

Original Research Article

Laparoscopic reversal of Hartmann's procedure: a hospital-based prospective observational study

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ABSTRACT

Background: Hartmann's procedure involves surgical resection of the rectosigmoid colon with the closure of the anorectal stump and the formation of an end colostomy. After recovery from the initial surgery, colostomy reversal and restoration of bowel continuity are indicated in selected patients. The second stage procedure is associated with a considerable morbidity rate of 10% to 50% and a modest but genuine fatality rate. Laparoscopic reversal of Hartmann's procedure is a safe and practical alternative to the open reversal method.

Methods: This prospective observational study was conducted in the department of general surgery, GMC Srinagar over a period of 2 years after obtaining ethical clearance from the institutional ethical committee.

Results: Our study included 40 patients between the age group of 32 to 67 years, with the highest incidence between 41 to 50 years. 32 males and 8 females with a ratio of 4:1. Mean operative time was 184.6 ± 47.06 minutes. The conversion rate to open was 10%. The mean duration of hospital stay was 6.25 ± 2.21 days. The mean time of return to normal work was 13.4 days. Postoperatively, two patients developed ileus which was managed in the immediate postoperative period and two suffered from adhesion obstruction, managed by diagnostic laparoscopy with adhesiolysis. It remained uneventful in the rest of the patients.

Conclusions: Laparoscopic reversal of Hartmann's procedure is safe, effective, and achieves faster positive results with significantly better short-term outcomes despite a proportion of patients being converted to open surgery.

Keywords: Hartmann's, Laparoscopic reversal, Outcome

INTRODUCTION

The Hartmann procedure was first introduced in 1923 by Henry Albert Hartmann, and it includes surgical resection of the rectosigmoid colon with the closure of the anorectal stump and the formation of an end colostomy.¹ The procedure consisted of sigmoidectomy followed by terminal colostomy in the left iliac fossa and closure of the rectal stump. Although originally indicated for carcinomas of the lower sigmoid and upper rectum, the procedure is today used for a variety of indications.² After recovery from the initial surgery, colostomy reversal and restoration of bowel continuity are indicated

in selected patients. The second stage procedure requires major abdominal surgery and is associated with a low but real mortality rate and a significant morbidity rate from 10% to 50%.^{3,4} Lowering the high morbidity and mortality rates associated with Hartmann's reversal might lead to an increased percentage of patients whose colostomies are closed. Open restoration has been associated with significant morbidity (13-50%).⁵

The use of laparoscopic reversal increased dramatically over time, from about zero in 2005 to more than 25% in 2014, quickly becoming a "must-have" in every colorectal surgeon's armamentarium.⁶ The difficult

complete freeing of the splenic flexure, extensive adhesiolysis, and the identification and mobilization of the rectal stump are some of the causes of its slow acceptance from the surgical community. Hartmann reversal was felt to be one of the most difficult procedures emerging that minimally invasive Hartmann's takedown is best left for the advanced stages of colorectal surgeon's experience.⁷

Many patients after Hartmann's procedure have severe intra-abdominal adhesions. As a result, safe entry into the abdominal cavity as well as extensive laparoscopic adhesiolysis for Hartmann's reversal may be challenging and this represents the main cause of conversion to open reversal. The high conversion rate may also be attributed to the presence of associated comorbidity and the difficult technique of this procedure. The current literature reports a conversion rate to conventional surgery close to 20%, with significant variations among the earlier published studies and the more recent ones (range 0-20 per cent).^{8,9} Intra-abdominal adhesions and short rectal stump are the most common reason, for conversion to open reversal, especially when the extensiveness of those adhesions threatened ureteral or vessel injury.¹⁰ The probability of a successful laparoscopic colostomy reversal is higher among patients who have previously undergone a laparoscopic Hartmann operation than among those who have previously undergone an open Hartmann operation.¹¹ To date, primary procedure (HP) is still preferably performed with an open approach as it is performed after urgent or emergent colonic resections due to suppurative or stercoraceous peritonitis, especially in ASA IV patients.¹²

Objectives

To assess the operative time, conversion rates to open surgery, hospital stay, time of return to normal work and complications.

METHODS

This was a prospective observational study that was conducted in the department of general surgery, GMC Srinagar over a period of 2 years after obtaining ethical clearance from the institutional ethical committee.

Inclusion criteria

All patients between 16-70 years of age, who had undergone Hartmann's procedure and who gave consent for the surgery and get included in the study.

Exclusion criteria

Patients with coagulopathies, contraindications for laparoscopic surgery, history of multiple abdominal surgeries, ASA class 4/5 and unfit for general anesthesia were excluded.

