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Case Report

Transverse Colonic Volvulus: A Case Report and Literature Review of a Rare Disease

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ARTICLE INFO

Article history:

Received: 30 November, 2019

Accepted: 29 December, 2019

Published: 31 December, 2019

Keywords:

Transverse colon

volvulus

surgical management

ABSTRACT

Obstructions of the large and small bowel are frequently caused by cancer, inflammation, post-surgical adhesions, hernias, and, more rarely, volvulus, representing <10% of all reported cases. Of these, volvulus of the transverse colon (TCV) is found in <5% of all instances of colonic volvulus with delayed diagnosis and treatment resulting in infarction, peritonitis, and death. Given the morbidity and the fact that TCV most often develops acutely, diagnosis of this condition is considered to be a surgical emergency. Common surgical procedures to correct this often involve urgent exploratory laparotomy, followed by either colopexy or colectomy with subsequent creation of colostomy or anastomoses. This is a review of all of the treatment and complications of transverse colonic volvulus published in the last 75 years.

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Introduction

Obstructions of the large and small bowel are frequently caused by cancer, inflammation, post-surgical adhesions, hernias, and, more rarely, volvulus, representing <10% of all reported cases [1]. Of these, transverse colonic volvulus (TCV) is found in <5% of all instances of colonic volvulus with delayed diagnosis and treatment resulting in infarction, peritonitis, and death [2]. Given the morbidity and the fact that TCV most often develops acutely, diagnosis of this condition is considered to be a surgical emergency. Common surgical procedures to correct this often involve urgent exploratory laparotomy, followed either by colopexy or colectomy with subsequent creation of colostomy or anastomoses. The following is a case report describing the treatment of 21-year-old female with a history of mast cell disease and Ehler-Danlos syndrome who presented to the emergency department with a TCV followed by a review of all of the treatment and complications of transverse colonic volvulus published in the last 75 years.

Case Report

A 21-year-old female with a history of mast cell disease, Ehler-Danlos syndrome, gastroparesis, reflux disease, and failure to thrive presented

to the emergency department with sharp abdominal pain and abdominal distension. Patient's surgical history included a Nissen fundoplication to treat her reflux disease and a gastrostomy tube to treat her failure to thrive. Patient was requiring long term steroids to treat her mast cell disease. Patient stated that she had persistent pain for greater than four hours, and her pain was steadily increasing in severity. The patient complained of nausea and retching. Vomiting was absent, likely due to her history of Nissen fundoplication. Patient denied having bowel movements or flatus since her episode of pain began. Labs showed a mildly elevated leukocyte count of 12.6, with lipase of 36 and normal metabolic panel. An acute abdominal series demonstrated severe dilation of bowel (Figure 1). Due to the patient's allergy to contrast, a non-contrasted CT scan of the abdomen and pelvis was performed and confirmed severe gaseous dilatation of the distal small bowel and proximal colon. A transition point was identified at the distal transverse colon along with a mesenteric swirl sign (Figure 2) which suggested a volvulus. An exploratory laparotomy was performed.

At operation, a right upper quadrant optical entry was attempted. Due to distension of the abdomen and lack of adequate visualization, the procedure was converted to open. A midline incision was made, and the bowel was eviscerated. The transverse colonic volvulus was identified

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and reduced. There was noted to be decompressed colon distal to the site of obstruction. The patient had extensive colonic mesentery, and due to the risk of recurrent volvulus, she was treated with a subtotal colectomy. An ileosigmoid anastomosis was created and the patient's abdomen was closed. The patient was admitted to the ICU following surgery. Patient was transferred to the floor on post-op day two. Full return of bowel function occurred by post-op day four. Her hospital course was complicated by a Clostridium difficile infection on hospital day eight and patient was started on Fidaxomicin due to patient's allergy to vancomycin. Patient was discharged home on hospital day nine.



Figure 1: X-ray of the abdomen of 21 year old female demonstrating distended loops of bowel secondary to transverse colonic volvulus.



Figure 2: CT scan of the abdomen of a 21 year old female demonstrating a mesenteric swirl sign highlighting the patient's transverse colonic volvulus.

