

Surgical results of Hartmann procedure in emergency cases with left-sided colorectal cancer

Resultados quirúrgicos del procedimiento de Hartmann en casos de emergencia con cáncer colorrectal izquierdo

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Abstract

Objective: We aimed to define indication of Hartmann procedure (HP) under emergency conditions, analyze, and present in which cases this procedure should be used. **Methods:** The patients who underwent emergency surgery for colorectal cancer were analyzed. Rates of mortality, overall, and disease-free survival of the patients were evaluated. The colostomy closure rate, operative mortality, and surgical complications of the secondary operation performed after the HP were also assessed. **Results:** Fifty-seven patients who underwent HP were included in the study. The indications were obstruction ($n = 37$) or perforation ($n = 20$). The post-operative mortality and morbidity rates were 21.1% and 63.2%, respectively. The 1-, 3-, and 5-year survival rates for all patients were 54%, 49%, and 45%. **Conclusion:** HP can be a life-saving procedure in cases of high risk, emergency colorectal disease. Surgeons create a temporary stoma as a part of this procedure that is generally closed with a second operation. However, it is not possible to close the stoma in some cases, and the potential physical and emotional issues related to the stoma should be a part of the surgeon's considerations.

Key words: Colorectal cancer. Hartmann procedure. Obstruction. Perforation. Colostomy.

Resumen

Objetivo: Definir la indicación del procedimiento de Hartmann en condiciones de emergencia y en qué casos debe utilizarse. **Método:** Se analizaron los pacientes sometidos a cirugía colorrectal de emergencia. Se evaluaron las tasas de mortalidad y de supervivencia global y libre de enfermedad. También se evaluaron la tasa de cierre de la colostomía, la mortalidad operatoria y las complicaciones quirúrgicas de la operación secundaria. **Resultados:** Fueron incluidos en el estudio 57 pacientes sometidos a un procedimiento de Hartmann. Las indicaciones fueron obstrucción ($n = 37$) o perforación ($n = 20$). Las tasas de mortalidad y de morbilidad posoperatorias fueron del 21,1% y el 63,2%, respectivamente. Las tasas de supervivencia a 1, 3 y 5 años para todos los pacientes fueron del 54%, el 49% y el 45%. **Conclusión:** El procedimiento de Hartmann puede salvar vidas en casos de enfermedad colorrectal de emergencia de alto riesgo. Los cirujanos crean un estoma temporal como parte de este procedimiento, que generalmente se cierra con una segunda operación. Sin embargo, en algunos casos no es posible cerrar la estoma, y los posibles problemas físicos y emocionales relacionados con este deberían ser parte de las consideraciones del cirujano.

Palabras clave: Cáncer colorrectal. Procedimiento de Hartmann. Obstrucción. Perforación. Colostomía.

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Introduction

Almost 10-28% of patients with colorectal cancer (CRC) present with mechanical intestinal obstruction or perforation. This situation usually requires emergency surgical intervention. In the literature, the mortality rate after emergency colorectal surgery has been reported as 15-22.5% with a morbidity rate of 40-50%^{1,2}. Particularly in cases of colon cancer with a mechanical bowel obstruction, gastrointestinal continuity can now be provided with the help of new technological methods, such as stenting and laser therapy. Thus, patients presenting with emergency status can be converted to elective or semi-elective status, reducing both mortality and morbidity and allowing for a one-stage operation³.

