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RESEARCH ARTICLE

Does the Long Duration of Defunctioning Stoma Lead to Increased Rates of Coloanal Anastomosis Stenosis?

Uzun Süreli Saptırıcı Stoma, Koloanal Anastomoz Darlığının Artmasına Neden Olur Mu?

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ABSTRACT

Aim: The aim of this study was to evaluate whether the long duration of defunctioning stoma was associated with increased rates of coloanal anastomosis stenosis.

Method: Medical records of all adult patients diagnosed with rectal cancer and who underwent low anterior resection and defunctioning stoma at two centres were retrospectively analysed. All patients underwent colonoscopy to evaluate the coloanal anastomosis state. The primary outcomes of this study were evaluation of the rate of anastomotic stenosis and comparison of the durations between patients with anastomotic stenosis and those without stenosis.

Results: Between April 2009 and December 2017, 72 patients with rectal cancer underwent resection with defunctioning stoma at two centres, and 69 of them were included in this study. The median patient age was 65 (28-92) years. Defunctioning ileostomy was performed in 50 (73%) patients, whereas defunctioning colostomy was performed in 19 (27%) patients. The median stoma duration of the patients with anastomotic stenosis (n=19) was significantly longer than that of patients without stenosis (n=50) [at 15 (7-41) and 7 (2-25) months, respectively, p=0.002].

Conclusion: This study showed that a long duration of defunctioning stoma was associated with increased rates of coloanal anastomosis stenosis.

Keywords: Anastomosis stenosis, defunctioning stoma, low anterior resection

ÖZ

Amaç: Bu çalışmanın amacı, uzun süreli saptırıcı stomanın artmış koloanal anastomoz darlığı oranları ile ilişkili olup olmadığını araştırmaktır.

Yöntem: Rektal kanser tanısı alan ve iki merkezde düşük anterior rezeksiyon ve saptırıcı stoma uygulanan tüm erişkin hastaların tıbbi kayıtları retrospektif olarak incelendi. Koloanal anastomoz durumunu değerlendirmek için tüm hastalara kolonoskopi yapıldı. Bu çalışmanın birincil çıkarımları, anastomoz darlığı oranının değerlendirilmesi ve anastomoz darlığı olan hastalar ile darlığı olmayanlar arasındaki sürelerin karşılaştırılmasıydı.

Bulgular: Nisan 2009 ile Aralık 2017 tarihleri arasında 72 rektum kanserli hastaya iki merkezde aşağı anterior rezeksiyon ile beraber saptırıcı stoma yapıldı ve bunlardan 69'u bu çalışmaya dahil edildi. Hastaların ortalama yaşı 65 (28-92) ve 50 (%73) hastaya saptırıcı ileostomi yapılırken, 19 (%27) hastaya saptırıcı kolostomi uygulandı. Anastomoz darlığı olan hastaların (n=19) ortanca stoma süresi, darlığı olmayan hastalardan (n=50) anlamlı olarak daha uzundu [sırasıyla; 15 (7-41) ve 7 (2-25) ayda, p=0,002].

Sonuç: Bu çalışma, uzun süreli saptırıcı stomanın artmış koloanal anastomoz darlığı oranları ile ilişkili olduğunu göstermiştir.

Anahtar Kelimeler: Anastomoz darlığı, saptırıcı stoma, aşağı anterior rezeksiyon

What does this paper add to the existing literature?

Coloanal anastomosis stenosis is thought to be associated with various factors. This study aimed to evaluate whether a long duration of defunctioning stoma was associated with increased rates of coloanal anastomosis stenosis. We showed that the long duration of stoma was associated with increased rates of coloanal anastomosis stenosis. Therefore, early closure of stoma should be considered.

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Introduction

Anastomotic leak is one of the serious early complications observed after low anterior resection with coloanal anastomosis. These leaks are associated with increased morbidity and mortality.[1,2] The incidence of anastomotic leaks following low anterior resections is 3%-26%.[3,4,5] Therefore, most surgeons prefer to perform defunctioning stoma to protect patients against septic complications of anastomotic leaks. However, defunctioning stoma has been associated with complications such as stomal ischaemia/necrosis, retraction, mucocutaneous separation, parastomal abscess, parastomal hernia and prolapse.[6] Furthermore, defunctioning stoma requires additional operation for closure. Anastomotic stenosis is a late complication associated with coloanal anastomosis that may require endoscopic dilatation or surgical revision, particularly before the stoma closure, if present.