Discussion

TCV is a rare occurrence where delayed diagnosis and treatment can result in infarction, peritonitis, and death [2]. Additionally, TCV is more likely than other sites of volvulus in the large bowel to produce septic shock, with rates of gangrene reported to be between 16% and 60% [3]. While TCV has been reported in all ages and genders, those with developmental delays, chronic constipation, and pregnant women have shown more frequent incidences [1, 4]. TCV most often presents as abdominal pain, fever, vomiting, distension, and constipation [5]. TCV develops acutely and is considered to be a surgical emergency. Common surgical procedures to correct TCV often involve urgent exploratory laparotomy, followed by either colopexy or colectomy with subsequent creation of colostomy or anastomoses [6].

Table 1: Comprehensive Literature Review of Transverse Colonic Volvulus Cases from 1944 to 2018.

Author	Year	Pts	Age*	Gender	Procedure	Colectomy vs. Colopexy	Post-Op Complications	Hosp Stay (Days)
Schammel	2018	1	21	F	Laparotomy with Colectomy	Colectomy	C. Difficile Infection	9
Milickovic [4]	2017	1	16	M	Ex. Lap with Colectomy and Colostomy	Colectomy	Cardiorespiratory Failure	240
Sala-Hernandez [6]	2016	1	81	M	Subtotal Gastrectomy, subtotal colectomy, Y en Roux gastrojejunostomy, ileosigmoid anastomosis	Colectomy	Anemia	13
Waluza [7]	2015	3	11 7 17	F M M	Laparotomy with colectomy	Colectomy Colectomy Colectomy	Ileus Constipation; Fever; Pain Small Bowel Obstruction	18 28 35
Walczak [3]	2013	1	76	F	Laparotomy with Colectomy	Colectomy	Cardiorespiratory Failure; Death	7
Sharma [1]	2013	1	29	F	Laparotomy with Colopexy	Colopexy	None	
Smith [8]	2013	1	7	M	Laparotomy with Colopexy	Colopexy	None	
Sana [2]	2013	1	39	F	Laparotomy with hemicolectomy	Colectomy	None	5
Lianos [9]	2012	1	82	F	Laparotomy with Total Colectomy	Colectomy	None	8
Kaushik [10]	2012	1	38	M	Laparotomy with Colectomy and Colostomy	Colectomy	None	
Sage [11]	2012	1	25	F	Laparotomy with Needle Decompression and Colopexy	Colopexy	None	6
Chen [12]	2012	1	12	M	Laparotomy with Colectomy	Colectomy		

