Case study

Successful treatment of an ileal conduit fistula with negative pressure: report of a case

ABSTRACT

Aim To present the management of a patient who developed a fistula from a uretero-ileostomy anastomosis of the ileal conduit by applying intra-conduit negative pressure through a dual tube.

Case report The patient was a 73-year-old man diagnosed with bladder cancer who underwent a radical cystectomy and formation of an ileal conduit in our centre. A fistula occurred in the ileal conduit less than 1 week after the surgery. Urine leaked continuously into the pelvic cavity which put the patient at risk of fluid and electrolyte imbalances. A further operation to suture the fistula to contain the leakage was suggested. To save the patient from a further operation, intra-conduit negative pressure through a dual tube was attempted to assist with management of the fistula. This conservative treatment promoted successful closure of the fistula.

Method It is clinically challenging to manage a urinary fistula associated with an ileal conduit in a conservative way. This is because the fistula is deep within the body cavity and it is almost impossible for the fistula to heal spontaneously. The literature reveals previous conservative treatment has been mostly unsuccessful. Surgical suturing of the fistula is the most used method but is not always an ideal choice. By applying intra-conduit negative pressure through a dual tube system to the ileal conduit, the aim was to facilitate closure of the fistula.

Conclusion In this case report the application of intra-conduit negative pressure through a dual tube to contain a fistula from a uretero-ileostomy anastomosis of an ileal conduit was found to be safe and effective. This method of conservative treatment is worth promoting.

Keywords negative pressure, dual tube, fistula of ileal conduit, urostomy

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INTRODUCTION

Bladder cancer is a highly prevalent disease associated with high recurrence and mortality[1]. Radical cystectomy is the gold standard treatment for both muscle invasive bladder cancer and recurrent high grade non-muscle invasive bladder cancer[2]. After radical cystectomy, surgeons mostly choose the formation of an ileal conduit or urostomy for urinary diversion[3]. It is reported that 15–16% of patients will develop a fistula within the conduit after urinary diversion[4,5]. Urinary fistula of an ileal conduit is a complex and serious complication that often occurs in the early postoperative period[2,5]. The occurrence of this complication will not only prolong the hospital stay of patients, but also increases the mortality rate[5].

Management of a urinary fistula within an ileal conduit is difficult[6]. One management option to deal with this complication is further surgery to suture the fistula; however, operating twice on the patient in a short time can cause too much trauma. Doctors and ET nurses often feel very conflicted as to whether to operate a second time, especially when a patient's physical and psychological condition may not be robust enough to tolerate secondary surgery. Further, the patient may refuse a second operation. In addition to surgical treatment, the literature reveals that other conservative management strategies such as percutaneous nephrostomy or a fenestrated conduit catheter usually fail to close the fistula[5].

Negative pressure therapy is widely used to treat fistulas as it facilitates and accelerates drainage of fluid which increases the likelihood of the fistula healing[7–9]. Through a literature review, the authors found positive results in several patients with a fistula of an ileal conduit following the application of negative pressure therapy[10,11]. While these previous studies revealed that negative pressure therapy maybe a good clinical choice for managing a urinary fistula within an ileal conduit, these relevant reports are too few and more studies are needed to confirm the safety and efficacy of the treatment. Moreover, clinicians must be aware that ileal conduits are very vulnerable to secondary trauma during the negative therapy processes from the amount of negative pressure applied and catheter-related damage to the conduit[5]. In this case report, the authors present the outcome of the application of intra-conduit negative pressure in a patient with a fistula in a uretero-ileostomy anastomosis of an ileal conduit. The authors further demonstrate how to use a dual tube to decrease the treatment risk.

CASE PRESENTATION

A 73-year-old man in otherwise good health underwent a radical cystectomy and formation of an ileal conduit for muscle invasive bladder cancer. On the 5th postoperative day, the left pelvic drainage tube drained out 1350ml of faint yellow drainage, while the urinary stoma only drained out 700ml of urine. Urinary leakage of the intra-abdominal portion of the ileal conduit was suspected. Examination of fluid from the left pelvic drain confirmed the suspicion and presence of urine as creatinine was confirmed. The level of creatinine present in the drainage fluid was high at 4396.µmol/L – normal range of serum creatinine is 60–110µmol/L. A CT scan of the abdomen showed the fistula was located where the right transplanted ureter entered the ileal conduit.

