

Colostomy reversal after a Hartmann's procedure

Effects of experience on mortality and morbidity



Ann Ital Chir, 2019 90, 6: 539-544
pii: S0003469X19030379
Epub Ahead of Print - June 2
free reading: www.annitalchir.com

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Colostomy reversal after a Hartmann's procedure. Effects of experience on mortality and morbidity

AIM: Hartmann's procedure (HP) is mostly lifesaving procedure especially for obstructive colorectal carcinomas, but remains bothersome requiring staged operation and subsequent reversal colostomy. We aimed to investigate risk factors for unfavorable surgical outcome after Hartmann's reversal.

MATERIALS AND METHODS: Between September 2003 and September 2014, all patients who underwent colostomy reversal surgery after HP were enrolled into the study. Retrospective data collection included demographics (age, gender, body mass index (BMI), ASA scores) primary pathologies, interval period, surgeon who performed procedure [general surgeon (GS)/colorectal specialty (CRS)], postoperative complications and hospital stay.

RESULTS: There were 72 patients (49M/23F) with a median age of 64 (range: 29-83) years. The median BMI was 24 (21-44). Most of the patients (82%) had ASA score 3-4. Colorectal cancer was the primary diagnosis in 79% while others included diverticular perforation, volvulus, trauma and Crohn disease. Hartmann's procedure was performed as an emergency in three-fifths of patients. Median interval period between index surgery and reversal colostomy was 7 (1-24) months. The morbidity and mortality rates for colostomy reversal surgery were 34% and 8.3%, respectively. The most common postoperative complication was surgical site infection (22%) followed by anastomotic leak 5%. Mortality and morbidity rates were significantly higher in patients with higher BMI ($p=0.031$), higher ASA scores ($p=0.028$) and patients who underwent procedure not by a CRS.

CONCLUSION: Reversal colostomy procedure resulted in significant morbidity and mortality, particularly in those with high BMI and ASA scores. Efforts to improve risk management and specialization in colorectal surgery may help to improve the outcome in reversal colostomy after Hartmann's procedure.

KEY WORDS: Colorectal surgery, Experience, Hartmann's procedure, Reversal colostomy, Morbidity

Introduction

Hartmann's procedure was first described in 1923 by Henry Hartmann, a French surgeon, as an alternative to abdominoperineal resection in high-risk patients with rec-

tosigmoid cancer¹. Today, the procedure is not routinely performed but still considered as an alternative choice in colorectal tumor obstruction and perforations that may risk the safety of the anastomosis, particularly in hemodynamic instability and severe peritonitis cases, in diverticula perforations, in tumors that cannot be anastomosed and in some traumatic colon injuries²⁻⁵. The closure of the colostomy may become an issue in 3-6 months when the patient's general health improves and the underlying pathology is solved⁶. Despite it's an elective surgical procedure, the mortality and the morbidity rates remains considerably high. This rate has been

Pervenuto in Redazione Gennaio 2019. Accettato per la pubblicazione Marzo 2019

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reported as 0-75% in the literature ⁷. In addition, reoperation following colostomy closure is another issue ^{7,8}. In our study, we aimed to investigate the risk factors that influence the morbidity and mortality after reversal colostomy following Hartmann's procedure.

Methods

Between 2003 and 2014, all patients who were treated with Hartmann's procedure were reviewed. Those who underwent reversal colostomy procedure were enrolled into the study. Exclusion criteria included patients who did not undergo stoma reversal operation due to severe co-morbidity or patient decision and those who underwent index surgery at different hospital (n=5). Finally, 72 patients met our criteria. Retrospective data collection included demographic characteristics, primary cause for Hartmann procedure, ASA score, interval time between Hartmann's and reversal colostomy procedure, surgeon experience (defined as general surgeon or surgeon with colorectal specialty), the length of hospital stay, and the morbidity and mortality. All patients under-

went total colonoscopy to examine the entire colon before the reversal colostomy procedure. Detailed body scanning was performed to detect any additional pathology. The closure of the colostomy in patients with colorectal cancer or cancer perforation was delayed for chemotherapy.