Nofuentes [13]	2011	1	28	F	Laparotomy with hemicolectomy and anastomosis	Colectomy	None	9
Deshmukh [14]	2010	1	27	M	Laparotomy with Colostomy	Colectomy	None	
Rahbour [15]	2010	1	15	M	Laparotomy with colectomy and loop defunctioning ileostomy	Colectomy	Small Bowel Obstruction	
Booij [16]	2009	1	43	M	Laparotomy with subtotal colectomy and ileorectal anastomosis	Colectomy	Fever; Infection	9
Katsanos [17]	2009	1	83	F	Laparotomy with hemicolectomy and transversectomy	Colectomy		
Ramirez-Wiella-Schwuchow† [18]	2009	1	46	F	Laparotomy with hemicolectomy and ileocoloanastomosis	Colectomy	None	4
Sparks [19]	2008	1	75	M	Laparotomy with hemicolectomy and Ileostomy	Colectomy	None	6
Hinkle [20]	2008	1	22	M	Laparotomy with Colectomy	Colectomy	None	
Matsushima [21]	2006	1	22	F	Laparotomy with Colectomy	Colectomy		
Casamayor [22]	2005	1	34	F	Laparotomy with colectomy and anastomosis	Colectomy	Dehiscence; Inflammation	
Tobinaga [23]	2004	1	70	M	Laparotomy with Colopexy	Colopexy	Megacolon	17
El-Tawil [24]	2002	1	61	F	Laparotomy with Colectomy	Colectomy	None	
Asabe [25]	2002	1	12	F	Laparotomy with Colectomy	Colectomy	None	
Echenique† [26]	2002	2	59		Laparotomy with Colectomy	Colectomy Colectomy	None	
Al-Homaidhi [27]	2001	1	15	M	Laparotomy with hemicolectomy with anastomosis	Colectomy	None	
Rangiah [28]	2001	2	32 34	M M	Laparotomy with Colectomy and Colostomy Laparotomy with Colectomy	Colectomy Colectomy	Ileus None	
Samuel [29]	2000	1	5	M	Laparotomy with Colectomy and Colocolic Anastomosis	Colectomy	None	
Haque [32]	1999	1	37	F	Laparotomy with Colectomy	Colectomy	None	
Ciraldo [31]	1999	1	75	F	Laparotomy with Colectomy	Colectomy		
Houshian [33]	1998	1	9	F	Laparotomy with Colectomy and Anastomosis	Colectomy	None	
Plorde† [34]	1996	1	64	M	Laparotomy with Decompression and Hemicolectomy	Colectomy		
Loke [35]	1995	1	34	M	Laparotomy with Colectomy	Colectomy	None	
Mercado-Deane [36]	1995	1	7	M	Laparotomy with Colopexy	Colopexy	None	
Yaseen [37]	1994	1	50	M	Laparotomy with subtotal colectomy	Colectomy	Bowel Perforation; Death	23
Mellor† [38]	1994	2	2 15		Laparotomy with Colopexy	Colopexy Colopexy		
De Paula† [39]	1991	1	26	M	Laparotomy with Transversectomy	Colectomy	Small Bowel Obstruction	
Neilson [40]	1990	1	11	M	Laparotomy with Colectomy	Colectomy	None	
Javors [41]	1986	1	56	F	Laparotomy with Colopexy	Colopexy	Inflammation	
Gumbs [42]	1983	3	20 66 75	F F M	Laparotomy with Colectomy Laparotomy with Colopexy Laparotomy with Colopexy	Colectomy Colopexy Colopexy	Infection; Anemia None None	
Fishman [43]	1983	4	40 83 19 73	M F F M	Laparotomy with Colectomy Laparotomy with Colectomy Laparotomy with Colopexy Laparotomy with Colectomy	Colectomy Colectomy Colopexy Colectomy		
Anderson [44]	1981	7	12 43	F F	Transverse colectomy and primary anastomosis	Colectomy Colectomy		

			63 20 65 89 35	M F F F M	Exteriorization resection of transverse colon Detorsion, fixation of flexures and caecopexy Detorsion and fixation of flexures Resection of adhesion and detorsion Resection of adhesion and detorsion Extended right hemicolectomy	Colopexy Colopexy Colopexy Colopexy Colectomy		
Zinkin [45]	1979	1	46	F	Laparotomy with Colectomy	Colectomy		
Eisenstat [46]	1977	5	28 34 79 71 15	M F F M F	Laparotomy with Colectomy Laparotomy with Colectomy Laparotomy with Colopexy Laparotomy with Colectomy Laparotomy with Colectomy	Colectomy Colectomy Colopexy Colectomy Colectomy	Small Bowel Obstruction None None Cardiorespiratory Complications; Death Cardiorespiratory Complications; Death	15 4
Dadoo [47]	1977	1	12	M	Laparotomy with Colopexy	Colopexy		14
Budd [48]	1977	1	52	F	Laparotomy with Colopexy	Colopexy	Constipation	
Miller [49]	1977	1	23	M	Laparotomy with Colopexy	Colopexy		
Newton [50]	1977	2	25 26	F F	Laparotomy with Colectomy Laparotomy with Colopexy	Colectomy Colopexy		
Howell [51]	1976	1	4	F	Laparotomy with Colectomy	Colectomy		
Smith [52]	1976	1	81	F	Laparotomy with Colectomy	Colectomy	Infection; Death	
Lapin [53]	1973	1	36	F	Laparotomy with Colectomy	Colectomy		18
Gibson [54]	1972	1	71	M	Laparotomy with Colopexy	Colopexy	Cardiorespiratory Complications; Death	
Singh [55]	1970	1	40	M	Laparotomy with Colopexy	Colopexy		
Ponka [56]	1969	1	54	F	Laparotomy with Colopexy	Colopexy		10
Fischer [57]	1964	1	77	F	Laparotomy with Colectomy	Colectomy		18
Perdue [58]	1963	1	21	M	Laparotomy with Colopexy	Colopexy	Infection	29
Weir [59]	1959	1	18	F	Laparotomy with Colectomy	Colectomy		10
Boley [60]	1958	2	82 68	F M	Laparotomy with Colopexy Laparotomy with Colopexy	Colopexy Colopexy	Infection Dehiscence	21 27
McGowan [61]	1957	1	29	F	Laparotomy with Colopexy	Colopexy		8
Zaslow [62]	1954	1	69	M	Laparotomy with Colopexy	Colopexy		
Figiel [63]	1953	1	56	F	Laparotomy with Colopexy	Colopexy		
Murray [64]	1950	1	22	F	Laparotomy with Colopexy	Colopexy		26
Martin [65]	1944	1	22	M	Laparotomy with Colectomy	Colectomy		