Careful examination of the ileal conduit was also undertaken and a large amount of mucus was found to have accumulated in the ileal conduit. The doctor flushed the ileal conduit to clear the mucus away. However, although the ileal conduit was no longer obstructed from mucus, the urine still leaked into the pelvic cavity continuously. On the 6th postoperative day, the left pelvic drainage increased to 1890ml, while the urine draining out from the stoma decreased to 410ml. Urine leakage increased the risk of pelvic infection and water electrolyte imbalance; both clinical problems needed to be managed properly as soon as possible. A further operation to suture the fistula closed was suggested. However, taking the trauma of further surgery, the economic cost and the patient's will into consideration, it was decided to attempt implementation of conservative treatment first.

NEGATIVE PRESSURE THERAPY

The negative pressure system used was constructed by a doctor and an ET nurse. The authors chose this therapy with the aim of achieving two goals. Firstly to stop urine draining continuously into the pelvic cavity and secondly to promote the closure of fistula. A well-known contraindication is to apply negative pressure therapy to organs because the risk of traumatising organs is high. To avoid adverse events such as bleeding, ischaemia and catheter-related ileal conduit perforation from happening, the authors applied negative pressure to the ileal conduit through a dual tube (Figure 1). The dual tube consisted of a rigid tube and a soft tube. The rigid tube could conduct negative pressure well; however, it may cause mechanical damage to the ileal conduit. The soft tube was unable to sustain negative pressure but could protect the ileal conduit from catheter-related injuries by isolating the rigid tube from coming into contact with the ileal conduit. The steps used to construct and apply the therapeutic negative pressure system are listed as follows.

Figure 1. An illustration of a dual tube

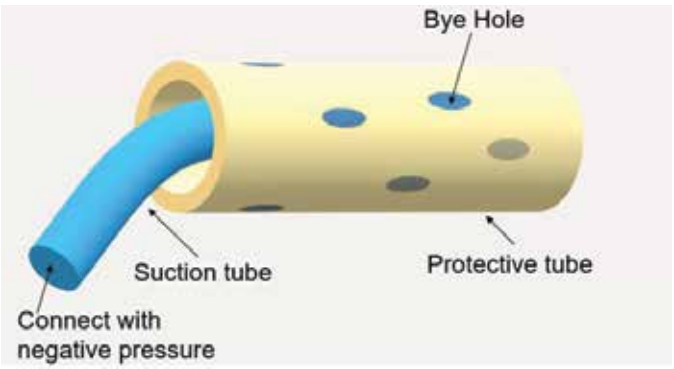

Figure 2. A soft tube was placed inside the ileal conduit

Figure 3. Six to eight bye holes were cut out of the inner tube

Figure 4. The rigid tube showing seven bye holes

Figure 5. The rigid tube was inserted into the ostomy bag using haemostatic forceps

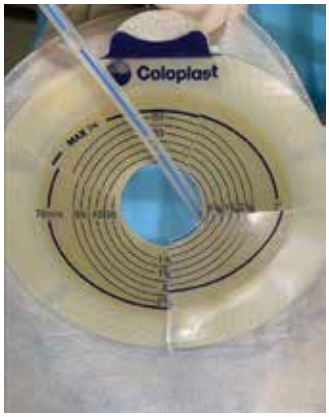

Figure 6. The ostomy chassis backing film was cut into three to four pieces

Figure 7. The rigid tube was inserted into the soft tube

Figure 8. The urinary ostomy bag was applied to the patient

- Select a soft and protective medical latex tube as the outer tube. A soft tube is routinely placed inside the ileal conduit during operation and, as this tube had not been removed when the urinary fistula occurred in our case, it was used as the outer tube (Figure 2).
- Select a rigid tube such as a medical sputum aspiration tube as the inner tube.
- Cut six to eight bye holes out of the inner tube (Figures 3–4).
- Insert the rigid tube into the ostomy bag with haemostatic forceps (Figure 5), cut the ostomy chassis backing film into three to four pieces(Figure 6).
- The doctor then inserts a rigid tube into the soft tube (Figure 7). The insertion depth of the inner tube should be 1cm shorter than the outer tube.
- Apply a urinary ostomy bag to the ostomy skin barrier or base plate (Figure 8) and fix the inner tube properly (Figure 9).
- Cut a small hole in the top of the ostomy bag (Figure 10), and insert a small tube through the hole into the ostomy bag to make the negative pressure semi-closed (Figure 11).
- Connect the inner drainage tube to a negative pressure system (Figure 12) and adjust the negative pressure to 20–50mmHg (Figure 13). In this case, wall suction was used, but a commercial negative pressure therapy machine is also suggested.
- After doing this, observe the negative pressure system suctioning the ostomy bag tight and, at the same time, urine should be immediately sucked out from the ileal conduit (Figure 14).

