

Resection and Primary Anastomosis with Modified Blow-Hole Colostomy or Hartmann's Procedure. Which Method should be Performed for Gangrenous Sigmoid Volvulus?

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Rezumat

Rezecție cu anastomoză primară și colostomie laterală modificată sau operație Hartmann. Ce metodă trebuie efectuată pentru volvulusul gangrenos de sigmoid?

Scop: Pentru a evalua eficacitatea procedurii Hartmann și a rezecției cu anastomoză primară și colostomie laterală modificată pentru volvulus gangrenos de sigmoid.

Metode: Șaizeci și unu de pacienți operați între ianuarie 2004 - septembrie 2010 au fost analizați retrospectiv. Datele demografice ale pacienților, caracteristicile clinice, tipul de procedură chirurgicală efectuată, complicațiile postoperatorii, mortalitatea și durata de spitalizare după intervenția chirurgicală au fost analizate.

Rezultate: Spitalizarea medie, infecția de plagă și mortalitatea nu a diferit în mod semnificativ între cele două grupuri. Rata infecțiilor de plagă superficiale a fost mai mare în lotul A (32% vs 15%). Nu a fost observată apariția de fistule secundare închiderii stomei. În timpul perioadei de spitalizare, complicații postoperatorii au fost infecții ale plăgii la patru pacienți, abcese intraabdominale la doi pacienți, eviscerație și dehiscența plăgii în două cazuri, aritmie în șase cazuri, pneumonie în opt cazuri. Ratele complicațiilor medicale și chirurgicale în cele 2 grupuri au fost similare ($p > 0,05$). În comparație, durata de spitalizare în

terapie intensivă nu au fost statistic diferită ($p > 0,05$), dar durata medie de spitalizare a fost mai mare în grupul A decât grupul B ($p < 0,05$).

Concluzie: Sigmoidectomia ar trebui să fie principiul de bază în managementul volvulusului sigmoidian. Rezecția cu anastomoză primară și colostomie laterală modificată oferă rezultate satisfăcătoare. Este o tehnică ușor de efectuat la pacienții cu volvulus sigmoidian. Rezecție cu anastomoză primară și colostomie laterală modificată poate fi efectuată în condiții de siguranță la pacienții selectați, fără creșterea morbidității și a duratei medii de spitalizare.

Cuvinte cheie: colon, volvulus, tehnica chirurgicală, obstrucție intestinală

Abstract

Aim: To evaluate the efficacy of Hartmann's procedure and RPA with modified blow-hole colostomy for gangrenous sigmoid volvulus.

Methods: Sixty-one patients operated on between January 2004 to September 2010 were reviewed retrospectively. The demographic data of the patients, clinical features, type of surgical procedure performed, postoperative complications, mortality and duration of hospital stay (DHS) after surgery were reviewed.

Results: The mean hospital stay, wound infection and mortality did not differ significantly between the groups. Superficial wound infection rate was higher in group A (32% vs 15%). Development of leaks secondary to stoma closure was not observed in any patient. During hospitalisation period; the postoperative complications were wound infection in four patients, intraabdominal abscess in two, evisceration and

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wound dehiscence in two, arrhythmia in six, pneumonia in eight. Medical and surgical complication rates of the groups were not different ($p > 0.05$). When compared, the durations of intensive care unit (ICU) stay were not statistically different ($p > 0.05$), but mean duration of hospital stay (DHS) was longer in group A than group B ($p < 0.05$).

Conclusion: Sigmoidectomy should be the basic principle in the management of sigmoid volvulus. RPA with modified blow-hole colostomy provides satisfactory results. It is easy to perform in patients with sigmoid volvulus. RPA with modified blow-hole colostomy can be performed safely in selected patients without increasing morbidity and DHS.

Key words: colon, volvulus, surgical technique, intestinal obstruction

Introduction

Sigmoid volvulus is the third most common cause of large-bowel obstruction in the western world, after cancer and diverticular disease (1). It accounts for 4% of all cases of large-bowel obstruction in the United States and United Kingdom (1,2). Sigmoid volvulus is relatively more common in Eastern Europe, India and Africa, accounting for 50% of all cases of intestinal obstruction (1,2). Resection and primary anastomosis (RPA) has emerged as the treatment of choice for sigmoid volvulus over the past two centuries (3,4). However resection with primary anastomosis in emergency situations carries an unacceptably high complication rate, when the general condition of the patient is suboptimal and bowel not prepared (5,6,7,8). In such situations, a blow-hole colostomy may play a protective role in avoiding anastomotic leakage. Gangrenous colon requires immediate resection (9,10,11). In the presence of gangrene, resection is followed by one of these colostomies; mucous fistula or Hartmann's procedure, depending on the surgeon's experience and preference, as well as whether or not it is possible to bring the distal loop to the skin (12).

