ORIGINAL ARTICLE

Analysis of factors related to the decision of Hartmann's procedure and its reversal: a single-center experience

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ABSTRACT

BACKGROUND: Hartmann's procedure (HP) is commonly applied to resolve acute clinical conditions in most cases with colonic obstruction or perforation. HP and the closure of the end colostomy are associated with high morbidity-mortality rates. In our study, we aimed to report our clinical experience in HP.

METHODS: Demographic data and outcomes of Hartmann procedures performed between 2015 and 2023 were retrospectively reviewed.

RESULTS: The median age of our study was 63 (18–94) years; 65 of the patients were female, and 97 were male. Colorectal malignancies were the primary etiology in 50% of patients who underwent HP, with 70% presenting with obstruction and 30% with perforation. Two-thirds of the patients were American Society of Anesthesiologists-2 or higher. Postoperative complications did not develop in 74.7% of patients. Our mortality rate was 33.3%. The colostomy was closed in 59 patients during an average 2-year follow-up. The median closure time was 311 (57–1319) days. A stapler was used in 89.8% of patients during the closure. A diverting ileostomy was created in only two patients. The median hospital stay was 8 (5–70) days. Post-operative complications did not develop in 25.4% of patients, while four patients died.

CONCLUSION: In our population, HP was more commonly performed for colorectal cancer. The procedure and closure of the ostomy result in low stoma closure rates, high morbidity, and mortality rates, as well as surgical difficulties.

Keywords: Hartmann's procedure; Hartmann's reversal; morbidity; mortality.

INTRODUCTION

Hartmann's procedure (HP) was first described in 1921 by French surgeon Henri Albert Hartman as an emergency intervention for obstruction due to left colon cancer. In this procedure, the rectosigmoid colon is resected, the rectal stump is closed, and an end colostomy is created.[1] The main indications include obstruction and perforation due to left colon cancer, diverticulitis, ischemia, volvulus, and trauma.[2-4] Despite morbidity rates reaching 50% and mortality rates reaching 15%–25% reported in the literature, the procedure is still performed today for various emergency or elective indications.[5-8]

Hartmann's colostomy should be evaluated for closure once optimal conditions are achieved. However, the reversal of the Hartmann colostomy, like the creation of the colostomy itself, is a major surgery. Colostomy closure has high morbidity rates above 50% and high mortality rates above 5%. For this reason, the reversal rates of Hartmann's colostomy in the literature vary between 26% and 61% across different centers. In addition, comorbid factors of these patients make the surgery more challenging.[9-14]

In this study, we aimed to evaluate the emergency and elective operations where HP was preferred in our clinic between 2015 and 2023 and their outcomes.

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MATERIALS AND METHODS

A total of 162 elective or emergency HPs were performed in our hospital between January 2015 and December 2022. Demographic information, time elapsed until surgery, American Society of Anesthesiologists (ASA) classification, treatment purpose, operation duration, length of stay, and post-operative outcomes data were extracted from the hospital's clinical database. Post-operative mortality was defined as death occurring within 30 days after surgery or during the same hospital admission as a result of the operation. Patients who had their Hartmann's colostomy closed were analyzed. The time elapsed for reversal of HP; complications after reversal were retrospectively examined.

Statistical analysis was performed using the Chi-square test or Fisher's exact test for nominal variables. The 2-sample t-test was used to compare continuous data from independent samples. All statistical tests were carried out using the Statistical Package for the Social Sciences for Windows (SPSS version 12.0); P<0.05 was considered significant.

RESULTS

A total of 162 patients underwent HP. Of these, 97 (59.9%) were male and 65 (40.1%) were female. There was no significant difference in terms of gender (P<0.383). The average age was 63 years (min: 18, max: 94). About 87% of the patients underwent surgery due to emergency surgical reasons. Perforation and obstruction were the main two reasons. In terms of etiology, the most common was complicated abdominal malignancies in 93 (57.4%) patients. Other diseases for which HP was applied are shown in Table 1.

The distribution of the anesthetic risk scale (ASA) was as follows: 60 patients were ASA I (37%), 73 patients were ASA II (45%), and 29 patients were ASA III (18%). The mortality of HP was 33.3% (54) and the average length of hospital stay was 15.32±0.88 days. More than two additional diseases were present in 36.4% of the patients who underwent HP. Post-operative complications developed in 25.3% of patients, and wound infection was the most common among these patients (Table 2). Among the 85 colorectal cancer patients, the group in which HP was most commonly applied, only 14 had a history of neoadjuvant chemoradiotherapy treatment.

