Case Report

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

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

| Name      | Year | Age | Sex | Operation                          | Complication | Mortality | Other Complications |
|-----------|------|-----|-----|------------------------------------|--------------|-----------|--------------------|
| Zinkin    | 1979 | 46  | F   | Laparotomy with Colopexy           | Colectomy    |           |                    |
| Eisenstat | 1977 | 28  | M   | Laparotomy with Colectomy          | Colectomy    |           |                    |
| Miller    | 1977 | 23  | M   | Laparotomy with Colopexy           | Colectomy    | 15        |                    |
| Newton    | 1977 | 26  | F   | Laparotomy with Colopexy           | Colectomy    |           |                    |
| Howell    | 1976 | 4   | F   | Laparotomy with Colectomy          | Colectomy    | 18        |                    |
| Smith     | 1976 | 81  | F   | Laparotomy with Colectomy          | Colectomy    |           | Infection; Death   |
| Lapin     | 1973 | 36  | F   | Laparotomy with Colopexy           | Colectomy    |           |                    |
| Gibson    | 1972 | 71  | M   | Laparotomy with Colopexy           | Colectomy    |           | Cardiorespiratory Complications; Death |
| Singh     | 1970 | 40  | M   | Laparotomy with Colopexy           | Colectomy    |           |                    |
| Ponka     | 1969 | 54  | F   | Laparotomy with Colopexy           | Colectomy    | 10        |                    |
| Fischer   | 1964 | 77  | F   | Laparotomy with Colectomy          | Colectomy    | 18        |                    |
| Perdue    | 1963 | 21  | F   | Laparotomy with Colectomy          | Colectomy    | 29        | Infection          |
| Weir      | 1959 | 18  | F   | Laparotomy with Colectomy          | Colectomy    | 10        |                    |
| Boley     | 1958 | 82  | M   | Laparotomy with Colopexy           | Colectomy    | 21        | Dehiscence         |
| Magowan   | 1957 | 29  | F   | Laparotomy with Colopexy           | Colopexy     | 8         |                    |
| Zaslow    | 1954 | 69  | M   | Laparotomy with Colopexy           | Colopexy     | 26        |                    |
| Figiel    | 1953 | 56  | F   | Laparotomy with Colopexy           | Colopexy     |           |                    |
| Murray    | 1950 | 22  | F   | Laparotomy with Colopexy           | Colopexy     |           |                    |
| Martin    | 1944 | 22  | M   | Laparotomy with Colopexy           | 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.
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 mesentric 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, the treatment of a TCV is to operatively reduce the volvulus followed by either a colopexy or colectomy. In the review of the literature, 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.

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