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Factors Related to Mortality in Colovesical Fistula Patients in Tertiary Care Hospital for 20 Years Experienced

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ABSTRACT

Background: Colovesical fistula (CVF) is a rare but serious complication of intra-abdominal pathology, commonly resulting from diverticulitis, malignancy, or radiation. Management strategies vary, and the role of preoperative ostomy remains unclear in high-risk patients. *Objective:* To evaluate factors associated with mortality in CVF patients and examine the impact of preoperative ostomy on outcomes, particularly in relation to septic shock and SOFA scores.
Methods: A retrospective review was conducted on 181 patients with CVF between 2000 and 2022. Patients were divided into three groups based on surgical management: palliative ostomy, multi-stage operation, and single-stage operation. Demographic data, clinical variables, SOFA scores, and mortality were analyzed using univariate and multivariate statistics.
Results: Mortality was significantly associated with septic shock at admission and the use of palliative ostomy alone. Patients with SOFA scores >7 had markedly higher mortality rates, regardless of the surgical strategy employed. No significant differences in baseline comorbidities or demographics were observed across groups. Multivariate analysis identified septic shock (RR = 54.00; 95% CI: 11.56–252.25; $p < 0.001$) and multi-stage operation (OR = 5.92; 95% CI: 1.83–19.09; $p < 0.001$) as independent predictors of mortality.
Conclusions: Preoperative ostomy did not significantly reduce mortality in CVF patients with severe sepsis. SOFA score >7 was strongly predictive of poor outcome. Surgical planning should incorporate early risk stratification, and individualized management strategies are essential to improve survival in this high-risk population.
Keyword: colovesical fistula, mortality, SOFA score

INTRODUCTION

Colovesical fistula (CVF) is a rare but significant complication of intra-abdominal diseases, particularly those involving pelvic organs. The most frequent etiology is sigmoid diverticulitis, accounting for over two-thirds of all cases. Colorectal cancer contributes to approximately 10-20% of cases, while Crohn's disease represents the third leading cause, responsible for 5-7%. Other less prevalent etiologies include radiation therapy, trauma, and iatrogenic injury.

The diagnosis is primarily based on clinical presentation, with patients commonly exhibiting urological symptoms. A thorough diagnostic workup is

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essential and typically involves imaging modalities such as barium enema, fistulography, and computed tomography (CT) scans of the lower abdomen, in addition to endoscopic evaluations including cystoscopy and colonoscopy. These diagnostic tools are critical for confirming the presence of CVF, as well as for determining its size, extent, and underlying cause.

Surgical intervention remains the cornerstone of treatment. Although one-stage procedures are generally favored, multistage operations may be indicated depending on the patient's clinical condition and disease complexity. In patients with significant comorbidities or poor performance status, a permanent or palliative ostomy may be considered a definitive treatment option.

The objective of this study was to analyze the factors associated with mortality among patients diagnosed with colovesical fistula.

METHODOLOGY

Following approval from our Institutional Review Board, we conducted a retrospective review of patient charts using data retrieved from the electronic medical records. To identify individuals diagnosed with colovesical fistula (CVF), the authors reviewed the records of all patients who had undergone colectomy, bladder surgery, or treatment for gastrointestinal fistulas. Additionally, operative reports from surgeons known for frequently managing CVF cases were examined.

Data collected included patient demographics, diagnostic modalities, surgical management, and postoperative outcomes. Presenting symptoms at the time of diagnosis were also recorded and analyzed. Patients underwent a range of preoperative diagnostic evaluations, encompassing both invasive and non-invasive methods. These included computed tomography (CT) scans, barium enemas (BE), cystography, intravenous pyelography (IVP), cystoscopy, and colonoscopy. In some cases, additional testing was required until a definitive diagnosis of CVF was established.

Based on the type of surgical intervention received, patients were categorized into three groups:

1. Ostomy diversion only;
2. Two-stage operation, consisting of initial ostomy followed by resection and fistula closure;
3. Single-stage operation, involving resection and primary closure of the fistula without ostomy.

Definitions, Septic shock in this study was defined as sepsis requiring vasopressor therapy to maintain a mean arterial pressure (MAP) ≥ 65 mmHg and a serum lactate level > 2 mmol/L (18 mg/dL) despite adequate fluid resuscitation. Colovesical fistula (CVF) was defined as an abnormal communication between the colon (including the rectum) and the urinary bladder.

Statistical Analysis

To assess the data, the Student's t-test and the Mann–Whitney U test were applied to evaluate baseline patient characteristics across the three groups, including variables such as age and underlying comorbidities. The χ^2 (chi-square) test and Fisher's exact test were used to compare categorical variables associated with mortality. Statistical analyses were performed using SPSS version 26 (IBM Corp., Armonk, NY, USA). A p-value of ≤ 0.05 was considered statistically significant.

