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Transanal Specimen Extraction After Laparoscopic Sigmoidectomy for Sigmoid Volvulus

Sigmoid Volvulus Hastalarında Laparoskopik Sigmoidektomi Sonrası Transanal Spesmen Çıkarımı

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ABSTRACT

Objective: Sigmoid resection can be performed using conventional and laparoscopic methods. Specimen removal from the natural orifice after laparoscopic surgery is increasingly preferred. This approach can reduce wound complications and the length of hospitalization. In this study, we present the results from cases of sigmoid volvulus treated with laparoscopic surgery and transanal specimen removal.

Methods: A retrospective analysis was performed on eight cases in which patients diagnosed with sigmoid volvulus underwent elective laparoscopic sigmoid colon resection and transanal specimen extraction. The patients were evaluated in terms of age, gender, comorbidities, operation time, surgical difficulties, length of hospital stay, and complications.

Results: Laparoscopic sigmoid resection and transanal specimen extraction were performed on eight patients. All patients were male, and the median age was 68 years (28-86 years). Five of the patients had comorbidities. The median operative time was 195 minutes (180-360). Transanal specimen extraction was successful in all patients. Anastomotic leakage occurred in one patient and subileus occurred in two patients. The median hospital stay was 5.5 days (3-21).

Conclusion: Transanal specimen extraction after laparoscopic resection is an easy, feasible, and safe method. Sigmoid volvulus is the ideal disease for the application of this procedure because it does not involve mass-like lesions such as tumors and diverticula.

Keywords: Colon, surgery, laparoscopy, sigmoid volvulus, natural orifice

Öz

Amaç: Sigmoid rezeksiyon konvansiyonel ve laparoskopik yöntemlerle yapılabilmektedir. Literatürde sigmoid volvulus tanılı hastalarda doğal delikten spesmen çıkarımı bildirilen az sayıda yayın mevcuttur. Biz burada sigmoid volvuluslu hastalarda yapılacak laparoskopik cerrahi sonrasında transanal spesmen çıkarımının teknik olarak uygulanabilir bir yöntem olduğunu literatüre sunmayı amaçladık.

Yöntemler: 2018 ile 2019 tarihleri arasında sigmoid volvulus nedeniyle opere edilen hastaların dosyaları geriye dönük olarak tarandı. Elektif laparoskopik sigmoid kolon rezeksiyonu uygulanarak spesmen çıkarımı için transanal kullanılan olgular çalışmaya alındı. Hastalarda cinsiyet, yaş, komorbidite, operasyon süresi, operatif zorluklar, komplikasyonlar, yatış süresi ve mortalite bulguları analiz edildi.

Bulgular: Toplam sekiz hastaya laparoskopik sigmoid rezeksiyon ve transanal spesmen çıkarımı uygulandı. Olguların hepsi erkek olup, median yaş 68 (28-86) idi. Hastaların %62,5 da komorbidite mevcuttu. Operasyon süresi 195 dk. (180-360) idi. Hastaların hiçbirinde yara yeri enfeksiyonu görülmedi. Anastomoz kaçağı bir hastada görüldü. Hastanede yatış süresi median 5,5 gün (3-21) idi.

Sonuç: Doğal delikten spesmen çıkarımı cerrahisi giderek artan sıklıkla tercih edilmektedir. sigmoid volvulusta kolon çapı geniş olduğundan dolayı doğal delik cerrahisinin daha kolay ve güvenilir bir şekilde yapılabileceğini düşünmekteyiz.

Anahtar Sözcükler: Kolon, ameliyat, laparoskopi, sigmoid volvulus, doğal delik

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INTRODUCTION

Sigmoid volvulus is an important problem, especially in the elderly population. Unfortunately, surgical resection of the redundant sigmoid colon is currently the only radical treatment option. Emergency and elective colon surgery is always high risk in this elderly population, and the less invasive the treatment, the better. Endoscopic derotation is the first treatment approach in patients presenting with volvulus. Afterward, the sigmoid colon is removed with minimally invasive surgery under elective conditions.