SURGICAL TECHNIQUE

Open and laparoscopic techniques were used in 65 and 7 patients, respectively. All patients routinely administered intravenous antibiotics (500 mg ciprofloxacin and 1.5 gr cefuroxime axetil) 30 minutes before the surgery. In open technique, abdominal entry was performed by standard laparotomy. In the laparoscopic method, the first trocar entry was performed through the umbilicus under direct visualization with a 12-mm trocar (Hasson technique). A 12- to 15-mm Hg pneumoperitoneum was created and a 30° laparoscope used. The other 12 mm trocar was located to the right lower quadrant while the 5-mm trocar was located to the right superior paramedian position.

TABLE I - Demographic features, surgical data and postoperative period.

	N (%)
Gender	
Male	49 (68%)
Female	23 (32%)
Age (years), median (range)	64 (29-83)
ASA score	
I-II	13 (18%)
III-IV	59 (81.9%)
BMI, median (range)	24 (21-44)
Primary Pathology	
Colorectal Cancer	57 (79%)
Diverticular disease	7 (9.7%)
Others	8 (11%)
Initial surgery	
Emergency	44 (61%)
Elective	28 (38%)
Surgeon	
General surgery (GS)	25 (34.7%)
Colorectal specialist (CRS)	47 (65%)
Time to stoma closure (months)(median, range)	7 (1-24)
Length of rectal stump (cm, median, range)*	13 (7-25)
Length of hospital stay (day)	7 (2-25)
Morbidity**	34% (25/72)
Surgical site infection	16, (22%)
Anastomotic leak	4, (5%)
Others	5
Mortality	8.3% (6/72)

ASA: American Society of Anesthesiologists; BMI: Body mass index; GS/CRS: General Surgery/ Colorectal specialist, *This data was available for only 51 patients, **In 25 patients, 28 complications occurred.

An additional 5-mm trocar was used if needed. Then, in both techniques, the distal and the proximal endings of the colon anastomosis were found. In patients with a doubt of the tension of the anastomosis, the splenic flexura was released. The distal rectal stump was found and prepared for anastomosis, which was performed with a circular stapling device. The edge of the stoma and proximal colon was revised to take away excessive scar tissue, and an appropriately sized anvil of a circular stapler was secured with a purse-string polypropylene suture. After placed back into the abdominal cavity, an end-to-end colorectal anastomosis was created with an appropriately sized circular stapler. To determine the safety of the colorectal anastomosis, intraoperative water testing was routinely used.

All of the midline wounds and trocar insertion sites were primarily closed. Depending on surgeon preference and the size of the wound, stoma site wounds were either closed in a longitudinal fashion with staples or were reapproximated by using a purse-string suture. Only in the high-risk patients considering both health status and technical difficulties, simultaneous construction of a diverting ileostomy was performed to make the operation less morbid.

STATISTICAL ANALYSIS

Data were expressed as a mean \pm SD or median (range) for skewed distributions. The Fisher exact test or chi-square test and Student's *t* test were used for categorical and numerical variables, respectively. Statistical analyses were performed by using SPSS Software.

Results

In the study period, 72 patients with a mean age of 62.4 ± 10.7 were treated with reversal colostomy after Hartmann's procedure. Demographic features are shown in Table I. All operations were performed by the senior

resident (under the supervision of staff) or a staff surgeon [general surgeon (GS) or colorectal surgeon (CRS)]. The predominantly primary diagnose of the patients was colorectal cancer (n=57, 79%). Others included perforated diverticular disease (n=7), sigmoid volvulus (n=3), Crohn's disease (n=3) and rectal trauma (n=2). The median time interval between index surgery and reversal colostomy procedure was 7 months (range 2-15). The median length of rectal stumps was 13 cm (7-25cm). The open and laparoscopic techniques were used in 65 and 7 patients, respectively. End-to-end anastomosis stapler technique was used in all patients. In 14 patients (19%), a defunctioning ileostomy was performed, particularly in the high-risk patients.