However, in elderly patients, who are often dehydrated with poor hemodynamic status and sepsis, these procedures are difficult and time consuming⁴. Under these conditions, many surgeons avoid the risk of performing anastomosis. Therefore, the procedure of closure of the rectum following resection of the tumor and anastomosing the proximal part of the colon to the skin (end colostomy) in a patient with a recto-sigmoid tumor first described in 1921 by French surgeon Henri Hartmann is still widely used. This procedure also saves both surgeons and patients from many potentially troublesome situations⁵. In 1950, Boyden reported on the application of the Hartmann procedure (HP) in cases with acute diverticulitis and closure of the colostomy⁶. Emergency cases with a decompensated ileus due to tumor-induced obstruction, perforation, or bleeding; secondary interventions due to anastomotic leak; and unstable patients with high-risk hemodynamics are the main indications for HP⁷. This method has been preferred in cases of sigmoid volvulus, trauma-induced colon perforation, radiation injury, and anastomosis leak after anterior resection⁸. The creation of a stoma as a part of HP is technically reversible with a second operation, and surgeons often think of it as temporary. However, stoma closure will not be possible in some HP patients⁹. In studies evaluating the outcome of HP, the stoma closure rate has been as low as 24-35% and the 5-year survival rate has been reported to be 31%^{9,10}. Despite this, many surgeons still point to the fact that HP provides the opportunity to shorten operation time and reduce surgical trauma, particularly in high-risk patients, while allowing for R0 resection in CRC patients¹¹.

The aim of this study was to evaluate the surgical results of left-sided CRC patients who underwent HP under emergency conditions for mechanical intestinal obstruction or perforation.

Materials and Methods

The data of patients with left-sided CRC who underwent an emergency HP with a mechanical bowel obstruction or perforation between January 2012 and December 2017 were analyzed retrospectively. This study was approved by ethics committee of University of Health Science Kartal Training and Research Hospital (Project No: 2018/514/125/3). Informed consent was obtained from all patients before operation.

Patients who were operated on for non-oncological reasons, elective surgeries, and cases with unavailable or incomplete data were excluded from the study. Furthermore, the patients who placed endoscopic stent before surgery were not included in this study. Demographic characteristics, perioperative risks, tumor localization, surgical indication (obstructive or perforated), stage according to the TNM Classification of Malignant Tumors, and the type of resection (curative or palliative) were analyzed in this study. No evidence of residual or metastatic disease detected during the procedure and margins of the resected specimen that was determined to be devoid of tumor cells in the pathological examination was considered a curative resection. Operative mortality was defined as mortality occurring within 30 days of the procedure. The surgical reports indicated the presence of a pre-operative comorbidity, hemodynamic instability, localized or widespread peritonitis, and suspicion about the healthy circulation of the proximal colon as reasons for not performing anastomosis during the primary resection.

The rates of mortality, overall survival (OS), and disease-free survival (DFS) of the patients undergoing HP were evaluated. The colostomy closure rate, operative mortality, and surgical complications of the secondary operation performed after the HP were also assessed.

Statistical analysis

The age variable was defined using the mean \pm standard deviation (SD) and analyzed with a t-test. The OS variable was defined according to the median \pm SD and analyzed using the Mann-Whitney U-test. A Chi-square test was calculated using the Statistical

Package for the Social Sciences program for other variables. Normally distributed data were analyzed with t-tests. Data with a non-normal distribution were defined by the median and interval and analyzed using the Mann-Whitney U-test. Relationships between cross-tabulated variables were analyzed using a Chi-square test or Fisher's test, as necessary. The normality of the data was analyzed using the Kolmogorov-Smirnov test. Values of $p < 0.05$ were considered statistically significant.

Results

A total of 57 patients who underwent HP under emergency conditions were included in the study. All of the operations performed by general surgeons in the colorectal department. Thirty-one (54.4%) patients were male and 26 (45.6%) were female. The median age was 67 years (31-89 years) and distribution of patients by age groups presented in table 1. Concomitant diseases were observed in 40 (70%) patients. The indication for HP was obstruction ($n = 37$) or perforation ($n = 20$). The early post-operative mortality and morbidity rates were 21.1% ($n = 12$) and 63.2% ($n = 36$), respectively. Detailed mortality and morbidity rates by groups are presented in table 2. The median follow-up period for remaining 45 patients was 16 months (2-67 months). During the follow-up period, 23 (40.3%) patients presented with metastatic disease (19 cases with liver metastasis, 2 cases with lung metastasis, and 2 patients with carcinomatosis), and 19 (33.3%) of these patients died. Of the 26 (45.6%) surviving patients, 21 (36.8%) had DFS, while 5 (8.7%) patients had distant organ metastasis. The 1-, 3-, and 5-year survival rates for all patients were 54%, 49%, and 45%, respectively.