The advantages of laparoscopic surgery are also seen in patients with sigmoid volvulus, with shorter hospital stays and lower morbidity compared with open surgery (1). However, in laparoscopic approaches, specimen extraction necessitates either widening of the existing incision or the creation of an extra incision. These alterations may cause complications, such as increased wound infection and incisional hernia (2,3). The advantage of natural orifice specimen extraction (NOSE) after laparoscopic surgery is that no extra incision is required for specimen removal. Additionally, patients' pain and length of hospital stay are reduced with NOSE (4,5). However, natural orifice surgery is still rarely performed in patients with sigmoid volvulus. This study evaluates the potential advantages of NOSE in patients undergoing elective surgery for sigmoid volvulus.

MATERIALS AND METHODS

The retrospective study was conducted at Inonu University's Faculty of Medicine and at the Gastroenterology Surgery Clinic at Gaziantep Dr. Ersin Arslan Training and Research Hospital. The research was conducted in accordance with the ethical standards of the 1964 Helsinki declaration and its later amendments, or comparable ethical standards. The study was approved by the Gaziantep University Ethics Committee (decision number: 2020/178, date: 02.07.2020) and registered in an international database (ClinicalTrials.gov NCT04740619). The files of surgical patients with sigmoid volvulus at İnönü University Faculty of Medicine and Gaziantep Dr. Ersin Arslan Training and Research Hospital from November 2018 to September 2019 were retrospectively reviewed. Patients with missing data and those who underwent emergency or conventional, open and laparoscopic sigmoid resections were excluded from the study. The patients' gender, age, comorbidities, operation times, operative challenges, complications, duration of hospital stay, morbidity, and mortality data were analyzed.

Statistical Analysis

Statistical analyses were performed using SPSS v.22.0 (IBM, Armonk, N.Y., USA). Quantitative variables were expressed as means $\pm$ standard deviation (SD), a median, and a range. Qualitative variables were reported as numbers and percentages (%). The means and SD were recorded for homogeneous distributions, while medians and ranges were recorded for heterogeneous distributions. Qualitative variables were compared using Fisher's exact test. Heterogeneous distributions were analyzed using the Mann-Whitney U test, and homogeneous distributions with the Student's t-test. A p-value of less than 0.05 was considered statistically significant.

Surgical Technique

Informed consent was obtained from patients, and elective operations were scheduled after successful derotation. Because the patients were operated on after endoscopic derotation, only a rectal enema was performed before the surgery. Subcutaneous low molecular weight heparin (0.1 mg/kg) was administered preoperatively. A single dose of third-generation cephalosporin (1 g, IV) and metronidazole (500 mg, IV) was administered one hour before the operation for antibiotic prophylaxis. The patient was taken to the operating table in the lithotomy position, and fixed to prevent falling. General anesthesia was then administered. An incision was made under the umbilicus to place a 12 mm trocar. A pneumoperitoneum was created using a Veress needle. A total of four trocars were used. The 30-degree camera trocar was inserted when intra-abdominal pressure reached 12-15 mmHg. Then, two main 5 mm, and 12 mm trocars were placed in the right paracolic area. An assistant trocar was placed in the left paracolic area. The sigmoid colon was resected, preserving the mesentery, toward the distal end of the colon, descending to 5 cm above the peritoneal reflection. The staple line on the distal rectal stump was opened, and the stump walls were held open with a grasper (Figure 1). Resection of the sigmoid colon was aided by a clamp inserted through the anal canal and into the lumen. The specimen was retrieved through a transanal approach. (Figure 2). A 31-33 mm circular stapler was placed via the anus, and then the anvil was taken into the abdomen, and the shaft removed. The open rectal stump was closed again, with a stapler. The anvil was inserted at the end of the proximal colon through the stapler line, and the open area was closed with a stapler. The resected stapler lines were removed through the trocar using an endo bag. In seven of the eight patients, a side-to-end anastomosis was performed with a circular stapler, while in only one patient, the anastomosis was performed side-by-side with a linear stapler. The stapler opening was closed with 3-0 polypropylene. In most of the patients a 32F rectal tube was placed at the proximal end of the anastomosis. Following an air leakage test, the operation was completed by placing a drain. The rectal tube was removed on the third postoperative day.

