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Outcomes of Resection Anastomosis versus Hartmann's Procedure in Sigmoid Volvulus

Sigmoid Volvulus'ta Rezeksiyon Anastomoz ve Hartmann Prosedürünün Sonuçlarının Karşılaştırılması

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ABSTRACT

AIM: This study seeks to ascertain the comparative efficacy between the Hartmann procedure (HP) and resection anastomosis (RA), with or without concurrent fecal diversion, as surgical interventions for Sigmoid Volvulus (SV). The primary objective is to discern the procedure associated with a more favorable clinical outcome.

MATERIAL AND METHOD: The study cohort comprised individuals who underwent surgical intervention for SV within the timeframe of 2010 to 2022 at our clinical facility. Demographic particulars encompassing gender and age, as well as comorbid conditions, ASA scores, procedural modalities, postoperative untoward events, and duration of inpatient care, were sourced from the patient database. Evaluation of postoperative complications, occurring within the 30-day window post-surgery, was undertaken in conformity with the Clavien Dindo (CD) classification schema. Statistical analyses encompassing the Mann Whitney U test and chi-square test were applied for data interpretation. Variables with p-values below 0.05 were deemed to possess statistical significance.

RESULTS: The study encompassed a total of 125 patients, of whom 99 (79.2%) were male. Among these, 51 (40.8%) patients were allocated to the HP group, while 74 (59.2%) were assigned to the RA group. Concerning hospitalization duration, the median period was 8 (2-30) days in the HP group and 10 (3-35) days in the RA group (p=0.013). In accordance with the CD Classification, 68 (54.4%) patients encountered complications linked to the surgical procedure, with 11 (8.8%) patients experiencing procedure-associated mortality. Despite the observed statistically significant inter-group variance, it was discerned that HP exhibited a superior performance in terms of complications when compared to RA (p=0.048).

CONCLUSION: Significantly reduced durations of hospitalization and fewer occurrences of postoperative complications were observed within the cohort undergoing the Hartmann's procedure. As a result, we advocate that clinicians consider prioritizing the implementation of Hartmann's procedure for patients undergoing surgical intervention for SV.

Keywords: Intestinal volvulus, anastomosis surgical, colostomy, postoperative complications

ÖZET

AMAÇ: Sigmoid Volvulus'un (SV) cerrahi tedavisinde Hartmann prosedürü (HP) ya da fekal diversiyonlu- disversiyonsuz rezeksiyon anastomoz (RA) yapılabilir. Bu çalışmada iki prosedürün sonuçlarını karşılaştırarak üstünlüklerini belirlemeyi amaçlamaktadır.

GEREÇ VE YÖNTEM:2010-2022 yılları arasında kliniğimizde SV nedeniyle opere edilen tüm hastalar çalışmaya dahil edildi. Hastaların cinsiyet, yaş, komorbidite, ASA skorları, operasyon tipleri, postoperatif komplikasyonlar, hastanede kalış süreleri gibi demografik verilere hasta veritabanından ulaşıldı. Ameliyat sonrası komplikasyonlar (ameliyattan sonraki 30 gün boyunca) Clavien Dindo (CD) sınıflamasına göre sınıflandırıldı. İstatistiksel analizler Mann Whitney U ve ki-kare testleri ile analiz edildi. p<0,05 olan değerler istatistiksel olarak anlamlı kabul edildi.

BULGULAR: Çalışmaya toplam 125 hasta dahil edildi. Bu hastaların 99'unun (%79.2) erkek olduğu kaydedildi. 51 (%40.8) hasta HP grubuna, 74 (%59.2) hasta RA grubuna alındı. Hastanede yatış süreleri açısından ortanca HP grubunda 8 (2-30) gün iken RA grubunda 10 (3-35) gündü (p=0.013). CD Sınıflamasına göre 68 (%54.4) hastada operasyona bağlı komplikasyon, 11 (%8.8) hastada operasyona bağlı mortalite görüldü. Gruplar arası istatistiksel olarak anlamlı gözlenen varyansa rağmen, HP'nin RA'ya göre komplikasyonlar açısından daha üstün performans gösterdiği görüldü (p=0.048).