Comparison of the patients who underwent HP for obstruction with those who experienced a perforation did not reveal any significant difference in survival rate ($p > 0.05$). However, the presence of extramural perineural invasion ($n:31$) was significant in terms of poor prognosis ($p < 0.05$). Curative resection was performed in 34 patients (60%). In this group, the overall 1-, 3-, and 5-year survival rates were 79%, 67%, and 64%, respectively. The average DFS for Stage II and III patients was 30.7 months and 35.8 months, respectively, while the OS was 32.4 months and 35.9 months, respectively. For Stage IV patients, the average DFS was 3.7 months and the OS was 7.5 months. There was no significant difference in DFS and OS between Stages II and III. The average survival in Stage IV was

Table 1. Age distribution of patients

Patient's age	n (%)
<40 y/o	1 (1.8)
Between 40 and 65 y/o	22 (38.6)
More than 65 y/o	34 (59.6)

Table 2. Mortality and morbidity rates

	Obstruction (n:37)	Perforation (n:20)	Total (n:57)
Complication:			
Wound related	20	16	36 (63%)
Ostomy related	11	9	20 (35%)
Intra-abdominal abscess	3	2	5 (9%)
Respiratory or other	4	3	7 (12%)
Respiratory or other	2	2	4 (7%)
Mortality:			
Early	19	12	31 (54%)
Delay	8	4	12 (21%)
	11	8	19 (33%)

significantly less than in Stages II-III ($p<0.05$). The 5-year survival time of the study group is illustrated in figures 1 and 2.

The stomas of 12 (26.6%) patients were closed in an average of 237 days (180-360 days) (Fig. 3). No death or anastomotic leakage was observed after stoma closure. In one patient, the procedure was not completed as a result of the peroperative discovery of peritonitis carcinomatosa. Two patients in this group developed distant metastasis; however, no mortality was observed during the follow-up period.

Discussion

HP was initially used as a treatment modality for left-sided colonic obstruction, perforated diverticulitis, and emergency cases of colorectal disease with a high risk for anastomosis. The procedure is largely successful in achieving resolution of an emergency situation^{12,13}. However, with the increase in application of HP, new challenges emerged, and the deterioration in the quality of life of these emergency patients drew more attention. It has been reported in various studies that patients with an ostomy face psychological and physical difficulties^{14,15}. The ideal treatment approach in emergency cases of left-sided CRC is still controversial and it is closely related to the surgeon's experience as well as the general condition of the patient.

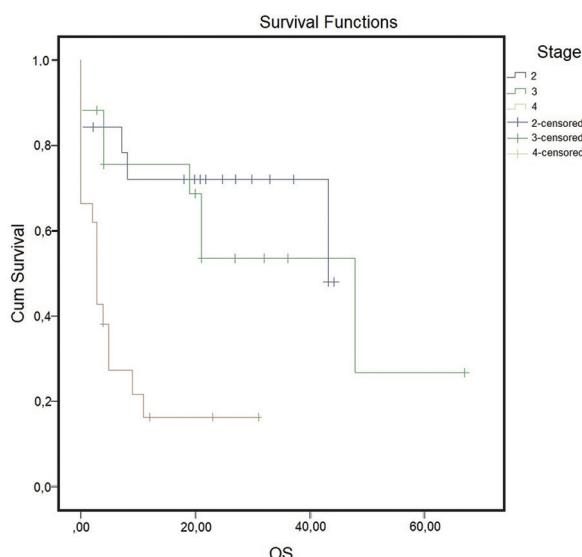


Figure 1. Overall survival (OS) in all stages (months).

