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Early Removal of Foley Catheter after Surgery for Colovesical Fistula Secondary to Diverticulitis: Friend or Foe?

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ABSTRACT

PURPOSE: Although colon resection and primary anastomosis (CRA)with or without bladder intervention is the preferred surgical approach in colovesical fistula (CVF), optimal postoperative management of Foley catheter (FC) withdrawal is debated in the literature. The aim of this study is to analyze whether early or late FC removal influences outcome in patients undergoing surgery for CVF for diverticulitis.

METHODS: A retrospective review was done for all patients who underwent CRA for CVF secondary to diverticulitis between January 1994 and November 2015 from an IRB approved prospectively maintained institutional database. Patients were grouped into two, based on FC removal day from the surgery: <7 days and ≥7 days.

RESULTS: A total of 162 patients were identified with a mean age of 63(34-88). Fifty-eight patients (36%) were female. Median FC withdrawal day was 7(1-65); 80 patients (49%) had early FC removal. All patients underwent sigmoid colectomy but only 54 patients (33%) had concurrent bladder repair. Perioperative morbidity was higher among patients who had late FC withdrawal (p=0. 008). Length of stay was longer in patients with late FC removal (10. 3 ±8. 2 vs. 5. 8 ±2. 1 days, p<0. 0001).

CONCLUSIONS: Late FC removal after surgery for colovesical fistula secondary to diverticulitis was associated with higher postoperative 30-day morbidity and length of stay. It may be preferable to perform a cystogram early and if no leak is demonstrated to remove the indwelling catheter to decrease perioperative morbidity and potential length of hospital stays.

KEYWORDS

Colovesical fistula; Foley catheter; Early catheter removal

INTRODUCTION

Colovesical fistula is the most common type of fistula complicating diverticulitis [1]. The preferred management

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for diverticulitis complicated with colovesical fistula is colon resection with anastomosis with or without stoma creation in practice guidelines but management of the bladder defect is controversial [2]. The type of surgical intervention depends on the severity of the disease. Primary repair of the defect, creation of an omental pedicle as a barrier after primary closure of bladder or to cover the defect in the bladder without a repair and partial or total cystectomy are some of the techniques described in the literature. Management should be tailored based on the fistula location and size [3-7]. There is limited data on postoperative bladder catheterization after colovesical fistula surgery. A minimum of 7 days of continuous bladder drainage has been reported previously [1,8,9]. More recent data from a small cohort showed that extended bladder catheterization did not provide any advantages [10].

The aim of this study was to evaluate postoperative bladder catheterization and outcomes in patients operated for colovesical fistula secondary to diverticulitis. We hypothesized prolonged bladder catheterization may not provide any additional benefit in this patient cohort.

METHODS

After institutional review board approval was obtained, we identified patients who were operated for colovesical fistula due to diverticulitis between1994 to November 2015and chart review was conducted to collect data.

Patients

Patients with additional risk factors for colovesical fistula including pelvic radiation therapy, malignancy, and history of inflammatory bowel disease were identified by chart review and excluded. The diagnosis of fistula was confirmed in all patients by at least one of the following methods; preoperative diagnostic studies and or intraoperative surgeon visualization. The diagnosis of diverticulitis was confirmed by computed tomography and/or pathology report. Median FC removal day was 7 in the patient cohort and this was used to create the groups. Patients were divided into two categories based on postoperative Foley catheter removal day: less than 7 days from the date of surgery was considered as early; 7 days or later was considered as late removal. Patients who had FC removal and reinsertion after urinary retention were excluded from the study. A total of 228 patients were identified according to these criteria. Patients who underwent Hartmann's procedure and operated under emergency circumstances were excluded. We only analyzed the outcomes of patients with primary anastomosis.

Patient charts and operative reports were reviewed to define intraoperative bladder intervention. Bladder repair was grouped into two: simple repair and resection. Patients were included in the simple repair group if the intervention was primary one- or two-layer hand-sewn repair of the bladder defect. Any type of bladder resection and 4 closure of the bladder defect was included in resection group. Patients with no information regarding bladder repair in their operative reports were recorded as no intervention.