The incidence of stenosis after colorectal anastomosis ranges from 0% to 30%.[7] These stenoses are thought to be associated with various factors, such as radiation[8], anastomotic ischaemia, leakage[9] and anastomosis technique. We hypothesised that a long duration with defunctioning stoma may be another factor contributing to coloanal anastomosis stenosis.

This study aimed to evaluate whether a long duration of defunctioning stoma was associated with increased rates of coloanal anastomosis stenosis.

Materials and Methods

Medical records of all patients diagnosed with rectal cancer who underwent low anterior resection and defunctioning stoma at two centres between 2009 and 2017 were retrospectively analysed. Patients with inflammatory bowel disease and those who were lost to follow-up were excluded from the study. Colonoscopy was performed in all patients who underwent stoma closure to evaluate the coloanal anastomosis before the stoma closure. Those who are still living with a stoma were invited to the hospital, and colonoscopy was performed to evaluate the coloanal anastomosis. The duration of stoma was defined as the time from the index operation to control colonoscopy before the stoma closure or the time from the index operation up to the last control colonoscopy in patients who did not undergo stoma closure. Anastomotic stenosis was defined as the narrowing in which the colonoscope could not pass through the coloanal anastomosis. Patients' demographic characteristics, comorbid diseases and whether they underwent chemoradiotherapy were retrospectively analysed. The primary outcomes were to evaluate the coloanal anastomosis stenosis rate and compare the durations between patients with anastomotic stenosis and those without stenosis. The secondary outcome was to compare other factors that contributed to the anastomotic stenosis between the two groups.

This study was approved by Marmara University Faculty of Medicine Ethics Committee, and all patients provided written informed consent.

Statistical Analysis

Data were analysed using the Statistical Package for Social Sciences for Windows version 23 (SPSS Inc., Chicago, IL, USA). Analysis was performed using the t-test or Mann-Whitney U test for continuous data and Fisher's exact test or the chi-square test for categorical data. All tests were two-sided, and p values <0.05 were considered significant.

Results

Between April 2009 and December 2017, 72 patients with rectal cancer underwent low anterior resection with defunctioning stoma at two centres. Three patients were lost to follow-up, and a total of 69 patients were included in this study. The median patient age was 65 (28-92) years, and 61% (n=42) were men. All patients undergo surgery for rectal tumour. Neoadjuvant radiotherapy was administered in 24 (35%) patients. The total mesorectal excision technique with coloanal anastomosis using circular stapler 31-4.8 mm was performed in all patients. The index operation was performed laparoscopically in 21 (30%) patients. Defunctioning ileostomy was performed in 50 (73%) patients; however, defunctioning colostomy was performed in 19 (27%) patients. Moreover, 45 (65%) patients underwent adjuvant chemotherapy, and 12 (17%) patients underwent concomitant adjuvant radiotherapy (Table 1). In total, 36 (52%) patients received radiotherapy either before or after surgery. Stoma closure was performed in 61 (90%) patients. Control colonoscopy revealed coloanal anastomosis stenosis in 19 (28%) patients. The median stoma duration of patients with anastomotic stenosis was significantly longer than that of patients without stenosis [15 (7-41) and 7 (2-25) months, respectively, p=0.002] (Table 2).

Age, gender, comorbidity, neoadjuvant chemoradiotherapy, smoking and alcohol consumption between the two groups were not significantly different (Table 2). Successful dilatation was achieved in 12 (63%) of the 19 patients with anastomotic stenosis after performing balloon dilatation. Of these 12 patients, 7 (58%) underwent stoma closure thereafter. Re-resection and re-anastomosis were performed in four (57%) of seven patients with dilatation failure, and 10 (14%) patients have permanent stoma (Figure 1).

Discussion

Coloanal anastomotic stenosis is thought to be associated with various factors, such as radiation[8], anastomotic ischaemia, leakage[9] or anastomosis technique. In this study, we hypothesised that a long duration with defunctioning stoma may be another factor contributing to coloanal anastomosis stenosis. We found that the median stoma duration in patients with anastomotic stenosis was significantly longer than that in patients without stenosis (p=0.002).

Anastomotic stenosis is not uncommon after coloanal anastomosis. Furthermore, whether anastomotic stenosis is associated with defunctioning stoma remains unclear.

