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REVIEW ARTICLE

Early Removal of Foley Catheter after Sigmoid Colectomy for Diverticular Colovesical Fistula without Intraoperative Bladder Repair or Postoperative Cystography: Feasibility of a Quality Improvement Pilot Program

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Abstract

Background: The treatment of colovesical fistula (CVF) due to diverticular disease is complex and imposes significant risk to the patient. Specifically, management of the bladder defect after fistula takedown is inconstant. In this quality improvement study, we report on the safety of early (< 7 days) urethral catheter removal without intraoperative or postoperative bladder imaging.

Methods: Between 2008 and 2018, patients who were operated on for CVF due to diverticular disease were identified retrospectively. Medical records were reviewed to obtain patient characteristics, operative technique and findings, and postoperative outcomes.

Results: Between 2008 and 2018, 17 patients with diverticulitis-induced CVF underwent fistula takedown. Bladder defects were only formally repaired if urothelium was visualized intraoperatively. Mean postoperative urethral catheterization was 5.5 days and bladder imaging was not performed intraoperatively or postoperatively. There were no urinary-related complications or mortalities, and mean follow-up was 249 ± 60 days.

Conclusion: This quality improvement pilot study supports early catheter removal (< 7 days) and suggests bladder imaging may be unnecessary in select cases.

Keywords

Colovesical fistula, Diverticulitis, Bladder repair, Urethral catheterization, Cystoscopy

Objectives

Diverticulitis is the most common cause of colovesical fistula, yet it is an uncommon complication and occurs in approximately 1-4% of cases [1,2]. Patients with CVF typically present with dysuria, recurrent urinary tract infection (UTI), pneumaturia, and/or fecaluria [1,2].

The standard approach for definitive management of CVF includes partial colectomy of the involved segment (usually sigmoid colon), takedown of the fistulous tract, and closure of the bladder defect [1,3]. Compared to open surgery, the laparoscopic approach is associated with a shorter length of hospital stay and lower overall complication rates, and has gained favor as the preferred surgical approach to treat colovesical fistula [3-8].

Whether open or laparoscopic, the surgical approach to CVF is technically challenging and is often associated with dense inflammatory adhesions between the colon and bladder. There is no standard management of the bladder defect after fistula takedown. Large defects are universally repaired; however, small or grossly undetectable defects may not require closure [5,9]. The integrity of the bladder can be assessed intraoperative with provocative leak testing (for example, by instilling dyed saline into the bladder), and postoperatively with

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contrast imaging studies (such as cystography). Post-operative bladder decompression with Foley catheter is routine, and is often continued for 14 days intending to allow the bladder defect to heal under minimal pressure. The desire to avoid bladder distention in the early postoperative period is balanced with the risks of catheter associated urinary tract infection, patient discomfort, decreased patient mobility, and prolonged hospital stay due prolonged catheter drainage of the bladder [9,10,11]. Some studies support early catheter removal (less than 7 days) implying that longer durations of bladder decompression impart unnecessary risk and little benefit [1,9]. There is similar variation in the use of postoperative bladder imaging (e.g. cystography) prior to Foley catheter removal and may also represent unnecessary risk and cost.

In this study, we report our early experience of a pilot project designed to assess postoperative length of stay and duration of indwelling urethral catheters after sigmoid colectomy for diverticular CVF, in which the protocol eliminated routine intraoperative bladder repair, intraoperative testing of bladder integrity, and postoperative bladder imaging. In addition, the protocol required short duration (< 7 days) of Foley catheter drainage after surgery.

Methods

This is a retrospective review of a prospectively designed pilot program of consecutive patients who underwent elective sigmoid colectomy for diverticulitis complicated by CVF from 2008-2018 at the Veteran's Administration (VA) Palo Alto Health Care System. All patients had a colonoscopy, urinalysis, and computed tomography scan performed prior to surgery to confirm the diagnosis of colovesical fistula and rule out other causes (i.e. malignancy). Cystoscopy was performed in patients for which the preoperative diagnosis was uncertain or was suspicious for malignancy. Patient demographic information, operative and postoperative data were collected from the electronic health record.

Intraoperatively, bladder repair was attempted only when a gross hole with direct vision of bladder urothelium was encountered, per protocol. Provocative leak testing, such as distending the bladder, was not performed and no omentoplasty was performed in any patient. In all cases, a urethral catheter was placed at the time of surgery and maintained to gravity drainage in the postoperative period. Per protocol, the urethral catheter was removed on postoperative day 4-6, at the discretion of the operative surgeon. The patient was discharged to home when clinically well, tolerating diet and voiding spontaneously. As routine, all patients were seen in follow-up in outpatient clinic 2 weeks after discharge.

Results

Between 2008-2018, 17 patients underwent elective sigmoid colectomy for diverticulitis complicated by CVF. Most patients were male, with a mean age of 63 years (range 57-73) (Table 1), and presented with recurrent urinary tract infections (76.5%) and pneumaturia (70.6%); fecaluria was less common.

All operations were started using minimally invasive surgical techniques and 17.6% (n = 3) were converted to open due to dense adhesions that could not be safely addressed with laparoscopic instruments. A robotic approach was used in 1 operation. A total laparoscopic operation was performed in most cases. In cases in which the fistula could not be taken down using laparoscopic instruments due to severe fibrosis, conversion to a hand-assisted approach was performed (23.6%, n = 4) to manually separate the colon from the bladder. All but 1 patient (94.1%) underwent primary colorectal anastomosis. The patient who had a diverting colostomy underwent an open operation for acute perforated diverticulitis in the setting of chronic diverticular disease.

