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Factors associated with portomesenteric venous thrombosis after total colectomy with ileorectal anastomosis or end ileostomy

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ABSTRACT

Background: Porto-mesenteric venous thrombosis (PMVT) is an uncommon but serious complication. Data on the risk factors for PMVT following total colectomy with ileorectal anastomosis or end ileostomy (TC/IRA or EI) is limited. This study aimed to evaluate the factors associated with PMVT after TC/IRA or EI. **Methods:** Patients who underwent elective TC/IRA or EI between January 2010 and December 2014 were identified from institutional database. Patients who had CT proven PMVT within 30 days of surgery were included in the PMVT positive group. Demographics and perioperative/postoperative 30-day outcomes were compared between groups.

Results: Out of 832 patients, 34 patients (4.1%) were diagnosed with PMVT. PMVT positive group were younger (35.8vs.41 years, $p = 0.03$). Postoperative organ-space surgical site infection (17.6% vs. 4.8%, $p = 0.007$), deep venous thrombosis (8.8%vs.1.5%, $p = 0.02$), ileus (38.2%vs.20.8%, $p = 0.018$), and readmission (50.0%vs.12.7%, $p < 0.001$) were more common in patients with PMVT, who also had longer hospital stay (8.5vs.6 days, $p = 0.002$).

Conclusions: PMVT after TC/IRA or EI may occur in non-IBD patients. PMVT should be included in differential diagnosis after TC/IRA or EI in patients with intraabdominal infection or ileus, especially in younger patients.

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1. Introduction

Portomesenteric venous thrombosis (PMVT) is a rare but potentially life-threatening postoperative complication.¹ PMVT is seen in approximately one in ten thousand abdominal surgery cases within 30 days of surgery.^{2–4} A number of factors have been proposed to predispose to PMVT including cirrhosis, pancreatic and hepatocellular carcinoma, inherited hypercoagulable states, inflammatory bowel disease (IBD), and abdominal sepsis in the setting of abdominal surgery.^{1,5–7}

The clinical spectrum of PMVT is variable, ranging from non-specific symptoms to fever, vomiting, right upper quadrant or epigastric pain and ileus. Computed tomography (CT) of the abdomen with intravenous contrast injection is the preferred diagnostic tool for PMVT.^{8,9} Once PMVT is diagnosed patients are generally treated with anticoagulation therapy for three to six

months.¹⁰

Data on risk factors for PMVT following total colectomy with ileorectal anastomosis or end ileostomy (TC/IRA or EI) is scant or limited by a small sample size. In particular, there is no previously published literature specifically focused on PMVT incidence and risk factors in patients with TC/IRA or EI. Allaix et al. reported a total of 10 patients with postoperative PMVT after TC/IRA or EI.¹¹ Another paper from our institution by Gu et al. focused on patients with restorative proctocolectomy and included 12 patients who developed postoperative PMVT following TC as initial stage of their surgical treatment.¹² The aim of this study is to evaluate the factors associated with PMVT after TC/IRA or EI.

2. Patients and methods

2.1. Patients

Patients who underwent elective TC/IRA or EI between January 2010 and December 2014 were identified from our prospectively maintained database. 173 patients had CT with intravenous

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contrast injection for a variety of post-operative symptoms. Study group patients had CT proven PMVT within 30 days of surgery. PMVT was defined as thrombus/thrombi within the portal, splenic, superior or inferior mesenteric vein diagnosed with CT abdomen/pelvis, which was routinely performed to evaluate unexplained postoperative abdominal pain, long lasting ileus, or unexplained persistent WBC elevation.^{10,13} Patients were divided into two groups according to postoperative PMVT occurrence: (-)/(+). Patients with toxic megacolon, massive gastrointestinal bleed, bowel perforation, or bowel obstruction, stage IV cancer, and IBD-associated cancer or dysplasia were excluded in our study.

2.2. Outcomes

Patient demographics, comorbidities, diagnosis, and perioperative/postoperative 30-day outcomes were compared between two groups. Converted cases were included in the laparoscopic group. Complications reported in the study were characterized according to the American College of Surgeons National Surgical Quality Improvement Program definitions.¹⁴

2.3. Perioperative management

Institutional deep venous thromboembolism (DVT) prophylaxis was established by perioperative compression stockings, which were placed in the operating room prior to induction of anesthesia and kept until hospital discharge; and subcutaneous low-molecular-weight heparin (LMWH) or unfractionated heparin (UFH) 5000 IU, administered subcutaneously 30 min before the surgical incision and maintained at prophylactic doses (UFH three times daily or LMWH once daily) until hospital discharge. Once PMVT was diagnosed, systemic anticoagulation was initiated and continued for six months.