Outcomes

Patient demographics, preoperative comorbidities, preoperative ureteric stenting, surgical details including type and approach of the surgery, creation of omental flap or stoma during surgery, and postoperative short and long-term outcomes were collected by chart review and compared between groups. The overall morbidity was calculated by considering the number of patients who had at least one postoperative complication. Adverse events reviewed and included were surgical site infection (SSI) (superficial, deep, organ-space), ileus, anastomotic leak, bleeding, sepsis, reoperation, wound dehiscence, pneumonia, reintubation, pulmonary emboli, deep vein thrombosis, failure to wean from ventilator within 48 hours of surgery, renal insufficiency, urinary infection, cerebrovascular accident, and myocardial infarction.

Statistics

Categorical variables were analyzed with chi-square or Fisher's exact test, and quantitative variables were analyzed with Wilcoxon rank-sum test. P values of < 0.05) were considered to be statistically significant. Continuous variables were reported as mean ± standard deviation (SD). Categorical variables were reported as numbers and percentages.

After comparing the baseline characteristics and perioperative study outcomes between the groups, we analyzed risk factors in a univariate model. Multivariate models were then constructed to compare risk-adjusted outcomes between the groups and evaluate the risk factors for short-term (30-day) morbidity. Risk factors that showed a correlation with the development of overall morbidity ($p < 0.05$) in univariate analyses were included in the multivariate analysis. All of the statistical analyses were performed using the JMP®pro software program (version 13.0, SAS Institute, Cary, NC, USA).

RESULTS

A total of 162 patients were identified with a mean age of 63 (SD: ±11.5). Fifty-eight patients (36%) were female. Median Foley catheter withdrawal day was 7 days (range 1-65).

	Early removal (<7), N=80	Late removal (≥7), N=82	p-value
Age, years*	59 ±10.7	66 ±11.4	0.001
Gender (Female)	24 (30)	34 (41)	0.1
BMI, kg/m²*	29.3 ±7.5	29.6 ±7.2	0.96
Smoking	48 (70.5)	38 (57.5)	0.1
Diabetes Mellitus	8 (10)	12 (14.6)	0.37
Hypertension	46 (57.5)	47 (57.3)	0.98
Cardiac Comorbidities	38 (47.5)	39 (47.5)	0.99
Pulmonary Comorbidities	12 (15)	10 (12)	0.6
Renal Comorbidities	4 (5.3)	7 (9.2)	0.5
ASA Classification			0.92
ASA I-II	30 (38)	31 (38)	
ASA-III-IV	49 (62)	49 (62)	
Approach (Laparoscopy)	41 (51.2)	34 (41.4)	0.21
Preoperative stent placement	22 (27.5)	28 (34.1)	0.35
Omental flap creation	32 (40)	40 (49)	0.26
Stoma creation	18 (22.5)	31 (37.8)	0.03
Bladder intervention			0.03
Simple repair	16 (20)	28 (34)	
Resection	3 (4)	7 (9)	
None	61 (76)	47 (57)	
Wound class			0.6
1-2	60 (78.9)	64 (82.1)	
3-4	16 (21.1)	14 (17.9)	
Cystogram	49 (61.2)	56 (68.2)	0.3

Values reported as mean (percentage) otherwise noted. * Values reported as mean ±SD. BMI: body mass index, ASA: American Society of Anesthesiologists. Missing data: Smoking: 28, ASA classification: 3, renal comorbidities: 10, smoking:28, wo und class:8.

Table 1: Comparison of demographics, preoperative comorbidities and surgical details between the groups.

Eighty patients (49.3 %) had early Foley removal. Mean FC removal day in the early group was 4.6 days (SD: 1.2) whereas it was 13 days (SD: 10) in the late FC removal group ($p<0.0001$) Comparison of demographics and comorbidities between the groups is given in Table 1 Forty-six percent of the patients (n=75) were operated laparoscopically. Only 54 patients (33.5%) underwent any type of bladder repair. Forty-four patients (81.5%) had simple repair, and 10 patients (18.5%) had partial cystectomy. Forty-nine patients (30.2%) underwent a diverting loop ileostomy. Fifty patients (31%) had ureteric stent placement preoperatively. Seventy-two patients (44%) had an omental pedicle flap. Sixty-five percent (n=106) of the patients had a postoperative cystogram to evaluate healing before their Foley catheter was removed. Only 2 patients had positive results (extravasation of the contrast from the bladder repair) and subsequently FC removal was postponed.