RESULTS

Between 2000 and 2022, a total of 200 patients were admitted with a diagnosis of colovesical fistula (CVF). After excluding 19 patients due to incomplete medical records, 181 patients were included in the final analysis. These patients were categorized into three treatment groups. The demographic characteristics of the study population are presented in *table 1*.

Regarding etiology, patients in the radiation-associated group had a documented history of receiving pelvic radiotherapy for conditions such as cervical cancer, prostate cancer, or other malignancies of pelvic organs.

Sepsis was defined as the presence of two or more of the following criteria:

- Temperature >38°C or <36°C;
- Heart rate >90 beats/min;
- Respiratory rate >20 breaths/min or $PaCO_2$ <32 mmHg (4.3 kPa);
- White blood cell count >12,000/mm^3 or <4,000/mm^3, or >10% immature band forms (1).

Septic shock in this study was defined as sepsis requiring vasopressor support to maintain a mean arterial pressure (MAP) ≥ 65 mmHg and a serum lactate level > 2 mmol/L (18 mg/dL) after adequate fluid resuscitation (2).

All patients received intravenous antibiotics. The regimens included third-generation cephalosporins plus metronidazole, meropenem, imipenem, quinolones plus metronidazole, and metronidazole alone. There were no statistically significant differences in antibiotic regimens among the treatment groups.

Some patients had percutaneous nephrostomy placement prior to admission: 2 in the palliative ostomy group, 2 in the multi-stage operation group, and 5 in the single-stage operation group. However, the distribution

Table 1 - Demographic Data of the Study Population

	Palliative ostomy group (n-31)	Multi-stage, Diversion and Resection (n-46)	Single stage (n-104)	p
Age (mean±SD)	61.1±6.98	57.8±10.34	59.0±7.83	0.276
Sex (%)				0.002
Male	13(48.1)	22(47.8)	76(70.4)	
Female	14(51.9)	24(52.2)	32(29.6)	
ASA classification				0.706
I	2(7.4)	13(28.3)	15(13.9)	
II	8(29.6)	12(26.1)	40(37.0)	
III	17(63.0)	19(41.3)	49(45.4)	
IV	0(0)	2(4.3)	4(3.7)	
History of previous pelvic radiation (%)	15(55.6)	2(4.3)	11(10.2)	<0.001
Underlying disease (%)				0.929
Non	2(7.4)	8(17.4)	8(7.4)	
DM	4(14.8)	9(19.6)	13(12.0)	
CAD & HT	9(33.3)	8(17.4)	33(30.6)	
HIV infection	1(3.7)	6(13.0)	7(6.5)	
Cirrhosis	5(18.5)	6(13.0)	20(18.5)	
CKD	5(18.5)	4(8.7)	19(17.6)	
Other	1(3.7)	5(10.9)	8(7.4)	
Chief complaint (%)				0.183
UTI	6(22.2)	22(47.8)	44(40.7)	
Pneumaturia	7(25.9)	10(21.7)	33(30.6)	
Fecaluria	7(25.9)	10(21.7)	20(18.5)	
Sepsis	7(25.9)	4(8.7)	11(10.2)	
Septic shock on admission(%)	17(54.8)	8(17.4)	5(4.8)	<0.001
Aetiology (%)				<0.001
Colorectal cancer	17(63.0)	29(63.0)	11(10.2)	
Diverticulitis	0	9(19.6)	68(65.0)	
Radiation associated	10(37.0)	2(4.3)	11(10.2)	
Trauma	0	3(6.5)	7(6.5)	
Bladder cancer	0	2(4.3)	4(3.7)	
Crohn's disease	0	1(2.2)	2(1.9)	
Colitis	0	0	5(4.6)	

Abbreviations: ASA – American Society of Anesthesiologists classification; DM – Diabetes mellitus; CAD – Coronary artery disease; HT – Hypertension; CKD – Chronic kidney disease; UTI – Urinary tract infection.

was not statistically significant across groups.

Mortality analysis revealed that 13 patients (41.9%) in the palliative ostomy group, 5 patients (10.9%) in the multi-stage operation group, and no patients in the single-stage operation group died, with a statistically significant difference ($p < 0.001$). Factors associated with mortality are summarized in *table 2*.

The Sequential Organ Failure Assessment (SOFA) score was calculated in 31 patients who presented with septic shock. The mean SOFA score among survivors was 6.23 ± 1.59, whereas non-survivors had a significantly higher mean score of 9.88 ± 1.64 ($p < 0.001$). The SOFA score, which reflects the severity of organ dysfunction in septic shock, was markedly elevated in patients who underwent palliative ostomy or multi-stage operations, with the highest values observed in the palliative ostomy group, which exhibited a mortality rate of 40%. The correlation between SOFA score and mortality is presented in *table 3*, and the predictive value of the SOFA score based on receiver operating characteristic (ROC) curve analysis is shown in *table 4*. Other evaluated factors - including ASA classification, antibiotic regimen, presence of percutaneous nephrostomy (PCN), and underlying comorbidities - were not significantly associated with mortality.