This study fills this gap in research and highlights the less discussed issues in clinical practice. To the best of our knowledge, this is the first study to investigate and address

Table 1. Patients' demographic and clinical characteristics (n=69)

Age [median (min-max)]	**65 (28-92)**
Gender	
Male Female	61% (n=42) 39% (n=27)
Neoadjuvant radiotherapy	35% (n=24)
Adjuvant radiotherapy	17% (n=12)
Laparoscopic resection	30% (n = 21)
Type of defunctioning stoma	
Loop ileostomy Loop colostomy	73% (n=50) 27% (n=19)
Median stoma duration	7 (2-25) months
Anastomotic stenosis	27% (n=19)
Balloon dilatation	17% (n=12)
Re-resection	1.5% (n=1)

min: Minimum, max: Maximum

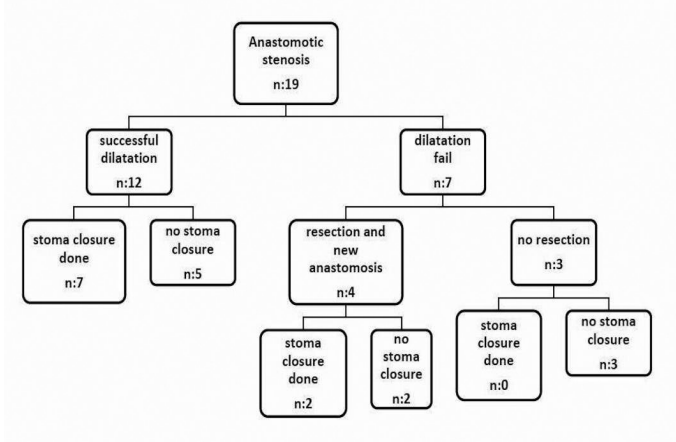


Figure 1. Outcomes of patients with anastomotic stenosis

Table 2. Comparison of the treatment groups according to coloanal anastomosis stenosis

	Patients with anastomosis stenosis (n=19)	No stenosis (n=50)	p value
Age	61 (36-73)	66 (28-92)	0.05
Gender			
Male Female	12 (63%) 7 (37%)	30 (60%) 20 (40%)	1.0
Neoadjuvant radiotherapy	3 (16%)	21 (42%)	0.05
Adjuvant radiotherapy	6 (31%)	6 (12%)	0.08
Adjuvant chemotherapy	11 (58%)	35 (70%)	0.3
Median stoma duration	15 (7-41)	7(2-25)	0.002
Comorbidity			
DM HT CAD CRF	3 (16%) 3 (16%) 2 (%11) 0 (0%)	13 (68%) 18 (95%) 3 (16%) 3 (16%)	0.5 0.15 0.6 0.6
Smoking	9 (47%)	19 (38%)	0.6
Alcohol consumption	0 (0%)	4 (0.8%)	0.6

DM: Diabetes mellitus, HT: Hypertension, CAD: Coronary artery disease, CRF: Chronic renal failure

this issue. According to our findings, early closure of the defunctioning stoma is recommended to prevent increased coloanal anastomosis stenosis rates. Although some studies have emphasised the median duration of a stoma, the importance of this period has not been demonstrated and thus remains ambiguous. We believe that this ambiguity has been addressed in our study, and we hope that this result can help surgeons select the appropriate strategies in the future.

However, the retrospective design, small number of patients and loss to follow-up of some patients are considered limitations of this study. This study was planned after a clinical observation that the coloanal anastomosis stenosis rate appears to be higher in patients with long duration of defunctioning stoma. This stenosis can be explained by the loss of the continuous dilatation effect of stool passage through the anastomosis, whereas the defunctioning stoma remains *in situ*. Although several factors, including radiotherapy, were investigated, the stoma duration was the only significant factor between the two groups in the study. This indicates that the duration is an independent factor that affects stenosis as much as or more than radiotherapy. Because this factor can be prevented easily by early stoma closure, it may have a big effect on our practice in dealing with defunctioning stoma.

Previous studies have reported various stoma durations based on different factors. Sier et al.[10] evaluated possible predictors of prolonged interval between the construction and reversal of defunctioning stoma. They showed that age, end ileostomy, higher body mass index and preoperative radiotherapy were independent factors for non-reversal.[10] However, they did not investigate the stoma duration as a potential risk factor for anastomotic stenosis that may lead to non-reversal. Several prospective studies have shown that closure in less than 2 weeks was associated with lower or equal morbidity compared with later closure.[11,12] In our study, this period was 7 months. The long duration was due to post-operative adjuvant chemotherapy, and some patients preferred late closure and others were afraid of closure complications; therefore, they preferred to keep the stoma. We think that the main cause of longer stoma duration (median stoma time of 15 months) in patients with stenosis is the permanent stoma, as observed in 10 patients who have not undergone stoma closure during follow-up. Furthermore, dilatation procedures lead to further delay of stoma closure in patients with stenosis. However, most of the cases of late closures in this study are due to patient preference, overcrowded workload of the medical institution or recommendation of some surgeons to wait up to 2 years after surgery to guarantee a disease-free status in that time.