Postoperative morbidity and mortality rates were 34% (n=25) and 8.3% (n=6), respectively. Twenty-nine complications occurred in 25 patients. The most common postoperative complication was surgical site infection (n=16, 22%). All of these infections were managed conservatively by opening the wound and did not require any further surgical intervention. Other complications included anastomotic leakage (n=4) and intra-abdominal abscess (n=3), postoperative ileus (n=2), incisional hernia (n=3) and sepsis accompanied by multiorgan failure (n=1). While one patient underwent re-operation due to leakage, which was the most serious local complication, other complications were successfully treated using minimally invasive approach (percutaneous drainage and antibiotherapy). The primary pathology of four patients with anastomotic leakage was rectal cancer. They were over 65-year old and ASA scores were 3 (n=2) and 4 (n=2). Only one patient underwent reoperation and ileostomy procedure was performed. This patient, who had ASA score 4, was later died of abdominal sepsis. All of these four patients had longer hospital stay (over 20 days). In remaining three patients, percutaneous drainage was performed. Postoperative intestinal obstruction or ileus responded to medical therapy. Incisional hernia repair was performed during the following one year after surgery. The mortality rate was 8.3%. Causes of death were as follows: sepsis (n=2), anastomotic leakage (n=2),

TABLE II - Risk factor analysis in patients who underwent reversal colostomy after a Hartmann's procedure

Parameters	Morbidity (n=25, 34%)	Without morbidity (n=47, 65%)	p value
Age, years (mean \pm SD)	63 \pm 10	60 \pm 10	0.235
Sex (F/M)	12/13	11/36	0.061
BMI (kg/m ²)	27.3 \pm 5	24.8 \pm 4	0.031
ASA (1-2 / 3-4)	1/24	12/35	0.028
Primary diagnosis (B/M)	4/21	11/36	0.553
Initial surgery (Em/El)	13/12	29/18	0.460
Interval time period	7.8 \pm 4	7.5 \pm 3	0.763
Surgeon (GS/CRS)	14/11	11/36	0.009
Hospital stay	9.2 \pm 5	6.4 \pm 1	0.006

ASA: American Society of Anesthesiologists; BMI: Body mass index; B/M: benign/ Malign; Em/El: Emergency/Elective, GS/CRS: General surgery / Colorectal specialist

TABLE III - Risk factors for mortality in patients who underwent reversal colostomy after a Hartmann's procedure

Parameters	Mortality(n=6, 8.3%)	Without mortality (n=65, 90%)	p value
Age, years (mean±SD)	74.8±9	60.6±7	<0.01
Sex (F/M)	3/4	20/45	0.675
BMI (kg/m ²)	33±6	25.8±3	<0.01
ASA (1-2 / 3-4)	0/7	13/52	0.337
Primary diagnosis (B/M)	1/6	14/51	NS
Initial surgery (Em/El)	6/1	35/30	0.226
Surgeon (GS/CRS)	6/1	19/46	0.006

ASA: American Society of Anesthesiologists; BMI: Body mass index; B/M: benign/ Malign; Em/El: Emergency/Elective, GS/CRS: General surgery / Colorectal specialist

cardiac disease (n=1), and respiratory system complications (n=1).

To identify risk factors for the development of complications after colostomy reversal, potentially related factors were compared between the group of 47 patients without morbidity and the group of 25 patients with morbidity (Table II).

It was found that the patients with morbidity had a significant higher ASA score (0.028) and higher BMI (p=0.031) compared to those without morbidity. Furthermore, those with anastomotic leak had significantly higher BMI compared to the patients with other postoperative complications (31.6 vs. 26.4, p=0.035). No significant association was found for age, gender, primary diagnosis, and time to stoma closure. However, the frequency of the surgeon experienced in colorectal surgery was significantly higher in the patients without any postoperative morbidity (p=0.009). Patients with postoperative complications had a significantly longer hospital stay (9.2 vs. 6.4 days, p = 0.006). Risk factors of mortality also included surgeon experience in addition to age and comorbidities (Table III).