	Total	Early removal (<7), N=80	Late removal (≥7), N=82	p-value
Morbidity	50 (30.8)	17 (21.2)	33 (40.2)	0.008
Mortality	0 (0)	0 (0)	0 (0)	n/a
Length of stay, days*	7.3 ±5.5	5.4 ±1.9	9.3 ±7.0	<0.0001
Ileus	29 (17.9)	9 (11.2)	20 (24.3)	0.02
UTI	13 (8)	4 (5)	9 (10.9)	0.15
SSI -Superficial	13 (8)	4 (5)	9 (10.9)	0.15
SSI -Organ space	5 (3)	1(1.2)	4 (4.8)	0.18
Sepsis	1 (0.6)	0 (0)	1 (1.2)	0.32
Stoma complications	2 (1.2)	0 (0)	2 (2.3)	0.15
Pneumonia	1 (0.6)	1 (1.2)	0 (0)	0.3
DVT	6 (3.7)	1 (1.2)	5 (6.1)	0.1
Fascial dehiscence	2 (1.2)	1 (1.2)	1 (1.2)	0.9
Arrhythmia	1 (0.6)	0 (0)	1 (1.2)	0.3
SBO	1 (0.6)	0 (0)	1 (1.2)	0.3
Anastomotic leak	4 (2.4)	0 (0)	4 (4.8)	0.13
Reoperation	7 (4.3)	2 (2.5)	5 (6.1)	0.2
Transfusion	1 (0.6)	1 (1.2)	0 (0)	0.3
ARF	1 (0.6)	1 (1.2)	0 (0)	0.3
Readmission	11 (6.7)	5 (6.2)	6 (7.3)	0.7
Values reported as mean (percentage) otherwise noted. * Values reported as mean ±SD. UTI: urinary tract infection, SSI: surgical site infection, DVT: deep vein thrombosis, SBO: small bowel obstruction, ARF: acute renal failure.				

Table 2: Comparison of postoperative 30-day outcomes between the groups.

	Morbidity (-), N=112	Morbidity (+), N=50	p-value
Age, years*	62.4± 11.9	64.5± 10.3	0.2
Gender, Female	40 (35.7)	18 (36)	0.09
Diabetes Mellitus	12 (10.7)	8 (16)	0.3
BMI kg/m^{2*}	30± 7.4	28± 7.0	0.1
Hypertension	66 (58.9)	27 (54)	0.5
Smoking (yes)	55 (60)	31 (73.8)	0.1
Pulmonary comorbidities	10 (8.9)	12 (24)	0.009
Cardiac comorbidities	50 (44.6)	27 (54)	0.2
CNS comorbidities	2 (1.7)	5 (10)	0.05
Renal comorbidities	5 (4.8)	6 (12.8)	0.1
Surgical approach, lap	54 (48.2)	21 (42)	0.4
Foley removal			0.008
Early removal	63 (56.2)	17 (34)	
Late removal	49 (43.8)	33 (66)	
Bladder intervention			0.3
Yes	35 (31.3)	19 (38)	
None	77 (68.7)	31 (62)	
Stoma creation	27 (24.1)	22 (44)	0.01
Omentum flap creation	49 (43.7)	23 (46)	0.7
Stent placement	30 (26.7)	20 (40)	0.09
Blood loss, ml *	261± 294	425± 438	0.01
Wound class (3-4)	28 (23.9)	5 (10)	0.02
ASA (3-4)	66 (59.4)	32 (66.6)	0.3
Cystogram	75 (66.9)	30 (60)	0.3
Values are expressed as absolute numbers (percentages) unless indicated otherwise. *Values are expressed as mean ± standard deviation. BMI: body mass index, ASA: American Society of Anesthesiologists. Missing data: Smoking: 28, ASA classification: 3, renal comorbidities: 10, smoking:28, wound class:8.			