Methodology

Patients were explained in detail, the surgical procedure and the nature of the study, and informed consent was obtained. A baseline preoperative assessment and evaluation was done in all patients. The interval between the original procedure and Hartmann's reversal was determined by each attending surgeon and the patient. Documented considerations included patient preference, findings on the initial procedure as well as metabolic and overall clinical status. Preoperative evaluation of the colon by colonoscopy or barium enema was done. Mechanical bowel preparation was done and enemas were given to clear the rectal stump. Intravenous antibiotics were given approximately 30 minutes before the surgery. A urinary catheter was routinely inserted and the patient was placed in either a split-legged or modified lithotomy position. Video monitors were placed on the patient's left side with the surgeon and the assistant standing on the right. Initial port insertion was accomplished by the open Hassen technique in the right lateral abdomen. Two to three additional ports were used in the upper abdomen and right lower quadrant. Lysis of adhesions was done to allow mobilization of the colostomy and identification of the rectal stump. This was carried out using scissors, monopolar diathermy or ultrasonic-activated devices according to the surgeon's preference. When necessary to identify the rectal stump, a dilator, stapling device or sigmoidoscope was inserted into the rectum. The colostomy was freed from the abdominal wall and the anvil of a circular stapling device was inserted into the lumen. The colostomy was delivered then into the abdomen and either a 12 mm trocar was placed at this site or fascial closure was performed. Mobilization of the left colon, splenic flexure, and resection of the proximal sigmoid or left colon were done as needed. A trans-anal, end-to-end anastomosis was performed using a circular stapling device. Anastomotic integrity was confirmed by using insufflations of air and coloured saline. Postoperatively, all patients were encouraged to ambulate on postoperative day 1. Pain management was done by intravenous patient-controlled analgesia and early conversion to oral medication. A clear diet was usually started on the postoperative day 1 and solid intake was initiated after the passage of flatus or bowel movements. A nasogastric tube was inserted only for clinical and radiographic evidence of the ileus. Patients were discharged when a solid diet was tolerated and the pain was well controlled on oral medications. The following data was collected:

Operative time

From port insertion to port removal.

Conversion rates to open surgery

Procedure abandoned intraoperatively and converted to open.

Hospital stay

total number of days patient was admitted to hospital postoperatively.

Time of return to normal work

Time taken by the patient to resume his daily activities.

Complications

Measured as intraoperative visceral injury, postoperative ileus, anastomotic leak, wound infection and adhesion obstruction.

The recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and then exported to the data editor of SPSS version 20.0 (SPSS Inc, Chicago, Illinois, USA). Continuous variables were expressed as mean $\pm$ SD and categorical variables were summarized as percentages.

RESULTS

The study included 40 patients who met the inclusion criteria and underwent the surgical procedure. The following observations were made in our study:

Age distribution

The age of the patients ranged from 32 to 67 years, with a mean of 50.25 $\pm$ 9.27 years.

Table 1: Age distribution of study patients.

Age (years)	Number	Percentage
32-37	2	5
38-43	6	15
44-49	16	40
50-55	2	5
56-61	8	20
62-67	6	15
Total	40	100

Mean $\pm$ SD (Range) = 50.25 $\pm$ 9.27 (32-67 years).

Gender distribution

Our study included 28 males (70%) and 12 females (30%). Males outnumbered females in our study.

Operative time

In our study mean operative time was 184.6 $\pm$ 47.06 minutes with a range of 110 to 275 minutes.

Conversion rate to open

Only 36 of 40 attempts at the laparoscopic reversal of the Hartmann operation during the research period (90%)

were successful. 4 patients (10%) were converted to open.

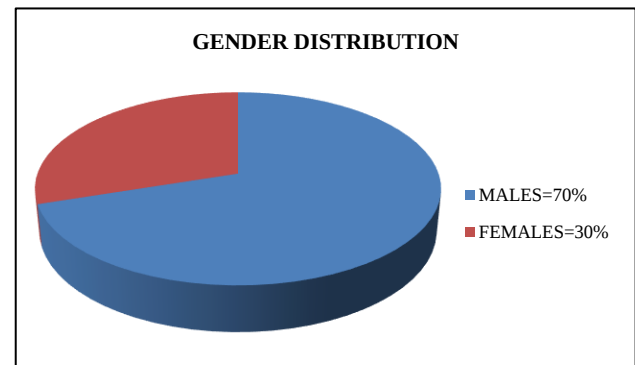


Figure 1: Gender distribution.

Table 2: Operative time (minutes) of study patients.