Discussion

While three-step surgery was the standard procedure for the management of acute left-sided colonic obstruction at the beginning of the last century, Hartmann's procedure started to be performed more commonly after the 70's⁹. Although the Hartmann procedure was initially developed for the treatment of distal colonic adenocarcinoma, the indications have progressed with the times including mostly benign disorders such as complicated diverticulae, traumatic colon injuries and sigmoid volvulus^{9,10}. However, in recent years, the common use of circular staplers for anastomosis in rectal surgery has resulted in a decrease in the frequency of Hartmann's procedure. In this study, the most common cause for Hartmann's procedure was adenocarcinoma of the colon with a rate of 80%.

Although Hartmann's procedure is often performed as

an emergency procedure to reduce the complication rates due to anastomotic dehiscence, the mortality and morbidity rate remains quite high in the current literature^{11,12}. Likewise, reversal colostomy procedure, which is one of the disadvantages of Hartmann's procedure, also results in a high complication rate ranging between 2.4% and 50%¹³⁻¹⁷. Therefore, Garber et al pointed out that, Hartmann's procedure should be performed in selected cases of whose colostomy was planned as permanent¹⁸. This is why only about 50-60% of colostomies are taken down at a later date, especially in selected cases¹⁹. Mastrorilli et al.²⁰ studied 82 patients with acute sigmoid diverticulitis and recommended Hartmann's procedure in patients with faecal peritonitis and patients with sepsis in order to reduce the risk of anastomotic leakage in this high risk patients. Capasso et al.²¹ studied the results of 60 patients with left colon obstruction and claimed that patients who underwent urgent resection and primary anastomosis by an expert surgeon, have a better quality of life but an higher length of hospital stay when compared to patients who underwent Hartmann's procedure.

Our study also demonstrated a complication rate of 34%, which was consistent with the literature. Marin et al.²² studied 104 patients who were operated due to the left sided large bowel emergencies. According to their results, 37 of 104 patients underwent Hartmann's operation with a postoperative morbidity rate of 28.8% which is in concordance with our results. In most studies, the risk was found associated with the patient's overall health and the exact type of procedure that was done. In our series, most of the patients had high ASA scores. More than half of the patients (61%) in our series were emergently performed index surgery. Only 65% patients underwent reversal colostomy procedure by a surgeon experienced in colorectal surgery. When comparison analysis was performed risk factors for postoperative complications were found as high BMI and ASA scores. In addition, surgeon factor was also found significantly associated with morbidity. Those without morbidity underwent reversal colostomy by a colorectal specialty surgeon more than the patients who had postoperative complication.

The most frequent complication was surgical site infection with a rate of 22%, which was compatible with the literature ranging between 5% and 51%²³⁻²⁵.

Anastomotic site leakage was the most serious complication following reversal colostomy procedure. One of four patients needed re-operation while others could be managed percutaneous drainage and appropriate antibiotic therapy. These four patients had significantly higher BMI and high ASA scores (all with ASA score 4 but one). However, as those patients with high ASA scores with debilitated health conditions usually undergo Hartmann procedure in emergency situations to shorten the operation time, most of the patients who are candidate for reversal procedure are again the same population. Another stoma following a reversal surgery is not a pleasant condition, but the certainty is that some authors prefer to create a diverting ileostomy to make the operation less morbid.

The literature showed the average mortality rate of the reversal operation as 16.3% and the total mortality as 1%. In our study, the reversal mortality was found as 8.3%, which was consistent with the literature. When the data of colorectal surgery centers were reviewed, the mortality rate after closure of Hartmann's colostomy was found below 5%²⁶. In our study, since the frequency of colorectal surgeon specialty was significantly higher in patients without morbidity, high mortality rate (8.3%) can be partially attributed to surgeon factor. In addition, comparative analysis demonstrated that ASA score and BMI, patient-related parameters, were associated with mortality. Another important point that can affect the outcome is the type of surgical technique.