SONUÇ: Hastanede kalış süresi ve postoperatif komplikasyonlar HP yapılan grupta daha azdı. Bu nedenle, klinisyenlere SV nedeniyle ameliyat edilen hastalarda HP yapmasını öneriyoruz.

Anahtar Kelimeler: bağırsak volvulusu, cerrahi anastomoz, kolostomi, postoperatif komplikasyonlar

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INTRODUCTION

Sigmoid Volvulus (SV) stands as one of the prominent benign etiologies of mechanical large bowel obstruction, frequently manifesting in the sigmoid colon among the intraperitoneal colon segments.[1] Noteworthy predisposing factors encompass concomitant neurological disorders, advanced age in males, and chronic constipation.[2,3] Non-necrotic colonic segment cases lacking perforation and signs of shock generally warrant colonoscopic detorsion, followed by prompt consideration of open or laparoscopic resection of the sigmoid colon.[4] However, instances presenting acute abdominal symptoms or sigmoid colon segment necrosis following colonoscopic detorsion necessitate surgical interventions such as resection anastomosis (RA), sigmoid colon resection, or the Hartmann procedure (HP) with end colostomy. Practical limitations in cases involving perforation deter the application of resection due to potential anastomotic complications.

Emergency surgical scenarios in SV entail risks of anastomotic leakage, surgical site infections, evisceration, prolonged paralytic ileus, intraoperative and postoperative hemorrhages, all contingent on the chosen surgical approach.[5] Mortality rates of 16.8% and morbidity rates of 34.2% have been documented in patients undergoing emergency surgery for SV.[6] Presently, a lack of definitive evidence prevails concerning the postoperative merits and drawbacks associated with HP and RA procedures. This retrospective investigation endeavors to ascertain the comparative morbidity profiles of HP and RA in the management of SV.

MATERIAL AND METHOD

Patient Selection and study design

A retrospective analysis was conducted encompassing the medical records of all patients who were admitted with a confirmed diagnosis of SV within the timeframe spanning from 2010 to 2022. Among the initial pool of 211 patients subjected to evaluation within the patient database, a total of 86 individuals who had undergone total colectomy, sigmoidopexy, or exhibited incomplete data were subsequently excluded from the study cohort. The study population was limited to patients who had undergone either the HP, constituting Group I, or RA, classified as Group II, as visually depicted in

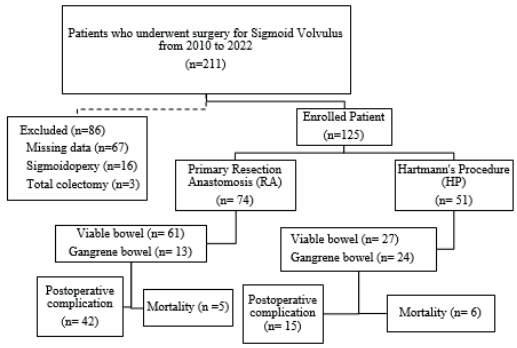

Figure 1. Patient selection and postoperative outcomes.

A comprehensive array of parameters was meticulously gathered during the index hospitalization of the 125 patients who remained eligible for inclusion in the study. These encompassed demographic variables such as age and gender, alongside clinical data encompassing comorbid conditions, ASA scores, Charlson Comorbidity Index (CCI) scores, instances of morbidity and mortality occurring within a 30-day period postoperatively, as well as the duration of hospitalization.

Patient management

Colonoscopic detorsion is employed as the initial intervention in patients diagnosed with SV presenting with normal inflammatory markers, absence of acute abdominal symptoms, and coexisting medical conditions. Subsequently, prior to discharge, patients who have received fluid resuscitation on the ward undergo laparoscopic sigmoid resection anastomosis, with the potential inclusion of diversion ileostomy. However, those with acute abdominal manifestations or evidence of intestinal ischemia during colonoscopic detorsion necessitate immediate surgical intervention. In cases involving contaminated abdomen due to perforation or notable diameter discrepancy in colonic loops observed intraoperatively and perioperatively, the HP is employed.