Operative time (minutes)	Number	Percentage
110-143	8	20
143-176	8	20
176-209	12	30
209-242	6	15
242-275	6	15
Total	40	100

Mean $\pm$ SD (range)= 184.6 $\pm$ 47.06 minutes.

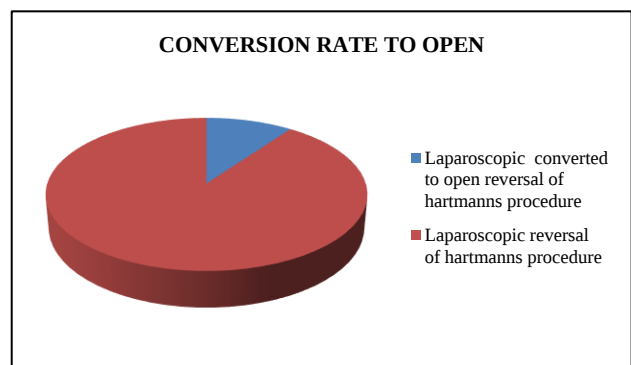


Figure 2: Conversion rate to open.

Hospital stay

In our study mean hospital stay was 6.25 days with a range of 3 to 11 days.

Table 3: Hospital stay (days) of study patients.

Hospital stay (days)	Number	Percentage
3-5	10	25
5-7	16	40
7-9	8	20
9-11	6	15
11-13	0	0
Total	40	100

Mean $\pm$ SD (range)= 6.25 $\pm$ 2.21 (3-11 days).

Time of return to normal work

In our study mean time of return to normal work was 13.4 days $\pm$ 2.010 range (10-17 days).

Table 4: Time of return to normal work.

Time of return to normal work	Number	Percent
10-11 days	8	20
12-13 days	16	40
14-15 days	8	20
16-17 days	8	20

Complications

Postoperatively, two patients developed ileus which was managed in the immediate postoperative period and two suffered from adhesion obstruction, managed by diagnostic laparoscopy with adhesiolysis. It remained uneventful in the rest of the patients.

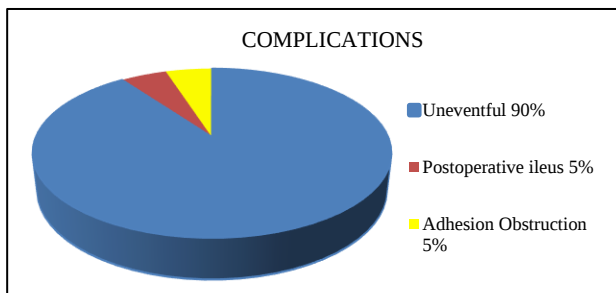


Figure 3: Complications.



Figure 4: Pre-operative photograph of the patient having midline scar of previous laparotomy and colostomy on the left side of the scar.



Figure 5: Placement of ports.



Figure 6: Laparoscopic view of colostomy.



Figure 7: Adhesiolysis.

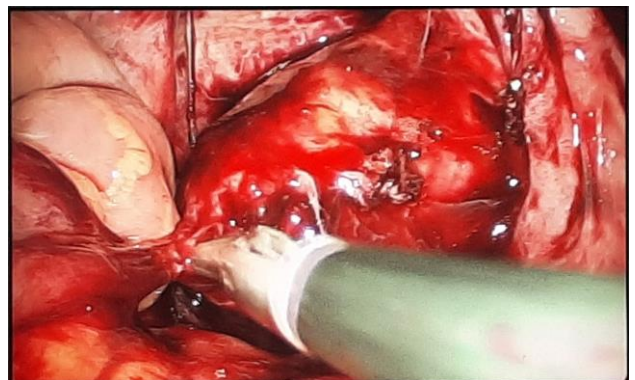


Figure 8: Identification of the distal rectal stump.



Figure 9: Proximal colon with fixation of anvil of circular stapler.

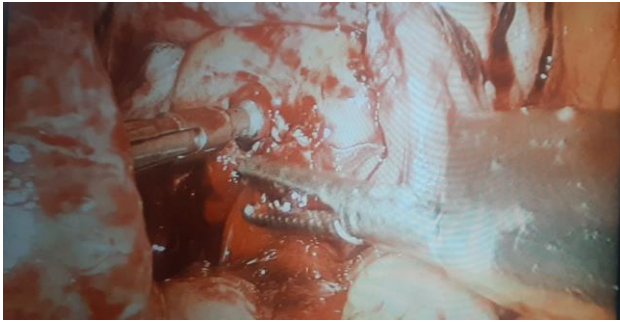


Figure 10: End-to-end anastomosis of the proximal colon with distal rectal stump by using a circular stapler.