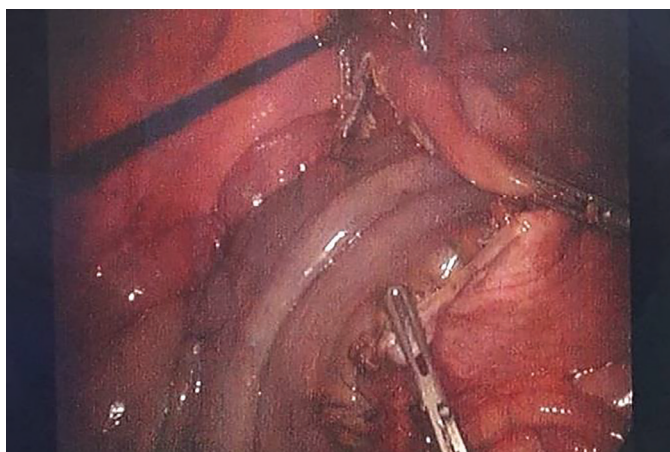


Figure 1. Extraction of the specimen from the rectal lumen.

RESULTS

Laparoscopic sigmoid resection and transanal specimen extraction were performed on a total of eight patients. All patients were male, with a median age of 68 (range =28-86) years. Comorbidity was present in 62.5% of the patients (Table 1). The median operation time was 195 min. (range =180-360). Operative challenges were encountered in two (25%) patients. In one case, there was an exploration problem due to colon dilatation, which resulted in the longest operation time (360 min.). In the second case, difficulties were encountered during surgery when attempting to insert an anvil into the proximal colon. This led to fecal contamination, which necessitated a colotomy. Postoperative complications occurred in three (37.5%) patients. In one patient, this complication was an anastomotic leak, which manifested as a fistula from the trocar site. The problem was resolved with conservative treatment. The complication in the other two patients was the development of subileus. One of these patients required further surgery seven days after the original operation, during which a procedure known as milking was performed. The other patient with subileus recovered with conservative follow-up. Wound infection was not observed in any of the patients.

The median length of hospitalization was 5.5 (range =3-21) days. The length of hospitalization for the subileus patient treated conservatively, the subileus patient treated by reoperation, and the patient who developed anastomotic leakage was 10 days, 12 days, and 21 days, respectively. None of the remaining five patients stayed in the hospital for more than six days. No mortality occurred during postoperative hospitalization. However, one (12.5%) of the patients died in the fourth month after surgery due to myocardial infarction.



Figure 2. Extraction of the specimen from the anal canal.

DISCUSSION

The results indicate that laparoscopic sigmoid colon resection and transanal specimen extraction are straightforward and feasible in elective sigmoid volvulus surgery. Clinical studies and case reports have supported the application of NOSE surgery in colorectal cases, including in patients with sigmoid volvulus (6-10). A study of sigmoid resection with transvaginal Natural Orifice Transluminal Endoscopic Surgery was also reported. (11). In addition, a clinical trial of NOSE surgery performed in six patients with sigmoid volvulus was reported in the most recent publication (12). Open surgery, conventional laparoscopic surgery, and single-port laparoscopic resection can all be used to treat sigmoid volvulus (2). However, in laparoscopic approaches, either the incision needs to be enlarged or an extra incision needs to be created for specimen extraction. These incisional alterations may lead to complications such as increased wound infection and incisional hernia (3,13). The greatest advantage of NOSE after laparoscopic surgery is that no extra incision is needed for specimen extraction. This surgical method is being increasingly accepted by surgeons because the comfort and aesthetic outcome for the patient is more favorable. Because the specimen extraction is performed through a transanal approach, the patient requires only the trocar site incisions (Figure 3). Trocar site herniation after elective laparoscopic colon surgery has been reported at rates of 1.5-2.9% (14,15). The incidence of incisional hernia was reported as 5.2% at 1-year follow-up and 8.5% at 4-year follow-up after laparoscopic colorectal surgery (16). In our study, incisional hernias were not observed because the specimens were extracted using the transanal approach and incisions were not needed.