*Age at diagnosis; †indicates that the article was not available in English and thus the information was retrieved from review articles or is missing; greyed boxes indicate variables that case studies or reviews did not address

While rare, TCV has been described in 86 cases in the literature, including the case presented here (1990 to 2018; Table 1). Most reports are individual case reports or small case series. From the literature, the mean age of patients with TCV was 40 years (range 2-89) with 51 percent of the reported cases involving females (44; 38 males at 44%). All cases reported performing a laparotomy, with 65 percent of patients receiving a colectomy and 35 percent treated with colopexy. Of the 30 patients who received colopexy, only seven experienced complications following the procedure, a complication rate of 23 percent. Comparatively, 18 of the patients who received colectomies experienced complications, a rate of 32 percent. Overall, 29 percent of the patients

reviewed had no complications following the procedure (28). Although a large percentage of patients experienced no problems in the aftermath of surgery, the most common post-op issues involved were cardiorespiratory complications (6; 7%) followed by infection (5, 6%) and bowel obstruction (4; 5%). Patients did experience a mortality rate of 7 percent as six of the cases in the literature review died. In general, with the toll of the surgery and high complication rate, TCV patients spent an average of 23 days (range 4-240) in the hospital following their operation.

The patient in our report presented to the Emergency Department complaining of abdominal pain, distension, and nausea (symptoms of a bowel obstruction). Pre-operative diagnosis of a TCV requires imaging studies (such as a CT scan), with the patient's imaging demonstrating severe gaseous dilation and a mesenteric swirl sign. Every patient in the literature received an urgent exploratory laparotomy, followed by either colopexy or colectomy depending on the surgeon's evaluation of the vasculature and condition of the bowel. In this patient's case, she received a colectomy with primary anastomosis with consideration to the healthy condition of her bowel but increased likelihood of recurrence as a result of her redundant mesentery. In the review of the literature, colectomies were far more widely utilized than colopexies. Although there were more complications seen in colectomy patients overall compared to those who received colopexies, there was no statistical difference in complication rates between the two groups ($p = 0.241$, significance level 0.05). Therefore, based on the results of the literature review, there is no significant benefit to performing a colectomy compared to a colopexy in patients suffering from the disease with regards to complications post-operatively.

Conclusion

TCV is a rare form of bowel obstruction that must be quickly and appropriately managed to reduce morbidity and mortality. The treatment of a TCV is to operatively reduce the volvulus followed by either a colopexy or colectomy to prevent recurrence. Although colopexy allows the surgeon to save the affected region of the colon by untwisting and securing the bowel instead of performing a colostomy or anastomoses, there is no identifiable benefit between the two procedures when regarding risk of complications following surgery. Therefore, choosing one procedure over another depends on an intraoperative determination of bowel viability and risk for future volvulus rather than on potential risk for problems in the post-operative setting.

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