During the negative pressure therapy process, the patient's fluid and electrolyte balance was closely monitored, the ileal conduit was cleared of mucus twice a day, and the patient was instructed to do passive activities while in bed. A nutritionist and psychotherapist were invited to join the medical, ET and nursing team to help improve the nutritional and psychological status of the patient.

After 12 days of negative pressure therapy treatment, the left pelvic drainage decreased to 210ml and the creatinine level of the drainage output was 73.7μmol/L, which indicated that urine was no longer leaking into the pelvic cavity. The negative pressure therapy was stopped 2 days later. It was pleasing to note that, following cessation of suction of the urine, there was no increase in pelvic drainage. The patient recovered well and was discharged from the hospital soon after. After a follow-up period of 3 months, no further anastomotic insufficiency was noted.

Figure 9. The inner tube was fixed properly

Figure 10. A small hole was cut in the top of the ostomy bag

Figure 11. A small tube was inserted through the hole into the ostomy bag

Figure 12. The inner drainage tube was connected to a negative pressure system

Figure 13. The negative pressure was adjusted to 20–50mmHg

Figure 14. The negative pressure system suctioned the ostomy bag tight

DISCUSSION

While not a medical emergency, a fistula within an ileal conduit is a complication that is very difficult to manage conservatively. Up till now, the treatment of this type of fistula occurrence has still been in exploratory stages. Conservative management strategies such as percutaneous nephrostomy and fenestrated conduit catheters have been tried to manage these situations, but are reported to have a high failure rate[5]. Percutaneous nephrostomies are commonly used for urinary diversion, resulting in successful drainage of urine[12]; however, this method of urinary diversion does not aid fistula healing. Similarly, placing a fenestrated drainage tube or fenestrated catheter into an ileal conduit is also ineffective. While this method may increase the patency of urine drainage it does not prevent urine from leaking into the pelvic cavity, nor does it promote development of granulation tissue around the fistula to assist with fistula closure.

Proper drainage of urine and promotion of the growth of granulation tissue are keys factors for healing fistulas of this nature. Negative pressure systems can help stimulate the formation of granulation tissue and remove excess exudate away from the wound site[13]. Thus, negative pressure therapy may be a useful alternative for the treatment of urinary fistula. Continuous suction leads to the absorption of leaking urine and intestinal mucus that can cause infection and disturb fluid and electrolyte balance of the patient. In addition, stimulation of angiogenesis and granulation tissue formation increases the chance of fistula healing.

Although negative pressure appears to work well in promoting the closure of fistulas, it should be used and applied with caution to fistulas within an ileal conduit. Adverse events such as bleeding, ischaemia and intestinal perforation may occur due to using negative pressure therapy to exposed organs[14]. Safety is more important than a curative effect. Although no adverse events have been reported in previous studies[10,11,15], this does not mean the therapy is safe and without risk. Some measures must be taken to decrease the treatment risk for the patient. Inserting a protective disc over the exposed organs could offer protection from local ischaemia, while still providing effective drainage[16].

In the dual tube model discussed here, the outer tube acted as a protective disc, thereby protecting the ileal conduit from mechanical injury and decreasing the risk of ischaemia and haemorrhage that may be caused by negative pressure. An animal experiment showed negative pressure between 50–170mmHg caused a significant decrease in the

microvascular blood flow in the intestinal loops[16]. The authors, therefore, adjusted the negative pressure to 20–50mmHg in this case to avoid ischaemia occurring. Compared with intestinal fistula, it was less likely that the suction tube would be obstructed when in a urinary fistula, so there was less need to adjust the negative pressure to more than 50mmHg. Moreover, keeping the negative pressure semi-closed was also a protective method to avoid ischaemia by stopping the tube from being tightly suctioned to intestinal tissue for long periods.

