and a noncovered stent were placed in an individual animal.[2] The dogs were sacrificed at 5, 10, and 15 weeks and histopathologic evaluation was made. The covered stents demonstrated patency with minimal luminal occlusion by urothelial hyperplasia when compared with the near-total occlusion of the noncovered stents. This was attributed to the impermeable membrane cover. The study also demonstrated that the covered stents did not migrate out of position like the noncovered stents.

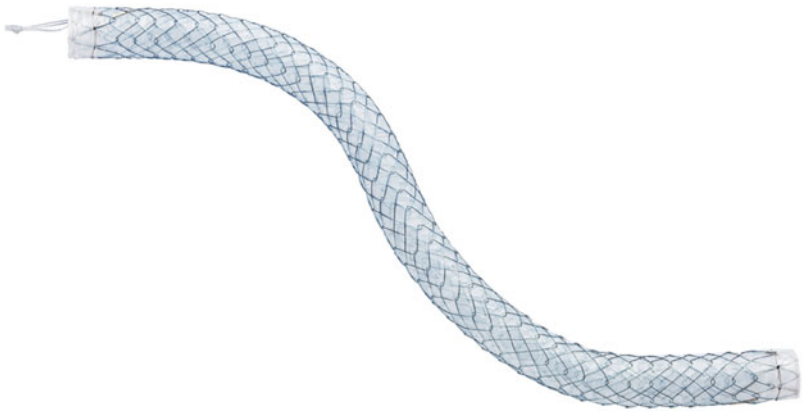

FIG. 2. PTFE-covered stent. PTFE, polytetrafluoroethylene.

FIG. 4. Nephrostogram showing bilateral PTFE stents *in situ* and resolution of leak.

In human studies, Trueba Arguinarena et al. studied 20 patients with various causes for ureteral obstruction who were treated with covered stents.[3] These patients were followed up for up to 24 months with imaging and endoscopic assessment. Four patients had stent migration and five patients had mucosal hyperplasia at the end of the stents that were not obstructive. There was no evidence of calcification of the stents. The authors concluded that covered stents were effective in managing ureteral stenosis.

A longer term study by Kim et al. found that they were associated with high-grade complications over time.[4] The study had a median follow-up of 31 months where complications such as ureteroarterial fistula, ureteroenteric fistula, ureterovaginal fistula, ureteral perforation, uncontrolled bleeding, and complete obstruction were seen. Previous treatment such as radiotherapy and the underlying pathology analysis did play a part in the complications, but the study questioned the use of this device in patients who are expected to have longer term survival.

The use of this covered stents has mixed results. Larger sample studies are needed to assess their safety and efficacy in ureteral pathology analysis for a longer period of time. In our case with urine extravasation, the use of PTFE-covered stents was valuable in managing a patient with limited options. The limitation of this case was the short follow-up; however, the use of this covered stent should be considered when other options such as conventional stents and nephrostomies have failed to resolve ongoing urine leak. It should be considered in patients who are too unwell to return to theater or who do not have sufficient ureteral length to redo the ureteroilieal anastomosis.

Conclusion

We present an effective case in managing urinary extravasation after radical cystectomy and ileal conduit with a PTFE-covered stent. The use of this stent should be considered by urologists in situations where conventional management options have proved futile. Further large studies are required by using covered stents to determine whether their use should be employed earlier in the treatment algorithm.

Disclosure Statement

No competing financial interests exist.

References

1. Lawrentschuk N, Colombo R, Hakenberg OW, Lerner SP, Månsson W, Sagalowsky A, Wirth MP. Prevention and management of complications following radical cystectomy for bladder cancer. Eur Urol 2010;57:983–1001.
2. Chung HH, Lee SH, Cho SB, Park HS, Kim YS, Kang BC, Frisoli JK, Razavi MK. Comparison of a new polytetrafluoroethylene-covered metallic stent to a noncovered stent in canine ureters. Cardiovasc Intervent Radiol 2008;31:619–628.
3. Trueba Arguinarena FJ, Fernandez del Busto E. Self-expanding polytetrafluoroethylene covered nitinol stents for the treatment of ureteral stenosis: Preliminary report. J Urol 2004;172:620–623.
4. Kim M, Hong B, Park HK. Long-term outcomes of double-layered polytetrafluoroethylene membrane-covered self-expandable segmental metallic stents (uventa) in patients with chronic ureteral obstructions: Is it really safe? J Endourol 2016;30:1339–1346.

Address correspondence to:
Nieroshan Rajarubendra, MBBS, MD, FRACS
Department of Urological Surgery
University Hospital
Barwon Health
Bellerine Street
Geelong 3220
Australia

E-mail: nieror@hotmail.com

Abbreviations Used
CT = computed tomography
PTFE = polytetrafluoroethylene

Cite this article as: Rajarubendra N, Owen A, Grills R (2020) The use of a polytetrafluoroethylene membrane-covered stent in the management of urine extravasation after radical cystectomy and ileal conduit formation, *Journal of Endourology Case Reports* 6:1, 4–6, DOI: 10.1089/cren.2019.0052.