Table 3: Univariate comparison of demographics and preoperative comorbidities between patients experience complication or not.

Variables	OR (CI 95%)	p- value
EBL per unit	1.0 (0.9-1.0)	0.9
Wound class (3-4)/(1-2)	0.3 (0.09-1.2)	0.1
Stoma creation (yes/no)	1.3 (0.4-3.5)	0.6
Foley removal (late/early)	2.8 (1.1-7.03)	0.01
Pulmonary (Yes/no)	4.5 (1.4-15.8)	0.009
EBL: estimated blood loss.		

Table 4: Nominal logistic regression analysis for occurrence of 30-day morbidity.

Mean operating time was 196 minutes (SD: ±79.3). Mean length of stay was 7.3 days (SD: ±5.5). Fifty patients (30.8%) developed at least one postoperative complication within 30 days of surgery. There was no mortality. Morbidity rate was 40.2% in the late removal group (n = 32 patients) whereas 21.2% in the early removal group (n=16 patients) (p=0.008). Most common complications were ileus (n = 29, 17.9%), urinary tract infection (n=13, 8%) and superficial SSI (n=13, 8%). Table 2 summarizes the comparison of postoperative outcomes between the groups. Reoperation (p=0.2) and readmission (p=0.7) rates were comparable between the groups.

For further analysis patients were re- grouped according to the presence or absence of any postoperative morbidity within 30 days of operation. Univariate analysis showed that pulmonary comorbities (p = 0.009), FC removal time (p=0.008), stoma creation during surgery (p=0.01) and wound classification (0.02) was different among groups (Table 3). Independent risk factors associated with morbidity were pulmonary comorbidities [odds ratio (OR) 4.5 (1.4–15.8), P = 0.009], and late FC removal [OR 2.8 (1.1–7.03), P = 0.01] (Table 4).

DISCUSSION

There is limited data on Foley catheter management after surgery for colovesical fistula secondary to diverticulitis. Our data shows that late removal of FC increases risks of postoperative complications and length of stay. Foley catheter removal ≥7 days after surgery is an independent risk factor for postoperative 30-day overall morbidity.

A recent publication from NSQIP dataset showed that no bladder intervention was undertaken in forty percent of the patients who underwent colorectal surgery for colovesical fistula [11]. Our study showed a slightly lower rate of no intervention; one third of the patients. Although there is a tendency to keep the FC longer than usual, there is no evidence that supports this. Moya et al. [10] reported on 45 patients who underwent surgery for colovesical fistula. All of the patients underwent complex or simple bladder repair and two-third of their patients had late FC removal [10]. Authors only reported on bladder related complications including urinary tract infection and urinary retention and these two parameters were statistically similar between the groups. Although it was not statistically significant, our study showed that UTI was 2 times more common in patients with late Foley removal and none of the patients experienced postoperative urinary retention. The pathophysiology of catheter-related UTI has been previously shown to be the entry of bacteria into the bladder along the biofilm that forms around the catheter or the ascending infection due to the urinary stasis and contamination [12,13]. In addition to UTI, ambulation restrictions after surgery due to late removal of FC may also increase the length of stay and complications like thromboembolism [14,15]. Our study reveals that early FC removal has no adverse consequences and late FC removal is related with an increase in overall morbidity. It is important to mention that trend of increased bladder intervention might be translated as increased disease severity in the late FC removal group. However, bladder intervention was not shown to be different between

morbidity (+) versus (-) groups and we believe it did not cause a patient selection bias. Further prospective studies are needed to eliminate the disease severity factor.

Pulmonary comorbidities have been shown to be associated with postoperative morbidity and unplanned readmission after abdominal surgery [16, 17]. Our study confirms that pulmonary comorbidity is a predictive factor 6 for postoperative 30-day morbidity after surgery for CVF. In addition to the disease itself, perioperative steroid use for pulmonary diseases might have contributed to increased morbidity.

Even though the use of cystogram to evaluate bladder defects before removal of the FC has been reported previously after colorectal surgery for CVF the benefit of performing a cystogram prior to FC removal is controversial [10]. Sixty-five percent of our patients had cystogram before removal of FC and all were negative except two patients. Due to the low number of the patients who underwent cystogram power analysis was not performed to evaluate the importance of this imaging modality; however, the authors believe that use of cystography in patients with planned early removal of FC may be beneficial.