Materials and Methods

We conducted a retrospective, descriptive study of patients diagnosed and operated for colonic volvulus in our center from January 2004 to September 2010 compiling a database. The diagnosis of sigmoid volvulus was made on the basis of clinical features and plain abdominal radiographies. Laparotomy was performed in all patients after active fluid resuscitation and correction of electrolyte imbalance was obtained. Although the bowel was unprepared, on-table lavage was not performed in any patient. Informed consent was obtained from each patient prior to the surgery. In 32 patients, Hartmann's procedure (Group A) was performed and in the remaining 29 patients, a modified blow-hole colostomy was performed with RPA (Group B). Only RPA group (32 patient) were excluded from this study to compare the colostomy groups. The clinical

course and postoperative complications were documented. Wound infection was defined as spontaneous discharge of pus from the wound or a wound that requires drainage.

Surgical technique of modified blow-hole colostomy

In group B, the peritoneal layer of the mesosigmoideum was cut with scissors. The vessels were isolated by finger dissection, clamped, cut and ligated. The gangrenous bowel is cut and removed. All the anastomoses were inverting and two-layered. A proximal stoma was performed to protect the anastomoses. A 3 cm longitudinal incision was made through the tenialibera, and into the transverse colon. An abdominal wall aperture intended for the colostomy was made in the right upper quadrant using a rectus splitting incision. The cut edges of the colon were sutured to the skin with 3/0 vicryl without fascial or peritoneal sutures. In these patients, oral intake was started on postoperative day 3. The anastomotic integrity was checked using water-soluble radiological studies, and if intact, colostomy closure was performed after 15-28 days.

Hartmann's procedure

The bowel segment was isolated between clamps. The peritoneal layer of the mesosigmoideum cut with scissors. The vessels were isolated by finger dissection, clamped, cut and ligated. The gangrenous bowel was cut and removed. The rectal stump was closed with a double layer of continuous suture. The suture ends were left long enough to facilitate identification of the stump at the second procedure when reestablishing the continuity of the intestine. The skin at the intended place for the colostomy was grasped and lifted up. A straight cut with the knife resulted in a round opening. A cross formed incision in the fascia with manual dilatation of the muscles makes the colostomy opening. The proximal sigmoid was brought out through the colostomy opening and the abdominal incision was closed. Hartmann's operation allows elective restoration of bowel continuity usually after 30-80 days, thus theoretically reducing the risk of anastomotic leak and overall morbidity.

Statistical analysis

Statistical analysis was performed using the SPSS* 15.0 version for Windows* (SPSS Inc., Chicago IL, USA) software package. Unpaired *t*-test was used for comparison of variables (age and length of hospital stay) between the two groups. Fisher's Exact and Pearson χ^2 tests were used for comparison of categorical variables between the groups. $P < 0.05$ was considered as significant.

Results

There was no significant difference between the two groups in the mean age or the sex ratio. The time to resumption of oral intake was postoperative day 3 in group A, and day 3 in group B. All patients in group B, had stoma closure performed on

Table 1. Clinical, operative characteristics between groups

	Group A	Group B	p value*
Gender	25 male, 7 female	22 male, 7 female	
Mean age (yr) (range)	48 (21-68)	46 (20-66)	0.904
Hospitalization time, days (duration of hospital stay (DHS))	9.94±4.67 (6-18)	7.75±4.29 (5-14)	0.010
ICU stay/day	3.5±1.38(2-5)	2.9±1.98(1-5)	0.721
Duration of operation (min)	80 (70-100)	90 (75-120)	0.001
Reoperation(stoma closure)/day	36.08±8.59(30-80)	16.13±7.88(15-28)	0.001

Unpaired *t*-test was used for comparison of variables (age and length of hospital stay)

Table 2. Operative and postoperative outcomes

	Group A	Group B	p value*
Wound infection %	32%	15%	0.001
Medical complications (arrhythmia, pneumonia)	7	7	0.816
Evisceration and wound dehiscence	1	1	0.447
Intraabdominal abscess	1	1	

Fisher's Exact and Pearson χ^2 test were used for comparison of categorical variables between the groups