Because the stoma duration was defined as the time between the index operation and control colonoscopy, colonoscopy was performed after the index operation in different intervals among patients during adjuvant treatments or as per patients' preferences. The incidence of stenosis after coloanal anastomosis ranges from 0% to 30%.[13,14] In this study, stenosis was observed within this range; however, it was relatively high (27%), which can be explained by the long duration as the single significant independent factor that affects the stenosis. Beamish et al.[15] showed that loop ileostomy-associated faecal stream diversion results in intestinal dysbiosis and likely influences the development of impaired intestinal function. This can be the factor triggering stricture.[15] Diversion colitis is invariably present in all diverted segments of the colon. It is usually asymptomatic but can present with tenesmus, rectal discharge, bleeding per rectum and abdominal pain. Major macroscopic changes include mucosal nodularity, erythema and friability. Microscopic features are predominantly those of lymphoid follicular hyperplasia, apthous ulceration and chronic inflammatory changes. We think that such chronic inflammatory changes may be a predisposing factor for stenosis.[16]

Study Limitations

In this study, the median stoma duration was long; therefore, exposure to trigger factors was higher. In this study, all anastomoses were performed using a stapled technique. The medical literature has shown that neither stapled technique nor handsewn methods for colorectal anastomosis would be superior particularly for anastomotic stenosis.[17] Previous studies have reported the negative effects of neo/adjuvant radiotherapy on anastomosis. Qin et al.[18] investigated clinical features and risk factors of surgical complications after intersphincteric resection for low rectal cancer following neoadjuvant chemoradiotherapy in 132 patients. Their results showed that radiation colitis was an independent prognostic factor of anastomotic leakage post-operatively and that anastomotic leakage was an independent prognosis factor of anastomotic stenosis post-operatively.[18] In a comprehensive study by Matthiessen et al.[19], risk factors for anastomotic leakage after an anterior rectal resection were investigated. The obtained result confirmed that preoperative radiotherapy is a risk factor for anastomotic leakage and hence anastomotic stenosis.[19] In our study, this effect was found to be borderline, which may be related to the small number of patients included. Hiranyakas et al.[20] investigated possible factors associated with post-operative colorectal anastomotic stenosis and found that the majority of patients who had anastomotic stricture were men (79%).

This may be related to technical difficulties in performing anastomosis in the deep narrow male pelvis.[20] This ratio was 89% in a study by Sun et al.[21]. In our study, the majority of patients with anastomotic stenosis were men (63%). However, no significant difference in gender was found between patients with and without anastomotic stenosis. None of the previous studies have investigated the effect of long stoma duration on coloanal anastomosis stenosis.

Some studies have supported the early closure of the stoma. They reported that a temporary ileostomy can be closed immediately after the first operation and was associated with low morbidity and mortality.[22,23,24] There is no consensus regarding the timing of defunctioning stoma colsure after low anterior resection. However, early closure is recommended in recent studies.[25]

Furthermore, Choi et al.[26] reported that ileostomy closure during adjuvant chemotherapy was clinically safe, and interruption of chemotherapy due to ileostomy closure did not change oncologic outcomes. A recent randomised controlled trial showed that early stoma closure does not carry an increased risk of post-operative complications, reduces cost towards stoma care and leads to better a quality of life.[27] Thus, an overall trend is toward early closure of temporary ileostomy, which is recommended in suitable patients. Stenosis is a late complication of coloanal anastomosis occurring after a long period. Thus, early functioning of the anastomosis should be considered a way to prevent stenosis. Further prospective studies with large number of patients are needed.

Conclusion

This study showed that the long duration of defunctioning stoma was associated with increased coloanal anastomosis stenosis rates. Because this factor can be prevented by early stoma closure, it should be considered in clinical practice, and surgeons should promote closure of defunctioning stoma as early as possible.

Ethics

Ethics Committee Approval: This study was approved by Marmara University Faculty of Medicine Ethics Committee.

Informed Consent: Obtained.

Peer-review: Externally and internally peer reviewed.

Authorship Contributions

Surgical and Medical Practices: H.B., W.A., İ.T., Concept: H.B., W.A., Design: H.B., W.A., Data Collection or Processing: H.B., W.A., Analysis or Interpretation: H.B., W.A., İ.T., Literature Search: H.B., W.A., Writing: H.B., W.A.

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