NOSE has been used to treat both benign and malignant disease, and similar oncological results have been reported as with other methods, and therefore, the popularity of NOSE is increasing (17).

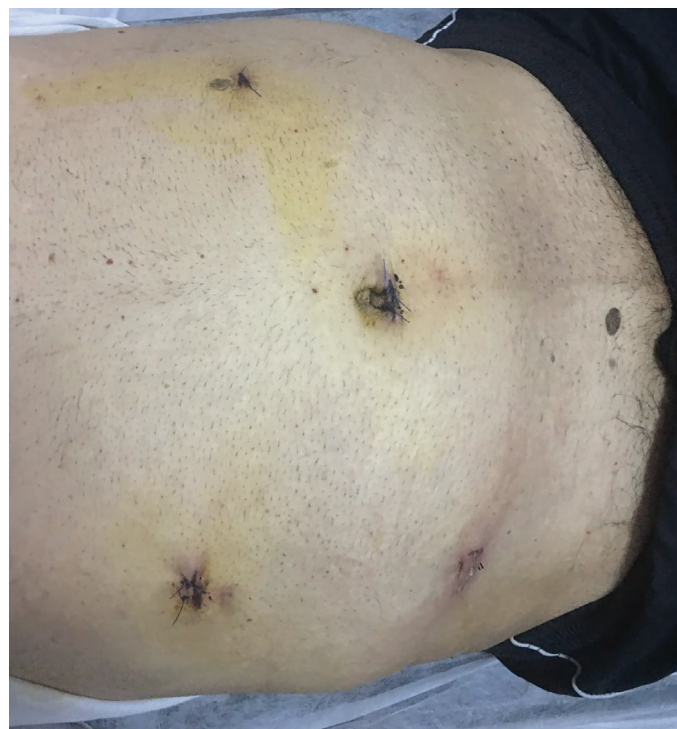


Figure 3. Postoperative trocar incision sites.

Table 1. Demographic, clinical, and surgical patient data

Patients features	1	2	3	4	5	6	7	8
Age	79	86	79	67	28	43	67	68
Gender	Male	Male	Male	Male	Male	Male	Male	Male
Comorbidity	HT, Alzheimer's disease	None	None	None	Epilepsy	Epilepsy, MR	None	HT, CAHD
Anastomosis	SECS	SECS	SSCS	SECS	SECS	SECS	SECS	SECS
Operative challenges	None	None	Exploration trouble	None	Fecal contamination	None	None	None
Rectal tube	No	Yes	Yes	No	Yes	Yes	Yes	No
Operation time (minutes)	180	240	360	180	240	210	180	180
Postoperative complication	None	Anastomotic leakage	Paralytic ileus	None	None	Ileus	None	None
Duration of hospitalization (days)	3	12	10	6	5	21	4	4
Mortality	None	None	None	None	None	None	None	None

SECS: Side to end circular stapler, SSCS: Side to side circular stapler, MR: Mental retardation, HT: Hypertension, CAHD: Coronary artery disease

In female patients, both transvaginal and transanal extraction methods are equally preferred by clinicians. While transvaginal extraction is recommended for larger masses, transanal extraction is recommended for smaller masses due to its suitability for the smaller diameter of the anal lumen (18). Because both ends of the colon are closed in transvaginal extraction, the risk of fecal contamination is very low; however, since the colon must be temporarily opened for specimen extraction, fecal contamination may still occur. Patience and caution are required in this regard.