Complication Classification

Complications are systematically categorized in accordance with the Clavien Dindo (CD) classification. Perioperative complications are subcategorized into five distinct types as follows:[7]

Grade 1: Complications characterized by mild impacts on patient recovery, devoid of life-threatening implications, and amenable to resolution through interventions such as antipyretics, analgesics, antiemetics, diuretics, and physical therapy. Bedside-managed wound infections are encompassed within this classification.

Grade 2: Complications that respond positively to interventions like blood transfusion, total parenteral nutrition, and medical treatments.

Grade 3: Correctable complications that necessitate surgical, endoscopic, or radiological interventions are further divided into two subgroups: 3a, which does not require general anesthesia, and 3b, which mandates general anesthesia.

Grade 4: Subcategorized as 4a and 4b; the former denotes single organ failure warranting intensive care, while the latter signifies multiorgan failure.

Grade 5: Signifies fatalities resulting from complications.

Statistical analysis

Statistical analyses were conducted utilizing the SPSS v23 software package. Data distribution characteristics were assessed utilizing the Kolmogorov-Smirnov test. Continuous variables that exhibited nonparametric distribution were subjected to analysis via the Mann-Whitney U test, and results were reported as medians with corresponding minimum and maximum ranges. Categorical data were subjected to scrutiny using the chi-square test, with presentation involving both frequency and percentage values. Statistical significance was established for intergroup distinctions with a "p" value of <0.05.

Ethical Approvel

The execution of this study received ethical approval from the Scientific Research and Publication Ethics Committee of Inönü University, as evidenced by Decision Number: 2023/4359, dated 24/01/2023.

RESULTS

Among the cohort of 211 patients with available data, 125 were successfully enrolled in the study. Of these, 51 (40.8%) underwent the HP, while 74 (59.2%) underwent RA. The median age (range) for the HP group was 70 (19-86) years, and for the RA group, it was 69 (19-92) years. Of the entire population, 99 (79.2%) were male and 26 (20.8%) were female. In terms of American Society of Anesthesiologists (ASA) classification, 65 (52%) were categorized as ASA 2, 54 (43.2%) as ASA 3, and 6 (4.8%) as ASA 4

Table 1. Demographic data of patients

		Median (min-max)	n(%)
Age, years		69(19-92)	
Sex	Male		99(79.2%)
	Female		26(20.8%)
HT[a]	Absent		105(84.0%)
	Present		20(16.0%)
COPD[b]	Absent		113(90.4%)
	Present		12(9.6%)
DM[c]	Absent		121(96.8%)
	Present		4(3.2%)
CAD[d]	Absent		121(96.8%)
	Present		4(3.2%)
Neurological Disease	Absent		108(86.4%)
	Present		17(13.6%)
ASA	2		65(52.0%)
	3		54(43.2%)
	4		6(4.8%)
Operation Type	HP[e]		51(40.8%)
	RA[f]		74(59.2%)
CCI[g]		3(0-7)	
Gangrene	Absent		88(70.4%)
	Present		37(29.6%)
Morbidity	Absent		57(45.6%)
	Present		68(54.4%)
Mortality	Absent		114(91.2%)
	Present		11(8.8%)
CD[h]	Absent		57(45.6%)
	1		12(9.6%)
	2		22(17.6%)
	3a		2(1.6%)
	3b		14(11.2%)
	4a		7(5.6%)
	4b		0(0.0%)
	5		11(8.8%)

a= Hypertension, b= Chronic obstructive pulmonary disease, c= diabetes mellitus, d= coronary artery disease, e= hartmann procedure, f= resection anastomosis, g= charlson comorbidity index, h= clavien-dindo classification

The prevalent comorbidities within our population were predominantly hypertension (16.0%) and neurological disorders (13.6%). Overall, the morbidity rate was 54.4%, with a corresponding mortality rate of 8.8%. The median Charlson Comorbidity Index (CCI) value was 3 (0-7). Notably, no statistically significant distinctions were observed between the groups concerning age, gender, comorbid conditions, CCI, and ASA classification