16.13±7.88(15-28)day, after radiological studies were carried out. Hartmann's operation allows elective restoration of bowel continuity usually after 36.08±8.59(30-80) days. Development of leak secondary to stoma closure was not observed in any patient. The Length of Stay in Hospital (LSH) was 9.94±4.67 (6-18)days and 7.75±4.29 (5-14)days in group A and group B respectively (Table 1). Hospitalization time in the group A was also significantly higher than group B. There were no deaths among patients. During hospitalisation period; the postoperative complications were wound infection in four patients, intraabdominal abscess in two, evisceration and wound dehiscence in two, arrhythmia in six, pneumonia in eight. Superficial wound infection was almost two times more common in the group A (32% *vs* 15%). All the infected wounds healed with conservative measures. No anastomotic leak was observed in group B. The operative time was longer in group B patients (90 minutes). The most frequent complications were wound infections. Medical and surgical complication rates of the groups were not different ($p > 0.05$). When compared, the durations of intensive care unit (ICU) stay were not statistically different ($p > 0.05$), but duration of hospital stay (DHS) was longer in group A than group B ($p < 0.05$).

Discussion

Sigmoid volvulus is the third most common cause of large bowel obstruction in the western world, after cancer and diverticular disease¹. It accounts for 4% of all cases of large-bowel obstruction in the United States and United Kingdom (1,2). Sigmoid volvulus is relatively more common in Eastern Europe, India and Africa, accounting for 50% of all cases of intestinal obstruction (1,2). It is most common in the middle aged, elderly, institutionalized population, or in neuropsychiatric patients (3). Although the exact aetiology of the sigmoid volvulus is unknown, high residue diet, narrow

attachment of pelvic colon, long pelvic mesocolon, overloaded pelvic colon with faeces due to chronic constipation, and band of adhesions to the apex of the sigmoid colon are considered the main predisposing factors for this disease (13). Patients with sigmoid volvulus present with abdominal distention, pain, nausea, vomiting, and obstipation, while peritoneal signs are noted infrequently (14).

Clinical features that suggest the presence of gangrene include severe pain, deterioration in the general condition of the patient with tachycardia and hypotension, and marked abdominal tenderness with absent intestinal sounds (15,16,17).

Plain abdominal X-rays are often diagnostic of volvulus. Air-fluid levels are present, and a "bird's beak" deformity is often seen at the site of the torsion (18).

The ischemia is often due to an abnormal and prolonged distension of the twisted loop rather than to strangulation and for this reason ischemic necrosis can appear in a later stage (19). Sigmoid volvulus can be divided in 2 clinical types with different onset and natural history (20): the acute fulminating type (obstructed patients) and the subacute progressive one (subocclusive patients). The first kind is characterized by a sudden onset with abdominal pain, often localized in the umbilical region, early vomiting, abdominal tenderness, constipation and marked physical prostration. Gangrene usually develops early and perforation and shock may appear quickly. Whereas the subacute progressive form is characterized by an insidious onset and progression and it frequently occurs in older patients. It often shows an unspecific clinical presentation characterized by widespread cramp-like abdominal pain, sometimes located in the left abdominal quadrants. Fever and vomiting are rare at the beginning.

Emergent resection carries a high mortality rate partly because of the poor general condition of the patient and toxemia from necrosis (4). Mortality following emergent

surgery for acute SV is higher (36-80%) (1) in the developed rather than the developing world (16-33%) (21,22). Most authors agree that the definitive treatment of sigmoid volvulus is sigmoidectomy with or without anastomosis (4,6,7). However resection with primary anastomosis in emergency situations, when the general condition of the patient is suboptimal and bowel not prepared, carries an unacceptably high complication rate (5,6,7).

Gangrenous colon requires immediate excision (9,10,11). In the presence of gangrene, resection is followed by a colostomy and mucous fistula or Hartmann's procedure, depending on the surgeon's experience and preference, as well as whether or not it is possible to bring the distal loop to the skin (12).