DISCUSSION

Reversal of Hartmann's procedure is associated with substantial morbidity and mortality. The standard second-stage colostomy reversal to re-establish intestinal continuity requires a major abdominal operation resulting in extended recovery, incisional discomfort, and prolonged hospital stay. Gorey et al in 1993 first reported a laparoscopically assisted stoma reversal concluding that the procedure might lead to a shorter hospital stay and increased patient acceptance.¹³ Subsequently, many authors have documented many advantages of laparoscopic reversal of Hartmann's procedure, particularly regarding overall postoperative morbidity (wound infections and postoperative ventral hernia), length of hospital stay, and return to daily activities.^{14,15} In our study, the period between index surgery and reversal was 4 months.

Forty patients were enrolled in this study. The age of the patients ranged from 32 to 67 years, with a mean of 50.25 ± 9.27 years with males predominating over females, 70% male and 30% female.

Mean operative time was 184.6 ± 47.06 min in our study and it corresponds well with the study conducted by Panaccio et al in the period between January 2017 and July 2019 in the department of medicine and oral sciences and biotechnologies, unit of general and oncology surgery, Casa Di Cura Pierangeli, University G. D'Annunzio, Chieti-Pescara, Italy in which mean operative time was 180.5 ± 35.1 minutes in the LHR group.¹⁶ In a review of other similar studies, operation time was the interval between the first skin incision and wound closure. Patients having short rectal stump, rectosigmoid colon cancer, and previous radiotherapy in the pelvis resulting in dense adhesions and fibrotic stricture of the rectal stump increase the operative time.¹⁰

Conversion rate to open

In our study, it was only 10%, which is favourably in line with that reported in most previous studies. During the period under study, 40 attempts were made at the laparoscopic reversal of the Hartmann operation, but only

36 of them (90%) were successful. For 4 patients, laparoscopy was converted to laparotomy. This closely resembles the study conducted by Giuseppe et al at the section of general and thoracic surgery, University of Ferrara, Ferrara, Italy on 20 patients in which they reported one conversion to open (5%).¹⁷ Park et al in 2012 in their study at the department of surgery, Chung-Ang University Hospital, Chung-Ang University College of Medicine, Seoul, Korea on 5 patients reported a conversion rate of 20%.¹² The main cause of conversion in our study was secondary to dense adhesion and short rectal stump.

Mean hospital stay in our study was 6.25 ± 2.21 days with a range of (3-11 days) which closely resembles the study of Toro et al in 2014 in which the mean hospital stay was 6.1 days average range was between (3-12 days).¹⁸ Another study by Bagul et al in 2017 observed a mean hospitalization stay of 6 (4-15) days.¹⁹

Time of return to normal work

In our study mean time of return to normal work was 13.4 days and the median time of return to normal work was 12.75 days. which closely resembles the study of Raymond et al in 2009 at the department of surgery, Darent Valley Hospital, Dartford, Kent, UK in which the median time of return to normal work was 13 days range (10-63 days) in the laparoscopic group of colorectal surgery.²⁰

Complications

Laparoscopic reversal leads to a reduction in complication rates. Laparoscopic reversal of Hartmann's procedure is a technically difficult operation but has been reported to carry benefits such as decreased complication and mortality rates. Postoperative ileus was reported for two (5%) patients which were managed conservatively. Maitra et al in their study in 2013 reported 4.4% of postoperative ileus in the laparoscopic attempted group.²¹

Wound infection

Our study reported no case of wound infection. However, Ung et al observed 1.5% of wound infections in their study.¹

Anastomosis leakage

Our study reported no case of anastomotic leakage. A study was conducted by Giuseppe et al in 2018 on 20 patients at the section of general and thoracic surgery, University of Ferrara, Ferrara, Italy.¹⁷ Similar findings were observed (no anastomotic leakage).

Adhesion obstruction

Our study reported two cases (5%) of adhesion obstruction which needed intervention. Similar findings

were observed by Giuseppe, et al in 2018 at the general surgery department at Sant'Anna Hospital in Ferrara, Italy on 20 patients (1 abdominal adhesion) managed by conservative means.¹⁷