There are currently very few recommendations on the use of negative pressure therapy for the management of urinary fistula. As the patient did not have coagulation defects, the authors felt that, under close clinical observation, it would be worth trying very gentle negative pressure through a dual tube approach to aid urinary fistula healing. During the therapy process, it is necessary to regularly check whether the suction tube is displaced or obstructed, monitor the amount of the pelvic drainage and urine discharged in the collecting system of the device daily, and be alert for complications such as bleeding, ischaemia, infection and fluid and electrolyte imbalances. Urinary leakage at the anastomotic site of an ileal conduit can lead to periureteral fibrosis and scarring, thus predisposing to stricture formation[6]. Surgical follow-up to evaluate anastomotic status is also needed.

SUMMARY

Fistula occurrence at the site of an ileal conduit is a serious complication after urostomy formation. How to promote the closure of urinary fistula quickly and effectively in a conservative way has been problematic and concerning for urologists and ET nurses for a long time. In this case report the authors have shared their successful experience with the application of negative pressure through a dual tube system to manage this complication. The treatment in this instance was found to be safe and effective. It is worth further exploration as the authors believe more patients could benefit from it.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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REFERENCES

1. Sanli O, Dobruch J ,Knowles MA, et al. Bladder cancer. Nat Rev Dis Primers, 2017;3:17022. doi:10.1038/nrdp.2017.22
2. Wei ST, Lamb BW, Kelly JD. Complications of radical cystectomy and orthotopic reconstruction. Adv Urol 2015;2015(3):1-7. doi:10.1155/2015/323157.
3. Kotb A F. Ileal conduit post radical cystectomy: modifications of the technique. J Ecancermedicalscience 2013;7:301.
4. Teixeira SC, Ferenschild FT, Solomon MJ, et al. Urological leaks after pelvic exenterations comparing formation of colonic and ileal conduits. Eur J Surg Oncol 2012;38(4):361–366.
5. Brown KG, Koh CE, Vasilaras A, et al. Clinical algorithms for the diagnosis and management of urological leaks following pelvic exenteration. Eur J Surg Oncol 2014;40(6):775–781.
6. Farnham SB, Cookson MS. Surgical complications of urinary diversion. World J Urol 2004;22(3):157–167.
7. Bobkiewicz A, Walczak D, Smolinski S, et al. Management of enteroatmospheric fistula with negative pressure wound therapy in open abdomen treatment: a multicentre observational study. Int Wound J 2017;14(1):255–264.
8. Ruiz-Lopez M, Titos A, Gonzalez-Poveda I, et al. Negative pressure therapy as palliative treatment for a colonic fistula. Int Wound J 2014;11(2):228–229.
9. Loaec E, Vaillant PY, Bonne L, et al. Negative-pressure wound therapy for the treatment of pharyngocutaneous fistula. Eur Ann Otorhinolaryngol Head Neck Dis 2014;131(6):351–355.
10. Yetişir F, Salman AE, Aygar M, et al. Management of fistula of ileal conduit in open abdomen by intra-condoit negative pressure system. Int J Surg Case Rep 2014;5(7):385–388.
11. Denzinger S, Luebke L, Burger M, et al. Vacuum-assisted closure therapy in ureteroileal anastomotic leakage after surgical therapy of bladder cancer. World J Surg Oncol 2007;5(1):41.
12. Ahmad I, Pansota MS. Comparison between double J (DJ) ureteral stenting and percutaneous nephrostomy (PCN) in obstructive uropathy. Pakistan J Med Sci 2013;29(3):725–729.
13. Wolvos T. The evolution of negative pressure wound therapy: negative pressure wound therapy with instillation. J Wound Care 2015;24(4 Suppl):15–20.
14. Ontario HQ. Negative pressure wound therapy: an evidence update. Ontario Health Technology Assessment 2010;10(22):1.
15. Heap S, Mehra S, Tavakoli A, et al. Negative pressure wound therapy used to heal complex urinary fistula wounds following renal transplantation into an ileal conduit. Am J Transplant 2010;10(10):2370–2373.
16. Lindstedt S, Hlebowicz J. Blood flow response in small intestinal loops at different depths during negative pressure wound therapy of the open abdomen. Int Wound J 2013;10(4):411–417.