Table 2. Relationship between variables according to the operation type

		Operation Type				
		HP[a]		RA[b]		
Variables		Median	n(%)	Median	n(%)	*p*
Age, years		70(19-86)		69(19-92)		
Sex	Male		39(76.5%)		60(81.1%)	0.748*
	Female		12(23.5%)		14(18.9%)	0.378
HT[c]	Absent		44(86.3%)		61(82.4%)	
	Present		7(13.7%)		13(17.6%)	0.565
COPD[d]	Absent		43(84.3%)		70(94.6%)	
	Present		8(15.7%)		4(5.4%)	0.055
DM[e]	Absent		49(96.1%)		72(97.3%)	
	Present		2(3.9%)		2(2.7%)	0.540#
CAD[f]	Absent		49(96.1%)		72(97.3%)	
	Present		2(3.9%)		2(2.7%)	0.540#
Neurological Disease	Absent		41(80.4%)		67(90.5%)	
	Present		10(19.6%)		7(9.5%)	0.104
ASA	2		23(45.1%)		42(56.8%)	
	3		23(45.1%)		31(41.9%)	0.069
	4		5(9.8%)		1(1.4%)	
CCI[g]		3(0-7)		3(0-6)		0.687
Length of stay, days		8(2-30)		10(3-35)		**0.013***
Gangrene	Absent		27(52.9%)		61(82.4%)	
	Present		24(47.1%)		13(17.6%)	**<0.001**
Morbidity	Absent		30(58.8%)		27(36.5%)	
	Present		21(41.2%)		47(63.5%)	**0.036***
Mortality	Absent		45(88.2%)		69(93.2)	
	Present		6(11.8%)		5(6.8%)	0.331
CD[h]	Absent		30(58.8%)		27(36.5%)	
	1		2(3.9%)		10(13.5%)	
	2		8(15.7%)		14(18.9%)	
	3a		0(0.0%)		2(2.7%)	
	3b		2(3.9%)		12(16.2%)	
	4a		3(5.9%)		4(5.4%)	
	4b		0(0.0%)		0(0.0%)	
	5		6(11.8%)		5(6.8%)	**0.048**

a= hartmann procedure, b= resection-anastomosis, c= Hypertension, d= Chronic obstructive pulmonary disease, e= diabetes mellitus, f= coronary artery disease, g= charlson comorbidity index, h= clavien-dindo classification * Mann Whitney U testi, # Fisher's Exact Test, Pearson Chi-square test. p<0.05 was considered statistically significant.

As a perioperative finding, 37(29.6%) patients had colonic gangrene, while 24 of them had HP and 12 had resection anastomosis (p<0.001).

In the context of the CD classification, a notable absence of complications was observed in 30 (70.6%) patients within the HP group. In contrast, complications were noted in 15 (19.4%) patients, with the majority classified as CD2. In the RA group, 36 (48.6%) patients experienced a lack of complications, while 38 (51.4%) patients encountered complications, primarily falling into the CD3b, CD2, and CD1 categories, respectively

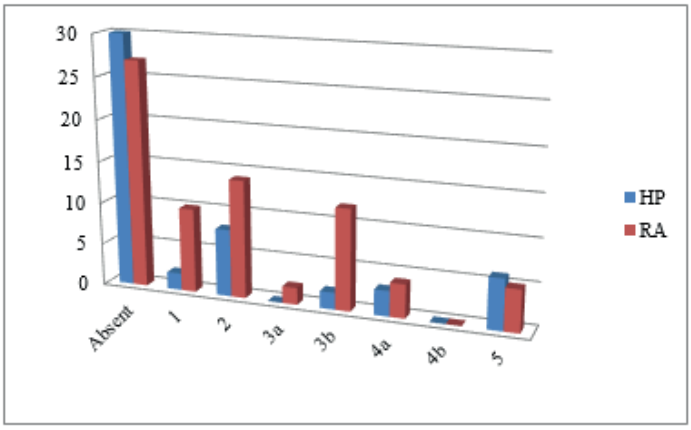

Figure 2. Results of operation types according to CD classification

A statistically significant disparity between the types of surgical

procedures was evident with regard to complication occurrence (p=0.048).