A subgroup analysis was conducted in patients diagnosed with colorectal cancer to identify mortality-associated factors. The results of this analysis are summarized in *table 5*.

Multivariate logistic regression analysis demonstrated that undergoing a multi-stage operation was significantly associated with mortality, with an odds ratio (OR) of 5.92 (95% confidence interval [CI]: 1.83–19.09, $p < 0.001$). In addition, patients who presented with septic shock at admission had a substantially elevated risk of mortality, with a risk ratio (RR) of 54.00 (95% CI: 11.56–252.25, $p < 0.001$).

DISCUSSION

Numerous studies have explored various aspects of colovesical fistula (CVF); however, no previous research

Table 2 - Factors associated with mortality

	Survive group (N=163)	Mortality group (N=18)	p
Age (mean±SD)	59.00±8.39	58.05±9.21	0.983
Sex (%)			0.013
Male	105(94.6)	6(5.4)	
Female	58(82.9)	12(17.1)	
History previous pelvic radiation (%)	23 (14.8)	4 (25.0)	0.286
Etiology(%)			<0.001
Colorectal cancer	44(27.0)	13(72.2)	
Radiation	18(11.0)	5(27.8)	
Diverticulitis	77(47.2)	0(0)	
Trauma	10(6.1)	0(0)	
Bladder cancer	6(3.7)	0(0)	
Colitis	5(3.1)	0(0)	
Crohn's disease	3(1.8)	0(0)	
Chief complaint (%)			<0.001
UTI	5(27.8)	67(41.1)	
Pneumaturia	0(0)	50(30.0)	
Fecaluria	4(22.2)	33(20.2)	
Sepsis	9(50.0)	13(8.0)	
Surgical procedure(%)			<0.001
Diversion alone	18(11.0)	13(72.2)	
2 stage operation	41(25.2)	5(27.8)	
Single stage operation	104(63.8)	0(0)	
Septic shock on admission (%)	13 (8.4)	13 (81.3)	<0.001

Table 3 - Correlation Between SOFA Score and Mortality

SOFA score	Total cases		Cases in stage operation		Cases in palliative ostomy	
	Survival cases	Mortality cases	Survival cases	Mortality cases	Survival cases	Mortality cases
3	28	0	25	0	3	0
4	20	0	12	0	8	0
5	2	0	1	0	1	0
6	5	0	3	0	2	0
7	0	1	0	1	0	0
8	4	4	0	3	4	1
9	0	1	0	0	0	1
10	0	6	0	1	0	5
11	0	3			0	3
12	0	2			0	2
13	0	1			0	1

Table 4 - Predictive Value of SOFA Score for Mortality Based on ROC Curve in overall patients

Positive if Greater Than or Equal To	Sensitivity	1 - Specificity
2.00	1.000	1.000
3.50	1.000	.563
4.50	1.000	.219
5.50	1.000	.141
6.50	1.000	.063
7.50	.944	.063
8.50	.722	.000
9.50	.667	.000
10.50	.333	.000
11.50	.167	.000
12.50	.056	.000
14.00	.000	.000

Table 5 - Mortality-Associated Factors in Patients with Colorectal Cancer

	Survive group (62)	Mortality group (18)	p
Chief complaint			0.003
UTI	24(38.7)	5(27.8)	
Pneumaturia	19(30.6)	0(0)	
Fecaluria	12(19.4)	4 (22.2)	
Sepsis	7(11.3)	9 (50.0)	
Septic shock on admission(%)	3 (18.8)	13 (81.3)	<0.001
Surgical procedure(%)			<0.001
Diversion alone	18(29.0)	13(72.2)	
2 stage operation	26(41.9)	5(27.8)	
Single stage operation	18(29.0)	0(0)	

has specifically compared clinical outcomes between patients who underwent preoperative ostomy diversion to control infection and those who proceeded directly to definitive surgery. In the present study, no significant differences were observed between the groups in terms of age, gender, preoperative risk, or comorbidities - factors that are typically associated with surgical outcomes.

In cases of non-malignant etiology, the majority of CVFs were attributed to diverticulosis. Benign colovesical fistulae more frequently involved the sigmoid colon (91%) compared to malignant fistulae (55%), whereas malignant cases more commonly involved the rectum (3).