Nevertheless, as the frequency of laparoscopic reversal colostomy was not enough high to compare, we did not evaluate the effect of the type of surgery. However, in the last decade, Laparoscopic Hartmann procedure became popular with the new advances in laparoscopy, as the opening and closure of these colostomies are related with quite high morbidity and mortality. Early results showed it was feasible and resulted promising outcome (faster recovery and/or fewer morbidity) when compared to conventional technique²⁷⁻²⁹ whereas Zimmerman et al showed equal results considering laparoscopic and open techniques³⁰. In our centre, we also initiated to perform laparoscopic reversal colostomy procedure.

In the recent study, there are some limitations due to the retrospective nature of the study. The results of laparoscopically operated patients could be compared with patients who were operated with conservative open surgical technique in separate groups. But there were only 7 patients who were laparoscopically operated while the vast majority of the patients (90.2%) underwent open surgery. We assumed that, the marked difference between the groups would cause improper statistical results. We are planning a study about the comparison of laparoscopic and conventional techniques of colostomy reversal after reaching the adequate patient number for having a reliable sta-

tistical analyses. Another limitation of the study was, there were 3 patients with Crohn's disease among the patients. Due to the problematic prognosis of Crohn's disease, which is generally related with high morbidity, those patients could be analyzed individually.

In conclusion, reversal colostomy has still high morbidity and mortality rates. In particular, High ASA score, high BMI and surgeon factor may complicate this outcome. Satisfying results may be observed in experienced colorectal surgery centers providing a good preoperative anesthesia evaluation and risk management.

Riassunto

L'intervento di Hartmann (HP) è la procedura di salvataggio adottata spesso per i carcinomi ostruttivi del colon-retto, ma presenta caratteri di problematicità negli interventi di ricanalizzazione. Abbiamo mirato a indagare i fattori di rischio per esiti chirurgici sfavorevoli dopo la riconversione.

Tra settembre 2003 e settembre 2014, tutti i pazienti sottoposti a chirurgia per riconversione della colostomia dopo HP sono stati arruolati nello studio, e sono stati raccolti i dati retrospettivi: demografici (età, sesso, indice di massa corporea (BMI), punteggi ASA), patologie primarie, intervallo dal precedente intervento, specialità del chirurgo operatore [chirurgo generale (GS) / specialista coloretale (CRS)], complicanze postoperatorie e durata della degenza ospedaliera.

La casistica consiste di 72 pazienti (49M / 23F) con età media di 64 anni (range: 29-83 anni). Il BMI mediano era di 24 (21-44). La maggior parte dei pazienti (82%) presentava un punteggio di ASA 3-4. Il cancro del colon-retto era di diagnosi primaria nel 79%, mentre altri includevano perforazione diverticolare, volvolo, trauma e malattia di Crohn. La procedura di Hartmann è stata eseguita come emergenza nei tre quinti dei pazienti. Il periodo di intervallo mediano tra la chirurgia iniziale e la riconversione è stata di 7 (1-24) mesi.

I tassi di morbilità e mortalità per chirurgia di riconversione della colostomia sono stati del 34% e 8,3%, rispettivamente. La più comune complicanza postoperatoria è stata l'infezione del sito chirurgico (22%) seguita da una deiscenza anastomotica nel 5%. I tassi di mortalità e morbilità sono risultati significativamente più elevati nei pazienti con BMI più elevato ($p = 0,031$), punteggi ASA più alti ($p = 0,028$) e pazienti sottoposti a procedura non da un CRS.

La procedura di riconversione dopo intervento di Hartmann ha comportato una significativa morbilità e mortalità, in particolare in quelli con un alto indice di BMI e ASA. Gli sforzi per migliorare la gestione del rischio e la specializzazione nella chirurgia coloretale possono aiutare a migliorare l'esito della riconversione della procedura di Hartmann.

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