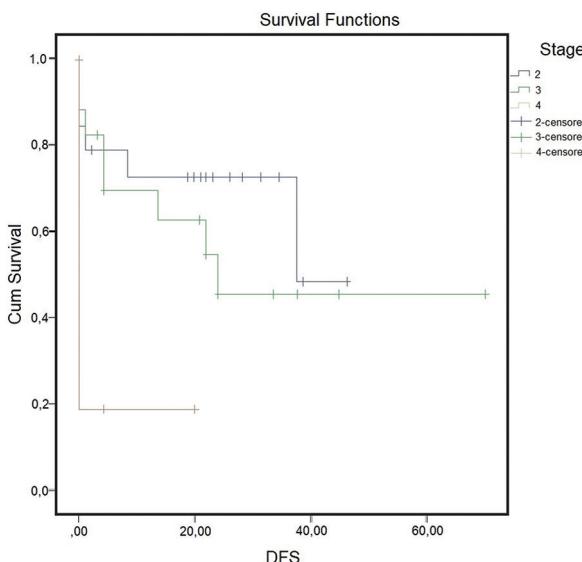


Figure 2. Disease-free survival (DFS) in all stages (months).

The main factor in the mortality and morbidity of these patients is comorbidities¹⁶. The incidence of primary resection and anastomosis is increasing in selected cases of emergency left-sided CRC surgery. However, if primary anastomosis is performed in patients who are not suitable candidates, dehiscence of the anastomosis, intra-abdominal abscess, wound infection, and mortality can occur^{17,18}.

HP can be an ideal surgical treatment. The post-operative complication rate in patients undergoing primary resection and anastomosis due to urgent CRC

has ranged between 39% and 44%, while the rate of anastomotic leakage and mortality has ranged between 4% and 11% and 9% and 11%, respectively¹⁹. In HP patients, the mortality rate can be 28% and the morbidity rate can be 60-70%²⁰. In our study, the operative mortality and morbidity rates were 21% and 63%, respectively. Higher mortality and morbidity rates in patients undergoing HP compared with patients who underwent a single-session primary resection and anastomosis may be explained by the fact that HP is often performed for older patients with poor nutritional status, comorbid diseases, higher American Society of Anesthesiologists (ASA) scores, unstable hemodynamic status, or obesity. In the present study, the mean age of the patients for whom HP was performed was 67.1 ± 13.3 years. Furthermore, 70% of those patients had comorbidities and the majority had an ASA III score with high existing morbidity.

The negative effect of emergency surgery on oncological outcomes in cases of CRC is limited to the initial postoperative period²¹. There is little difference in the length of post-operative OS in emergency patients when compared with elective surgery among patients with Stages II-III CRC²². In our study, the median survival in Stage II and III patients was 32.4 months and 35.9 months, respectively, while it was 7.5 months in Stage IV patients who received palliative treatment. Therefore, surgery has two goals in high-risk patients with obstructive or perforated CRC. The first is effective relief of symptoms in patients undergoing R1-R2 resection. The second is to lengthen survival with a minimization of surgical mortality and morbidity in patients undergoing R0 resection.

In some cases of CRC patients who undergo HP, the colostomy may be permanent. HP is technically reversible and surgeons often think of the colostomy as a temporary measure until they close the stoma with a second operation; however, closure of the stoma is not always possible⁹. Studies evaluating HP outcomes have reported stoma closure rates as low as 24-35%^{9,10}. Although the decision to perform a stoma closure and the timing of the procedure depend on many factors, the oncological condition of the patient is the primary determining factor. There are contradictory studies in the literature about the timing of a stoma closure. In a study of 69 cases, they divided study patients into two groups: those with a stoma closure performed within 4 months of the procedure or later²³. Pearce et al. categorized 80 patients according to a stoma closure time of within 3 months, 3-6 months, and 6 months after the first operation,