In a sigmoid volvulus specimen extraction reported by Sia et al. (9) a nylon band was applied to prevent contamination while transecting the colon, and specimen extraction was performed with a modified Alexis retractor. To create end-to-end anastomosis, a purse-string suture was used for anvil placement. When difficulties were encountered in extracting the specimen, the author suggested splitting the colon. In our procedure, we transected the colon with a linear stapler. After pushing the anvil into the colon, we placed it so that the anvil protruded from the sidewall, not from the colon end. Our colon anastomosis was therefore side-to-end. We used the mesenteric division technique to efficiently remove the specimen (19). In addition, we used a camera sleeve, similar to the one used in laparoscopy, instead of an incision protector to remove specimens (20).

In laparoscopic colorectal surgery, specimen extraction from the natural orifice is a more complex procedure than the conventional laparoscopic method of specimen extraction. With increased experience of the surgeon, the procedure can be easily performed in most patients. In our experience, the opening of the distal rectal stump and the placement of the anvil were the most challenging and time-consuming parts of this method. However, serious operational difficulties were encountered in only two of our patients. These conditions were the difficulty of exploration due to dilatation in the proximal intestines, and the difficulty experienced during anvil placement. Despite this, we completed these two operations without the need for conversion to other methods.

In the Anastomotic Leakage After Colon Cancer Surgery study, 8% of patients who underwent colectomy had anastomotic leakage,

and 80% of these patients required reoperation (21). It has been reported that no complications, mortality, or wound infection were observed in three patients who underwent natural hole surgery to treat sigmoid volvulus (10-12). In our study, anastomotic leakage developed in one patient, who did not require reoperation. Perioperative mortality was not observed, although one patient died due to myocardial infarction in the fourth month after surgery.

Surgical site infection rates are as high as 14% to 26% after colorectal surgery (22). In a cohort study, surgical site infection was 8.2% and 4.1% in open and laparoscopic sigmoidectomies, respectively (23). However, in a study comparing conventional and natural specimen extraction during laparoscopic surgery for colorectal cancer, no significant difference was found between the two methods regarding frequency of wound infection (24). Perioperative wound infection was not observed in the patients in our study. The mean length of hospital stay for patients who underwent laparoscopic sigmoid resection for sigmoid volvulus was reported as 7±1 days (25). There are insufficient data on the effect of NOSE surgery on the length of hospital stay in colorectal cancer (24,26). In our study, the median hospital stay was 5.5 (3-21) days. It was determined that the management of the three patients who developed complications prolonged the average length of stay. Except for these three patients, the maximum hospital stay was six days.

In our previous study, we reported a success rate of 2/3 in transanal specimen extraction after laparoscopic colon resection (27). However, because there is no mass present in the rectosigmoid colon in patients with sigmoid volvulus, specimen extraction by the transanal approach is straightforward. All patients in our study were male, and, while a narrow pelvis could be a challenge for transanal specimen extraction in NOSE, we experienced no difficulty removing the colon segments.

Study Limitations

Our study has limitations as it is retrospective and includes a small number of patients. However, we think that the results of this study, which was conducted with a homogeneous patient group, will contribute to the literature.

CONCLUSION

The laparoscopic approach is frequently preferred in elective sigmoid volvulus surgery. Colon diameter is larger in sigmoid volvulus than in other diseases, which provides an advantage for NOSE procedures. In the treatment of sigmoid volvulus with laparoscopic surgery, transanal specimen extraction is an easy and safe method.

Ethics

Ethics Committee Approval: The study was approved by the Gaziantep University Ethics Committee (decision number: 2020/178, date: 02.07.2020).

Informed Consent: Retrospective study.

Footnotes

Authorship Contributions

Surgical and Medical Practices: U.U., F.S., C.K., Concept: U.U., Design: U.U., F.S., Supervision: F.S., C.K., Resources: U.U., R.G., Material: U.U., C.K., F.S., Data Collection or Processing: U.U., R.G., Y.M.B., A.A., Analysis or Interpretation: U.U., A.A., C.K., Literature Search: U.U., F.S., Y.M.B., A.A., Writing: U.U., R.G., Y.M.B., A.A., Critical Review: C.K., F.S.

Conflict of Interest: No conflict of interest was declared by the authors.

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