The major limitation of the study is the retrospective nature of the study. Although a chart review was conducted for all of the patients included in the study, patients who underwent surgery before early 2000's did not have an electronic chart and paper chart review might have caused underrepresentation of the complications due to missing data.

In conclusion, late FC removal after surgery for colovesical fistula secondary to diverticulitis is associated with higher postoperative 30-day morbidity and length of stay. It may be preferable to perform a cystogram in the early postoperative course and removal of the indwelling catheter in the absence of leak potentially decreases the perioperative morbidity and potential length of stay.

REFERENCES

1. Woods RJ, Lavery IC, Fazio VW et al. (1988) Internal fistulas in diverticular disease. Diseases of the Colon and Rectum 31(8): 591-596.
2. Feingold D, Steele SR, Lee S et al. (2014) Practice parameters for the treatment of sigmoid diverticulitis. Diseases of the Colon and Rectum 57(3): 284-294.
3. O'Leary DP (1999) Use of the greater omentum in colorectal surgery. Diseases of the Colon and Rectum 42(4): 533-539.
4. Melchior S, Cudovic D, Jones J et al. (2009) Diagnosis and surgical management of colovesical fistulas due to sigmoid diverticulitis. Journal of Urology 182(3): 978-982.
5. Ferguson GG, Lee EW, Hunt SR et al. (2008) Management of the bladder during surgical treatment of enterovesical fistulas from benign bowel disease. Journal of the American College of Surgeons 207(4): 569-572.
6. Lewis SL, Abercrombie GF (1984) Conservative surgery for vesicocolic fistula. Journal of the Royal Society of Medicine 77(2): 102-104.
7. Nishimori H, Hirata K, Fukui R, et al. (2003) Vesico-ileosigmoidal fistula caused by diverticulitis: Report of a case and literature review in Japan. Journal of Korean Medical Science 18(3): 433-436.
8. Pollard SG, Macfarlane R, Greatorex R, et al. (1987) Colovesical fistula. Annals of the Royal College of Surgeons of England 69(4): 163-165.
9. Daniels IR, Bekdash B, Scott HJ et al. (2002) Diagnostic lessons learnt from a series of enterovesical fistulae. Colorectal Disease 4(6): 459-462.

10. de Moya MA, Zacharias N, Osbourne A et al. (2009) Colovesical fistula repair: is early Foley catheter removal safe? Journal of Surgical Research 156: 274-277.
11. Aydinli HH, Benlice C, Ozuner G et al. (2017) Risk factors associated with postoperative morbidity in over 500 colovesical fistula patients undergoing colorectal surgery: A retrospective cohort study from ACSNSQIP database. International Journal of Colorectal Disease 32(4): 469-474.
12. Kass EH, Schneiderman LJ (1957) Entry of bacteria into the urinary tracts of patients with inlying catheters. The New England Journal of Medicine 256: 556-557.
13. Garibaldi RA, Burke JP, Dickman ML et al. (1974) Factors predisposing to bacteriuria during indwelling urethral catheterization. The New England Journal of Medicine 291: 215-219.
14. Cassidy MR, Rosenkranz P, McAneny D (2014) Reducing postoperative venous thromboembolism complications with a standardized risk-stratified prophylaxis protocol and mobilization program. Journal of the American College of Surgeons 218(6): 1095-1104.
15. Liu VX, Rosas E, Hwang J et al. (2017) Enhanced recovery after surgery program implementation in 2 surgical populations in an integrated health care delivery system. JAMA surgery 152(7): e171032
16. O'Brien DP, Senagore A, Merlino J et al. (2007) Predictors and outcome of readmission after laparoscopic intestinal surgery. World Journal of Surgery 31: 2430-2435.
17. Kim W, Song KY, Lee HJ et al. (2008) The impact of comorbidity on surgical outcomes in laparoscopyassisted distal gastrectomy: a retrospective analysis of multicenter results. Annals of Surgery 248(5): 793-799.