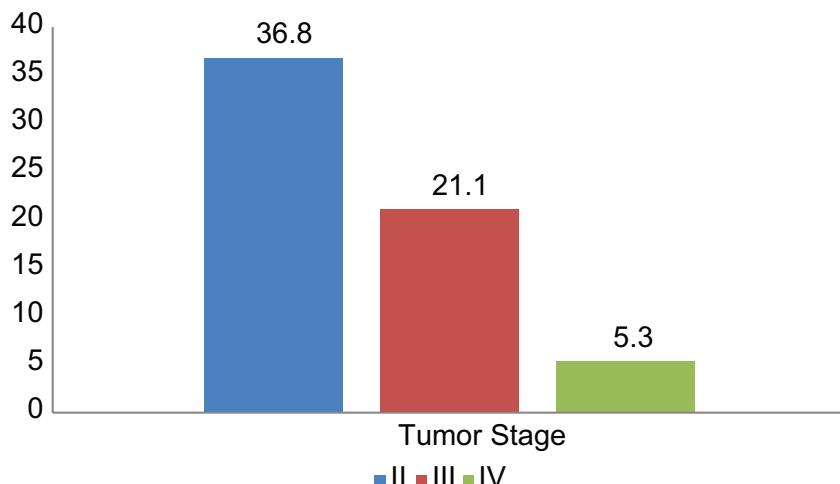


Figure 3. Colostomy reversal rates according to the tumor stages.

and found lower anastomotic leakage and mortality rates in patients whose stomas were closed 6 months after the first operation²⁴. In another study, it was reported that the number of post-operative complications was greater in patients whose stomas were closed 3-9 months after HP compared with those whose stomas were closed more than 9 months later²⁵. These contradictory results suggest that larger scale studies on stoma closure are needed. Horesh et al. reported morbidity and mortality rates related to stoma closure of 46.5% and 0.7%, respectively²⁶.

In our series, the colostomies of only 12 patients [26.6%] were closed in an average of 237 days (180-360 days). Although our rate of colostomy closure is within the range described in the literature, we attribute this low rate to the large number of Stage IV patients. We did not observe death or anastomotic leak after colostomy closure. In one patient, the procedure was discontinued because the presence of peritonitis carcinomatosa was detected peroperatively. Two patients in this group developed distant metastasis; however, no mortality was observed during the follow-up period. González et al. reported a stoma closure rate of 21.73%. Similarly, other lower stoma closure rates have also been reported in the literature²⁷⁻²⁹. In our study, the stomas of the patients who underwent HP were closed in a period of 6-12 months. It has been reported that if the existing stoma is not closed within the 1st year, it will probably become permanent³⁰. The time between HP and stoma closure allows for the identification of appropriate, low-risk patients for stoma closure. In our study, the stoma closure rate among socially active, Stage II and III

patients was 36% and 21.1%, respectively. However, the rate was 5.3% in Stage IV patients, and patients in this group were likely to have permanent colostomies (Fig. 3). Many factors may contribute to a low stoma closure rate: patients may not want a second operation, there may be significant risk factors associated with an additional operation, or the presence of an advanced stage tumor can preclude performing the closure procedure.

Conclusion

The main disadvantages of HP are need for a second major operation to reverse the colostomy, which will be also associated with a risk of morbidity and mortality like anastomotic dehiscence. In addition, ostomy has some psychological and physical difficulties for patients, so the 1-time surgery is superior in terms of patient's quality of life with a chance to live without ostomy. HP can be an ideal surgical treatment for these cases; anastomosis is risky due to poor condition and resection mandatory due to perforation. HP can be a life-saving procedure in high risk, emergency cases of colorectal diseases. Surgeons create a temporary stoma as a part of this procedure that can be reversed with a second operation. However, it is not possible to close the stoma in some HP patients.

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Conflicts of interest

No conflicts of interest were declared by the authors.

Ethical disclosures

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this study.

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. The authors have obtained the written informed consent of the patients or subjects mentioned in the article. The corresponding author is in possession of this document.

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