Resection and primary anastomosis (RPA) has emerged as the treatment of choice for sigmoid volvulus over the past two centuries (6,7). However resection with primary anastomosis in emergency situations carries an unacceptably high complication rate, when the general condition of the patient is suboptimal and bowel not prepared (5,6,7,8). In such situations, a blow-hole colostomy may play a protective role in avoiding anastomotic leakage. Gangrene may be patchy and difficult to recognize. In volvulus of the sigmoid colon with gangrene of the loop, resection should be performed without detorsion. Otherwise, endotoxin and bacteria may be released into the general circulation (23). Symptomatic anastomotic leak is the most important postoperative complication following emergency colorectal resection with intestinal anastomosis. De et al (24) reported 197 patients who had a single stage primary anastomosis without colonic lavage for left sided colonic obstruction due to acute sigmoid volvulus; only 2 (1.01%) patients developed symptomatic anastomotic leak. Development of leak secondary to stoma closure was not observed in any patient in this study. Various surgical procedures have been advocated for sigmoid volvulus such as sigmoidectomy with primary anastomosis, sigmoidectomy with Hartmann's or Paul-Mikulicz colostomies, mesosigmoidoplasty, percutaneous endoscopic or open sigmoidopexy, tube sigmoid colostomy, laparoscopy-assisted sigmoid colectomy, and extraperitonealization of sigmoid colon (6).

Ören et al (25), in a review of 827 cases of sigmoid volvulus, report a reduction in mortality when comparing cases of colonic volvulus that required urgent surgery and were treated by resection and primary anastomosis to cases operated under the same conditions which underwent a Hartmann's procedure or proximal stoma. Many other authors (7,26) also support primary anastomosis in patients with intestinal gangrene but clinically stable.

Hartmann's procedure, originally described by Henri Hartmann in 1923 for the treatment of obstructing colorectal cancer (27), involves resection of the perforated segment of sigmoid colon, creation of an end colostomy, and oversewing the distal stump (27). The proximal and distal extent of resection should extend to healthy, normal colon and rectum. Delayed closure of the colostomy is planned after resolution of pelvic sepsis and tissue inflammation, usually within 6 months after the initial procedure, to minimize complications such as anastomotic leak. Faranisi and other workers (24,28) found

that the twisted, obstructed and grossly distended sigmoid colon has a hypertrophied muscular wall that holds sutures well, producing a secure anastomosis. The mainly liquid and gaseous content of the sigmoid colon can also be evacuated well through a tube in the rectum, a Foley's catheter or a savage decompressor through the sigmoid wall. These qualities of the obstructed sigmoid colon in volvulus informed the possibility of a one-stage procedure (28). Therefore, staged operations or primary anastomosis after intraoperative antegrade colonic lavage can be avoided without increasing morbidity and mortality rates (29). Hartmann's procedure may be lifesaving, especially in gangrenous cases. Mikulicz's colostomy or exteriorization are the other alternatives. But all of them carry the complication risk of stomas (30,31). Several earlier studies (14,32) have recommended, without statistical support, the Hartmann type of operation as a safer procedure than resection and primary anastomosis. The occurrence of postoperative necrosis with an intraoperatively viable anastomosis has also been reported (33,34). Colorectal anastomosis after Hartmann's procedure can be a very difficult operation (35,36). The optimal interval is controversial. Complications were found to be lowest when reoperation was carried out either less than 28 days or more than six months following the first stage (37). Adams et al. recommended waiting at least 6 months for cases originally having colonic perforation and as little as 3 to 6 months in patients operated on for other reasons (38). It has been suggested that in selected cases the second stage operation should be performed earlier than 6 months because adhesions were found often to be denser after 6 months than in patients operated earlier (39). In our study second stage operation was performed 15-80 days after first operation to prevent adhesions.

Blow-hole colostomy was described by Turnbull for the treatment of toxic megacolon (40,41). Blow-hole colostomy and ileostomy for the treatment of toxic megacolon involves creation of a loop ileostomy and loop colostomy which is typically the transverse colon (41). This procedure is thought of as a bridge to definitive therapy and has been contraindicated in the setting of free perforation, abscess or hemorrhage (41). In general, blow hole colostomy could lower intraluminal pressure enough compared to intramural vascular perfusion pressure to avoid hypoperfusive status of the intestine proximal to the obstruction (42).

Due to these comorbid risk factors, particularly in patients presenting with gangrenous sigmoid volvulus, the addition of a modified blow-hole colostomy appears to be a promising procedure in order to avoid anastomotic leak. Early diet consumption is another advantage of this procedure and may improve the postoperative course (43).

In conclusion, RPA with modified blow-hole colostomy provides satisfactory results in patients with gangrenous sigmoid volvulus. Total hospital time is less than Hartmann's procedure. This procedure is safe and effective in preventing anastomotic leaks, and may become the treatment of choice in patients with gangrenous sigmoid volvulus. Further studies are required to definitively establish its role in gangrenous sigmoid volvulus.

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