Table 1. Indications for Hartmann's procedure in patients in the study (n=162)

Indications	n (%)
Malignancy	93 (57.41)
Diverticulitis	16 (9.88)
Trauma	20 (12.35)
Volvulus	15 (9.26)
Incarcerated hernia	2 (1.23)
Anastomotic leak	6 (3.7)
Mesenteric ischemia	1 (0.62)
Fistula	4 (2.47)
Fournier's gangrene	4 (2.47)
Toxic megacolon	1 (0.62)

Table 2. Hartmann's operation complications (n=47)

Complications	n (%)
Wound site infection	21 (12.96)
Bleeding	1 (0.62)
Intra-abdominal abscess	13 (8.02)
Ileus	7 (4.32)
Evisceration	2 (1.23)
Leak	1 (0.62)
Ostomy necrosis	2 (1.23)

Table 3. Complications following Hartmann's reversal (n=19)

Complications	n (%)
Wound site infection	11 (18.64)
Bleeding	1 (1.69)
Ileus	3 (5.08)
Evisceration	2 (3.39)
Intra-abdominal abscess	1 (1.69)
Other	1 (1.69)

Reversal operation of HP was performed in 59 (36.4%) patients. Fifty of these patients had an emergency colostomy. There was no statistically significant difference between emergency or elective cases. Of the patients who underwent closure, 43 were male and 16 were female. A significant difference was found for male gender in terms of gender (P<0.013). The reason for this was that the proportion of patients with a high ASA scale was higher in females. Anastomosis was performed with a stapler in 89.8% of patients. Only two patients had a protective ileostomy opened. The average time elapsed since the first operation for this procedure was 11.5 months, and the median time was 10.3 (1.9–43.9) months. About 22% of patients who recovered 6 months after HP, 47% after 12 months, and 36% after 18 months were closed. The median length of hospital stay for this second surgery was 8 (5–70) days. There was one mortality after this bowel reconstruction. Additional diseases were not statistically a risk factor for closure (P<0.249). Of the 85 colorectal cancer patients, including the 14 who received preoperative chemoradiotherapy treatment, 25 (29.4%) were successfully closed. After the closure, complications developed in 25.4% of patients, with the most common complication being wound infection again. Other complications are listed in Table 3.

DISCUSSION

French surgeon Henri Hartmann introduced a procedure for distal sigmoid colon cancer in 1921. This procedure involved leaving a rectal stump and creating a terminal colostomy in addition to anterior resection.[15] It was often preferred in emergency cases. The main goal was to avoid the morbidity and mortality caused by anastomotic leakage for the patient. However, the increasing number of articles in the literature reporting that primary anastomosis can be safely performed even in emergency cases with obstruction and perforation has led to a gradual decrease in the decision for HP.[16,17]

The most common indication for HP in our study was colorectal cancers, with a rate of 52.4%. Similarly, in the literature, colorectal cancers are mostly in the first place. In line with the literature, trauma, diverticulitis, volvulus, and other causes follow, respectively.[2,16-19]

Our HP reversal rate was 36.4%. In the literature, HP reversal rates are reported within a wide range of 4% to 85%. The closure rate of Hartmann colostomy opened due to benign diseases is reported as 47.8%, while the closure rate of colostomy opened due to malignant diseases is reported as 26.8%. In the literature, as in our series, closure rates were higher for benign diseases.[2,3,5,8-14,19-21]

The ASA distribution of the patients we applied HP to was inconsistent with the literature. In the literature, it is mentioned that the majority of patients preferred for HP are ASA-3 patients.[2,20,22] However, in our study, ASA-3 patients constituted only 18% of all patients. In our study, our mortality rate related to HP reached 33%. This rate was slightly higher than the mortality rates reaching 25% in the literature.[19,23] We can attribute these results to the majority of patients who were preferred for HP being emergency perforation cases and not being operated on by a specific colorectal surgeon.

In a quarter of the patients, colostomy closure could not be performed due to reasons such as recurrence of existing colorectal malignancy, additional diseases, patient refusal, or inability to reach the patient. The time to colostomy closure after HP varied between 57 and 1319 days after the operation, with a median time of 311 days. This is an average of 10.3 months and is similar to the literature.[10,19,24] This time did not make a significant difference in terms of complications after closure. In the literature, there are studies suggesting that this elapsed time increases possible complications, as well as studies stating that it decreases complications.[20,25]

The most common complication encountered during HP and colostomy closure was surgical site infection. In the literature, complication rates between 5.4% and 54.8% are reported after closure.[13,14,16,20,23,26-28] In our study, similarly, complications were observed in 25.6% of cases after closure, and half of these were surgical site infections. No serious complications, such as anastomotic leakage, were observed. The median hospital stay after closure was 8 days (min: 5, max: 70). Although Wigmore et al. thought that this duration varied depending on the patient's previous admission history,[29] we did not find a significant difference in our study.