The choice of surgical approach depends on multiple variables, including the underlying disease, the anatomical location of the intestinal lesion, and the patient's preoperative condition. The primary objective of surgical treatment is bowel resection with or without bladder repair. Either single-stage or multi-stage surgical procedures may be employed. Several studies have demonstrated that a single-stage resection and anastomosis, without the need for a protective ostomy, can be performed safely in selected patients (5-7). This approach is associated with low mortality and offers the benefit of improved quality of life, making it the preferred strategy in appropriately selected cases.

However, in patients with poor general condition, pelvic abscesses, or locally advanced and potentially unresectable malignancies, multi-stage procedures—such as primary resection with diversion or Hartmann's procedure—are typically indicated (8-13). In patients at high surgical risk, defunctioning ostomy followed by resection and eventual closure is considered a last-resort option.

Previous literature has reported that single-stage surgery was feasible in only 2 of 5 patients with CVF secondary to colorectal cancer, with 2 others requiring ostomy (14). Due to the complexity of such cases, ostomy prior to definitive fistula repair has been recommended. Subsequent studies supported staged procedures in patients with extensive pelvic abscesses, fecal contamination, advanced malignancies, or post-radiation changes (15,16). Some authors advocate for single-stage surgery, provided that ostomy diversion is performed in emergency settings (17).

The present study aimed to clarify the role of ostomy in the management of CVF. Our findings indicate that mortality was significantly associated with both septic shock on admission and undergoing palliative ostomy without subsequent resection. Notably, the presence of septic shock at presentation carried a mortality risk as high as 40–70% (18,19). Sepsis represents a complex systemic disturbance involving the dysregulation of both pro- and anti-inflammatory responses. This imbalance triggers widespread cytokine release and activation of complement and coagulation cascades. According to the Surviving Sepsis Campaign (SSC), early source control—through surgery or interventional radiology—and empiric antibiotic therapy are essential. Additional intensive care interventions such as mechanical ventilation, renal replacement therapy, and vasopressor administration are frequently required. Adjunctive therapies may be used as guided by clinical response (20).

In our cohort, ostomy did not appear to improve source control or reduce the severity of sepsis. Possible explanations include anatomical characteristics of the fistula (e.g., large size or extensive fecal contamination), mixed or anaerobic infections, and host immune factors. Notably, while the concept of preoperative ostomy to control infection is well established in rectal cancer management, it is rarely discussed in the context of CVF. Some studies in rectal cancer have recommended pre-treatment ostomy prior to neo-adjuvant chemoradiation in patients who are able to tolerate scope passage beyond the tumor (21).

Based on our results, we propose that preoperative ostomy may be warranted in patients with a SOFA score >7, as this score was associated with significantly increased mortality—regardless of whether the patient underwent single-stage, multi-stage, or permanent ostomy. These findings highlight the importance of early stratification and intervention in high-risk patients.

This study has several limitations. First, SOFA scores were not available for all patients, limiting subgroup analysis. Second, the anatomical location of the fistula was not clearly documented in all cases, making it difficult to differentiate between rectovesical and colovesical fistulae. Further studies are warranted to clarify these distinctions and refine treatment guidelines.

CONCLUSION

Among patients with colovesical fistula, those who underwent prior ostomy surgery continued to experience high mortality rates and often failed to achieve resolution of the septic shock cascade. Mortality was significantly associated with the underlying etiology of the fistula—particularly cases related to colorectal cancer and radiation—as well as the severity of the clinical presentation, especially when the SOFA score exceeded 7. In such high-risk

scenarios, surgical decision-making should be undertaken with caution.

The choice of surgical strategy should prioritize patient safety and individualized risk assessment. Options may include palliative ostomy for critically ill patients, or staged procedures involving resection and delayed fistula closure for those with potentially curable disease. Early identification of sepsis severity and appropriate surgical planning may contribute to improved outcomes in this complex clinical condition.

Study Limitations

This study has several limitations. First, the SOFA score was not available for all patients, limiting the generalizability of sepsis-related outcome analysis. Second, the anatomical location of the fistula (e.g., rectovesical vs. colovesical) was not consistently documented, which may affect interpretation of surgical outcomes based on fistula subtype. Third, the retrospective design may introduce selection bias and limit causal inference. Finally, the lack of standardized antibiotic regimens and surgical protocols across patients could confound the relationship between treatment strategy and mortality. Future prospective studies with standardized protocols are warranted to confirm these findings.

Author's Contributions

Siripong. and Paiboon conceived of the presented idea. Siripong developed the theory and performed the computations. Siripong and Pornpatchara. verified the analytical methods. Paiboon supervised the findings of this work. All authors discussed the results and contributed to the final manuscript.

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Competing Interests

The authors have NO Conflict of Interest.

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Ethical Statement

This study was approved by Rajavithi ethical broad committee.

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