Regarding hospitalization durations, the median length of stay was 8 (2-30) days for the HP group and 10 (3-35) days for the RA group (Table 2). A statistically significant distinction between the groups was observed in terms of length of hospitalization (p=0.013).

DISCUSSION

Within the scope of our investigation, the aggregate morbidity for patients diagnosed with SV who underwent emergent surgical intervention stood at 54.4%, accompanied by a 30-day mortality rate of 8.8%. A comparative analysis of surgical approaches revealed lower morbidity rates and abbreviated hospital stays among individuals subjected to the HP. Nevertheless, no discernible disparities were evident between the groups concerning mortality rates.

SV predominantly manifests within the geriatric demographic, rendering it a condition associated with heightened morbidity and mortality.[8] The presence of complications in such elderly patients engenders escalated mortality rates, augmented morbidities, and protracted hospitalization durations.[9] Consequently, the selection of a surgical approach should prioritize minimizing postoperative complications. In scenarios involving necrosis of the colonic wall, perforation, and peritonitis, the option of resection anastomosis is not recommended.[10] Conversely, patients subjected to the HP exhibited notably truncated hospital stays.[11-12] Notably, no statistically significant disparities emerged between the groups with respect to postoperative complications such as wound infections, evisceration, and paralytic ileus.[12] In our study, a greater incidence of complications was observed in patients who underwent resection anastomosis, thereby contributing to prolonged hospitalization durations.

Notably, within the subset undergoing RA, it is salient to observe a group with a lesser incidence of intestinal gangrene, yet paradoxically displaying a heightened frequency of complications. Moreover, complications were prominently categorized within the CD classification as grade 2, grade 3b, and grade 1, in ascending order of occurrence. Within the RA group, CD grade 3b – necessitating interventional procedures under general anesthesia – and the organ failure states encompassed by CD grade 4a and 4b, mandating intensive care oversight, exhibited a more pronounced prevalence, consequently influencing hospitalization durations. Our findings align with existing literature, as a statistically significant disparity emerged in terms of hospitalization durations between the distinct surgical modalities within our study population.

Atamanalp et al. propose the HP for patients falling under group 3b criteria, characterized by age exceeding 75 years, presence of gangrenous bowel, ASA classification IV-V, and the occurrence of edematous or differentially scaled bowel ends following resection. Conversely, group 3a patients, encompassing those aged below 75 years, presenting with gangrenous bowel, and having ASA classification I-III with normal bowel conditions, are recommended to undergo RA. Morbidity rates for group 3a range between 10-30%, whereas group 3b experiences a notable elevation to 30-60%.

Preoperative patient assessment should conscientiously factor in the presence of comorbidities, with the ASA score serving as an invaluable aid.[6] Evidently, patients with ASA scores of 4 and above, who undergo colectomy for SV, manifest higher rates of postoperative complications.[13] In addition to age and ASA scores, no discernible variance was detected between surgical approaches in terms of postoperative complications in the management of SV.[13-15]

However, within our study cohort, both the ASA score and age did not exhibit a negative predictive influence on the choice of surgical techniques. Moreover, despite the higher prevalence of gangrene within the HP group, a greater frequency of complications was observed in the RA group. In a separate investigation assessing the immediate outcomes of SV treatment, resection anastomosis emerged as the sole independent risk factor contributing to surgical complications.[16]

In contrast to our study findings, a randomized controlled trial revealed that RA could be favored over the HP in instances of fecaloid or purulent peritonitis, patients below the age of 85, and when hemodynamics are considered in the context of surgical techniques.[17]

CONCLUSION

While minimally invasive interventional procedures align with the principles outlined in the sigmoid volvulus guidelines, certain clinical situations necessitate prompt surgical intervention. Given the notable morbidity and mortality associated with the ailment, surgical modalities characterized by minimal morbidity should be prioritized. Consequently, we advocate that clinicians consider the Hartmann Procedure as a favored approach.

Conflct of Interest

The authors declare that there is no conflict of interest. There is no financial support from any institution or person for the study.

Author Contrbutons

CC: Concept, data analysis and interpretaton, drafting the article, writing, critical review HK: Data collection, NTB: Supervision , KS: Data collection, YSA: Literature research, CA: Literature research

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