In recent years, it is recommended to prefer temporary stoma or stoma-free primary anastomosis in the management of cases where HP was previously preferred.[30] In a meta-analysis conducted by Salem and Flum, it was revealed that there was no difference between the two patient groups with permanent stoma and primary anastomosis in terms of morbidity and mortality.[6] Moreover, in different studies, it has been emphasized that morbidity and mortality can be reduced by providing transition to definitive surgery with colonic stenting instead of HP in obstructive colon cancers.[31,32]

Unfortunately, the relatively longer duration of primary anastomosis compared to Hartmann's colostomy, especially in emergency practice, makes it difficult to prefer. Therefore, HP is still a safe and applicable surgical intervention preferred in high-risk patients, especially in emergency conditions, with comorbid diseases in today's practice.[5,33]

As mentioned in an article published in the USA, the increase in the number of surgeons dealing with colorectal surgery will lead to HP being less preferred. As a result, operation times, hospital stay durations, and morbidity and mortality related to the operation will significantly decrease.[34]

In our hospital, emergency surgical procedures are performed by many surgeons. The majority of these surgeons deal with subspecialties in daily practice, such as breast, endocrine, hepatobiliary, and colorectal surgery. Therefore, there are differences between colonic resections in emergency practice. While colorectal surgeons mostly prefer primary anastomosis, others mainly opt for HP. This is one of the limitations of our study. Moreover, the retrospective nature of our study and the relatively small number of cases are other limitations.

Conclusion

This study demonstrated that HP, which is often preferred in emergency cases, especially in complicated colorectal cancers, is associated with high mortality and morbidity rates. On the other hand, the reversal of colostomy was performed safely with lower morbidity and mortality rates. Changes in the perspective of colorectal surgery in the implementation of emergency surgery in the future may lead to a decrease in Hartmann procedures and overall improvement in morbidity and mortality.

Ethics Committee Approval: This study was approved by the Kanuni Sultan Suleyman Training and Research Hospital Clinical Research Ethics Committee (Date: 2023, Decision No: KAEK/2023.04.48).

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Analysis: A.K., E.S., S.Y.; Literature search: A.K., E.S.; Writing: A.K., E.S., S.Y.; Critical revision: A.K., E.S.

Conflict of Interest: None declared.

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ORİJİNAL ÇALIŞMA - *ÖZ*

Hartmann prosedürü ve tersine çevrilmesi kararı ile ilgili faktörlerin analizi: Tek merkezli bir deneyim

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AMAÇ: Hartmann'ın prosedürü, kolon tıkanıklığı veya perforasyonu olan çoğu vakada akut klinik durumları çözmek için yaygın olarak uygulanır. Hartmann prosedürü ve uç kolostominin kapatılması yüksek morbidite-mortalite oranları ile ilişkilidir. Çalışmamızda Hartmann prosedüründeki klinik deneyimimizi bildirmeyi amaçladık.

GEREÇ VE YÖNTEM: 2015-2023 yılları arasında gerçekleştirilen Hartmann işlemlerinin demografik verileri ve sonuçları retrospektif olarak incelendi.

BULGULAR: Çalışmamızın ortanca yaşı 63 (18-94) idi; hastaların 65'i kadın, 97'si erkekti. Hartmann prosedürü uygulanan hastaların %50'sinde kolorektal maligniteler birincil etiyolojiydi, %70'inde obstrüksiyon ve %30'unda perforasyon vardı. Hastaların üçte ikisi ASA-2 veya daha yüksekti. Hastaların %74.7'sinde postoperatif komplikasyon gelişmedi. Mortalite oranımız %33.3 idi. Ortalama iki yıllık takipte 59 hastada kolostomi kapatıldı. Ortalama kapanma süresi 311 (57-1319) gündü. Kapatma sırasında hastaların %89.8'inde zımba kullanıldı. Sadece iki hastada saptırıcı ileostomi açıldı. Medyan hastanede kalış süresi 8 (5-70) gündü. Hastaların %25.4'ünde postoperatif komplikasyon gelişmezken, dört hasta kaybedildi.

TARTIŞMA: Toplumumuzda Hartmann prosedürü daha çok kolorektal kanser için uygulanmaktaydı. Ostominin prosedürü ve kapatılması, düşük stoma kapanma oranları, yüksek morbidite ve mortalite oranlarının yanı sıra cerrahi zorluklarla sonuçlanır.

Anahtar sözcükler: Hartmann'ın prosedürü; Hartmann'ın tersine çevrilmesi; morbidite; mortalite.

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