The urethral catheter was removed after a mean of 5.5 days (Table 2). Patients were then followed clinically and allowed to spontaneously void. Mean length of hospital stay was 5.9 days (range 3-10). Early postoper-

Table 1: Patient characteristics and operative technique.

Characteristics	**N = (17)**
Sex, n (%)	
Male	16 (94.1)
Female	1 (5.9)
Age (years)	
Mean (SD)	63 (8.1)
Range	57 - 73
Presenting symptoms, n (%)	
Recurrent UTI	13 (76.5)
Pneumaturia	12 (70.6)
Pneumaturia and fecaluria	8 (47.1)
Operative Technique, n (%)	
Laparoscopic	9 (52.9)
Hand-assisted laparoscopic	4 (23.6)
Robotic-assisted	1 (5.9)
Conversion to open	3 (17.6)
Anastomosis, n (%)	
Primary anastomosis	16 (94.1)
None (colostomy)	1 (5.9)
Bladder repair, n (%)	
Sutured repair	1 (5.9)
None	16 (94.1)

Table 2: Outcomes.

Outcomes	**N = (17)**
Length of treatment (days)	
Duration of urethral catheter	5.5 ± 1.3 (range 3-6)
Length of stay	5.9 ± 1.6 (range 3-10)
Complications	
Urinary complications	0
Wound infection	2 (12.5%)
Incisional hernia	2 (12.5%)
Enterocutaneous fistula	1 (6.2%)

ative complications included surgical site infections at the colon extraction incision (12.5%) and incisional hernia (12.5%); one patient with perforated diverticulitis developed a presacral abscess. There were no urinary complications. At 2 weeks' follow-up, all patients were clinically well, with bowel function and voiding without dysuria, pneumaturia, or evidence of fistula recurrence. There was no evidence for symptomatic recurrence or urinary complication after a mean follow-up 249 ± 60 days. Mortality was 0%.

Discussion

Colovesical fistula is an uncommon, but serious complication of diverticular disease, and its incidence may be increasing [11]. The surgical approach has evolved to incorporate minimally invasive techniques, resulting in lower complication rates and decreased hospital lengths of stay. However, the proper intra-operative management of the bladder defect and the duration of urethral catheter decompression are unclear. Other studies have questioned the need for formal bladder repair and specific intraoperative bladder management as potentially increasing operative time without significant clinical benefit in most cases [5,6,9]. Indeed, CVF was historically treated by resecting the entire fistula-including a partial cystectomy-with subsequent primary repair of the bladder defect. However, several studies support the practice that in benign disease bladder resection and repair is not necessary, and that the bladder can be managed simply with Foley catheter decompression without an increased risk for bladder-related complications or fistula recurrence [5,6,9,12,13].

This study demonstrates that short duration of catheter bladder decompression decreases hospital length of stay without increasing morbidity and is consistent with the growing body of literature suggesting less aggressive management of the bladder during colovesical fistula repair. Recent studies show that catheterization of 7-14 days does not adversely impact outcomes [6,12,13]. While traditional management relies on prolonged bladder decompression of greater than 14 days, prolonged catheterization is known to increase risk of UTI, patient discomfort, limit patient mobility, and prolong hospital stay [9,10,11]. Our protocol of < 7 days of bladder decompression is consistent with literature suggesting re-epithelialization of the injured bladder mucosa is complete within 7 days [14].

Bertelson, et al. also suggest early urethral catheter removal in fewer than 7 days, however they conclude that intraoperative leak test, the absence of complex bladder repair (i.e. repair involving the bladder trigone), and postoperative cystogram is a prerequisite for early catheter removal [9]. In our study, we chose to formally repair the bladder defect only if visible urothelium was grossly visible and, as a matter of routine, did not perform an intraoperative leak test. Moreover, the urethral catheter was routinely removed at 4-6 days following surgery without additional confirmatory testing. In this cohort, there were no bladder-related complications on follow-up and no fistula recurrences after a mean follow-up of 8 months. The potential benefits of this approach include a lower risk of urinary tract infection, minimizing patient discomfort, and decreased patient exposure to ionizing radiation. We did not specifically examine the impact on cost of care in this study, however we expect that routine adoption of this protocol would lead to significant cost savings primarily through reduction in the duration of convalescence and obviating the need for routine post-operative cystography.

Prior to implementation of our protocol, bladder repair was performed based on surgeon preference, urethral catheter decompression was done for a minimum of two weeks, and cystography prior to catheter removal was performed selectively. One patient prior to 2008, developed a CVF recurrence approximately one year after surgery despite 3 weeks of Foley catheterization and a normal cystogram prior to catheter removal.

Limitations

This observational study is limited by the retrospective analysis of the data and lack of a comparison group. For the purposes of this study, and as is the case in our hospital's practice, the diagnosis of colovesical fistula was done by a combination of a detailed history, urinalysis confirming contamination of the genitourinary tract, and computed tomography demonstrating air in the bladder. We did not routinely perform cystoscopy or cystography, however this is not a necessary test to establish the diagnosis of colovesical fistula in most cases.

Conclusion

Early removal of Foley catheter (< 7 days) after sigmoid resection for diverticular colovesical fistula is safe in select cases. Routine intraoperative primary bladder repair and postoperative bladder imaging is not required when the defect is small or when no gross hole with direct vision of the urothelium is found. This approach to management of colovesical fistula is associated with a short length of hospital stay and eliminates exposure to unnecessary testing. Further study is needed to determine the impact on total health care cost.

Disclosure

The authors have no relevant conflicts or financial interests to disclose.

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