2.4. Statistical analysis

Comparison of the groups was performed using chi-square or Fisher exact tests with respect to categorical data and using the Wilcoxon rank sum test with respect to quantitative data. Parametric data were reported as means and nonparametric data as medians. Continuous data was evaluated by *t*-test or Wilcoxon-Mann-Whitney test. Multivariate analysis was performed using a logistic regression. A *p*-value <0.05 was considered statistically significant.

3. Results

Out of 832 total colectomy patients, 173 underwent abdominal/pelvic CT. Of these, 34 (4.1%) were diagnosed with PMVT (20 females; mean age 35.8 ± 14.2 years). Our study showed that the incidence of PMVT in patients who had abdominal CT scan for any reason in the postoperative period was 4.1% within 30 days of surgery after TC/IRA or EI. The median interval between surgery and diagnosis was 9.7 days (range 3–30). In one third of the cases, there was more than one thrombus in multiple peripheral portal vein branches. Thrombi localizations are summarized in Table 1.

Groups were comparable in terms of demographics and preoperative comorbidities except age [patients with PMVT were younger (35.8 ± 14 vs. 41 ± 15 years, $p = 0.03$)]. Patient demographics and preoperative comorbidities are summarized in Table 2. The most common indication for surgery was IBD (76.4%), followed by constipation (12.7%), polyposis syndromes (6.8%) and colon cancer (3.8%) ($p = 0.58$). The incidence of previous thromboembolic disease ($p > 0.99$), preoperative steroid use ($p = 0.52$) and laparoscopic approach ($p = 0.41$) were similar in both groups.

Table 1
Location of PMVT.

PMVT location(s) ^a	N = 34
Main PV	6
Right or left PV branches	9
SMV	7
Single peripheral PV branch	1
Multiple peripheral PV branches	9
IMV	2

PMVT: porto-mesenteric venous thrombosis; **PV:** portal vein; **SMV:** superior mesenteric vein; **IMV:** inferior mesenteric vein.

^a Multiple locations for some patients.

Seventy percent (N = 611) of the patients underwent TAC with EI ($p = 0.12$). Nearly two-third [N = 557 (67%), $p = 0.41$] of the patients had laparoscopic surgery, and 29 (5.2% of the laparoscopic operations) were converted to open. Table 3 shows the comparison of surgery related outcomes.

A total of 346 patients (41.5%) had postoperative complications. The most common complication was post-operative ileus ($p = 0.018$). Univariate analysis demonstrated that postoperative organ-space surgical site infection (17.6% vs. 4.8%, $p = 0.007$), deep venous thrombosis (8.8% vs. 1.5%, $p = 0.02$), ileus (38.2% vs. 20.8%, $p = 0.018$) and readmission (50.0% vs. 12.7%, $p < 0.001$) were more common in patients with PMVT who also had longer length of hospital stay [8.5 vs. 6; range: (5.25–13.75), (4–9.75), $p = 0.002$] [Table 4]. One patient died on postoperative day 9 due to bowel infarction. After adjustment for the following variables (age and surgical procedure), multivariate analysis showed that young age [(odds ratio (OR): 1.17, 95% confidence interval (CI): 1.02–1.33, 0.85, $p = 0.014$) was the only independent risk factor for developing PMVT within 30 days of surgery [Table 5].

4. Discussion

The results of the current study indicate that the occurrence of PMVT within 30 days after total colectomy with ileorectal anastomosis or end ileostomy is not uncommon and is associated with longer hospital stay and higher hospital readmission rates. Our results also highlight that PMVT can occur in patients without IBD.

Table 2
Comparison of demographics, and preoperative comorbidities between two groups.

	PMVT (-) (N = 798)	PMVT (+) (N = 34)	P-value
Age ^a (years)	41 ± 15.1	35.8 ± 14.3	0.03
Gender			0.30
Female	396 (49.6)	20 (58.8)	
Male	402 (50.4)	14 (41.2)	
BMI ^a (kg/m ²)	26.2 ± 6.6	25.8 ± 5.5	0.93
ASA score, n (%)			0.38
I-II	452 (57.0)	22 (64.7)	
III-IV	341 (43.0)	12 (35.3)	
Hyper coagulation	8 (1.0)	1 (2.9)	0.31
History of thromboembolic disease	28 (3.5)	1 (2.9)	>0.99
Steroid use ^b	218 (27.3)	11 (32.4)	0.52
History of smoking	9 (1.1)	0 (0)	>0.99
Diagnosis			0.58
IBD	611 (76.5)	25 (73.5)	
Constipation	99 (12.4)	7 (20.5)	
Polyposis syndromes	56 (7.0)	1 (2.9)	
Colon cancer	31 (3.8)	1 (2.9)	

Values are expressed as absolute numbers (percentages) unless indicated otherwise.

^a Values are expressed as mean (Standard Deviation). **BMI:** Body Mass Index, **ASA:** American Society of Anesthesiologists classification; **IBD:** Inflammatory bowel disease.

^b Steroid usage for a chronic medical condition within 30 days before surgery.

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