CONCLUSION

Our study has demonstrated that laparoscopic reversal has significantly better short-term outcomes despite a proportion of patients being converted to open surgery. Overall, the intention-to-treat analysis shows better short-term outcomes in this group. Laparoscopic reversal of Hartmann's procedure is safe, effective, and achieves faster positive results with acceptable morbidity and mortality.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Van Ung V, Huynh BC, Le VC, Tran DN, Vo TN, Van Pham T, et al. Effects of laparoscopic Hartmann reversal on short-term operative outcomes among Vietnamese patients. *J Coloproctol*. 2021;41(02):117-23.
2. Bruusgaard C. Volvulus of the sigmoid colon and its treatment. *Surgery*. 1947;22(3):466-78.
3. Schilling MK, Maurer CA, Kollmar O, Büchler MW. Primary versus secondary anastomosis after sigmoid colon resection for perforated diverticulitis (Hinchey Stage III and IV) a prospective outcome and cost analysis. *Dis Colon Rectum*. 2001;44:699-703.
4. Demetriades D, Pezikis A, Mellssas J, Parekh D, Pickles G. Factors influencing the morbidity of colostomy closure. *Am J Surg*. 1988;155(4):594-6.
5. van de Wall BJ, Draaisma WA, Schouten ES, Broeders IA, Consten EC. Conventional and laparoscopic reversal of the Hartmann procedure: a review of literature. *J Gastroint Surg*. 2010;14:743-52.
6. Pei KY, Davis KA, Zhang Y. Assessing trends in laparoscopic colostomy reversal and evaluating outcomes when compared to open procedures. *Surg Endosc*. 2018;32:695-701.
7. Jamali FR, Soweid AM, Dimassi H, Bailey C, Leroy J, Marescaux J. Evaluating the degree of difficulty of laparoscopic colorectal surgery. *Arch Surg*. 2008;143(8):762-7.
8. Scheidbach H, Lippert H. Laparoscopic approach for Hartmann reversal procedures. *J Minim Access Surg*. 2006;2:203-4.
9. Ballian N, Zarebczan B, Munoz A, Harms B, Heise CP, Foley EF, et al. Routine evaluation of the distal colon remnant before Hartmann's reversal is not necessary in asymptomatic patients. *J Gastroint Surg*. 2009;13:2260-7.
10. Park JM, Chi KC. Laparoscopic reversal of Hartmann's procedure. *J Korean Surg Soc*. 2012;82(4):256-60.
11. Park W, Park WC, Kim KY, Lee SY. Efficacy and safety of laparoscopic Hartmann colostomy reversal. *Ann Coloproct*. 2018;34(6):306.
12. Kwak HD, Kim J, Kang DW, Baek SJ, Kwak JM, Kim SH. Hartmann's reversal: a comparative study between laparoscopic and open approaches. *ANZ J Surg*. 2018;88(5):450-4.
13. Gorey TF, O'connell PR, Waldron D, Cronin Kerin KM, Fitzpatrick JM. Laparoscopically assisted reversal of Hartmann's procedure. *J Br Surg*. 1993;80(1):109.
14. Royo-Aznar A, Moro-Valdezate D, Martin-Arevalo J, Pla-Martí V, García-Botello S, Espín-Basany E, et al. Reversal of Hartmann's procedure: a single-centre experience of 533 consecutive cases. *Colorect Dis*. 2018;20(7):631-8.
15. Mazeh H, Greenstein AJ, Swedish K, Nguyen SQ, Lipskar A, Weber KJ, et al. Laparoscopic and open reversal of Hartmann's procedure- a comparative retrospective analysis. *Surg endosc*. 2009;23:496-502.
16. Panaccio P, Grottola T, Percario R, Selvaggi F, Cericola S, Lapergola A, et al. Laparoscopic versus open Hartmann reversal: a case-control study. *Surg Res Pract*. 2021;2021.
17. Giuseppe R, Nicolò ID F, Serafino M, Sara G, Nicola T, Giorgio C, et al. Laparoscopic reversal of Hartmann's procedure: a single-center experience. *Asian J Endosc Surg*. 2019;12(4):486-91.
18. Toro A, Ardiri A, Mannino M, Politi A, Di Stefano A, Aftab Z, et al. Laparoscopic reversal of Hartmann's procedure: state of the art 20 years after the first reported case. *Gastroenterol Res Pract*. 2014;2014.
19. Bagul A, Shrotri M. Laparoscopic Reversal of Hartmann's Procedure (eLapRHP). *J Surg*. 2017;138.
20. Raymond TM, Kumar S, Dastur JK, Adamek JP, Khot UP, Stewart MS, et al. Case controlled study of the hospital stay and return to full activity following laparoscopic and open colorectal surgery before and after the introduction of an enhanced recovery programme. *Colorect Dis*. 2010;12(10):1001-6.
21. Maitra RK, Pinkney TD, Mohiuddin MK, Maxwell-Armstrong CA, Williams JP, Acheson AG. Should laparoscopic reversal of Hartmann's procedure be the first line approach in all patients? *Int J Surg*. 2013;11(9):971-6.

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