

# Complicated or not complicated: Stoma site marking before emergency abdominal surgery

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## ABSTRACT

**BACKGROUND:** Marking a stoma site preoperatively decreases the possibility of experiencing later stoma-related problems and improves the quality of life of patients in the postoperative period. Those best equipped to perform this procedure are ostomy nurses and colorectal surgeons, as they receive the stoma therapy education during their training programs. The aim of this study was to compare the rate of stoma problems and quality of life of patients who underwent an operation that included stoma creation (elective or urgent) with and without preoperative stoma siting. The approach and behavior of surgical residents regarding stoma creation was also assessed.

**METHODS:** Patients who had undergone gastrointestinal surgery between January 2012 and December 2013 were assessed. A total of 116 of those patients who had a stoma created during the initial operation were followed by a stoma therapy nurse in the postoperative period and were enrolled in the current study. In addition, a survey of the residents was conducted to evaluate their knowledge about stoma creation and stoma care.

**RESULTS:** A total of 67 (58%) of the 116 patients included were male. The median age was 57±16 years (range: 17–87 years). A body mass index above 30 kg/m<sup>2</sup> was detected in 16 patients (14%). The reason for surgery was malignant disease in 93 (80%) patients, and 97 cases (84%) were elective operations. Preoperative stoma marking was performed in 72 patients (62%). The stoma type was an ileostomy in 87 patients (75%). Stoma-related complications were observed in 40 patients (35%). Emergency surgery ( $p=0.02$ ), preoperative stoma marking ( $p<0.0005$ ), adjuvant therapy ( $p=0.004$ ), and the stoma caretaker (patient or relatives) ( $p=0.05$ ) were associated with stoma-related complications. Logistic regression analysis revealed that only the type of surgery (emergency or elective), preoperative stoma marking, and the stoma caretaker increased the rate of stoma-related complications.

**CONCLUSION:** Marking the stoma location before surgery reduces the risk of stoma-related complications and has a positive effect on the patient's quality of life. Multivariable analysis indicated that marking the stoma site before the operation was the only factor that affected the rate of stoma-related complications, regardless of emergency or elective surgical conditions. Since surgeons will encounter the need for a stoma procedure during their professional career and they will not always have the opportunity to work with stoma therapy nurse, stoma care education should be provided during their residency (internship) education, and ascertaining a stoma localization before surgery for all potential stoma cases should be encouraged in emergency shifts.

**Keywords:** Emergency surgery; stoma complications; stoma site marking.

## INTRODUCTION

Marking a stoma site preoperatively decreases the possibility of potential stoma problems, such as leakage, fitting chal-

lenges, skin irritation, and pain (Fig. 1a–c). It also improves the quality of life of patients in the postoperative period. Therefore, it has been recommended that all patients be examined for stoma marking before surgical procedures.<sup>[1]</sup>

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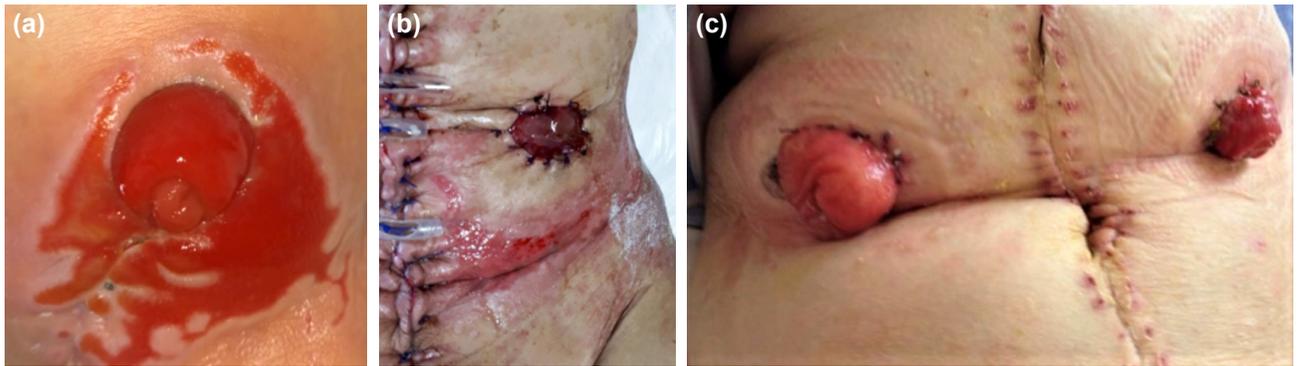
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**Figure 1.** Examples of stoma problems such as skin irritation (a, b), leakage (b), and fitting challenges (c).

This evaluation and assessment can also provide patients and their family members with education about a stoma and stoma problems, which may help improve the patient's quality of life in the postoperative period.<sup>[1,2]</sup> Ostomy nurses and colorectal surgeons are the best providers of this procedure since they receive stoma therapy education during their training programs.<sup>[1]</sup> However, in developing countries such as our country, there are not enough educated nurses who can provide the appropriate help in this process. Few centers have the opportunity to hire a stoma nurse. When the nurse is on vacation or when the hospital does not have a stoma nurse, only surgeons or residents who will perform the creation of the stoma are able to perform the stoma marking and provide education to the patient preoperatively. In a study from Scotland, Macdonald et al.<sup>[3]</sup> evaluated the ability of surgeons to mark stoma locations. The authors stated that a surgeon's skill in marking the stoma site was an important factor in the outcome. They also found that surgeons who had a subspecialty of colorectal surgery determined stoma sites better than others. The aim of this study was to compare the rate of stoma problems and quality of life of patients who underwent stoma creation procedures (elective or urgent) with and without preoperative stoma siting.

## MATERIALS AND METHODS

Patients who underwent gastrointestinal surgery between January 2012 and December 2013 were assessed. A total of 116 patients who had a stoma created during the initial operation and were followed up by a stoma therapy nurse in the postoperative period were enrolled in the current study. The data were recorded using Microsoft Excel software (Microsoft Corp., Redmond, WA, USA) and were evaluated retrospectively using IBM SPSS Statistics for Windows, Version 19.0 (IBM Corp., Armonk, NY, USA).

The data collected were details of sex, age, body mass index (BMI), the reason for surgery (benign vs. malignant disease), the type of surgery (elective vs. emergency), stoma type (ileostomy vs. colostomy), the education level of patient (secondary education and above vs. below secondary education), adjuvant treatment, stoma marking data, stoma care provider

(patient vs. relatives), stoma-related complications, and the stoma quality of life score of the patients.

A stoma therapy nurse who has extensive experience with stoma care and coping with stoma- and wound-related complications followed up with all of the patients. The data of stoma-related complications were collected and recorded prospectively. Patient follow-up data were obtained upon readmission, by phone call, and clinical examination. The same stoma therapy nurse conducted 3 surveys (Quality Life Scale For Ostomy Patients, Ostomy Adjustment Inventory, Quality of Life-Ostomy Questionnaire) of the patients to evaluate their quality of life 3 months after they were discharged.

The residents who were working in the general surgery department during the time of the study were also evaluated regarding their practice and approach to patients who were candidates for stoma creation procedures, particularly in emergency operations.

## Statistical Analysis

Bivariate analysis was used to compare the data of patients who were negative and positive for stoma site marking for differences in demographics, age, sex, emergency or elective surgery, and comorbidities. A chi-square test or Fisher's exact test was used to compare categorical variables. Student's t-test was used to analyze normally distributed variables, and the non-parametric Mann-Whitney U test was used for the analysis of non-normally distributed values.

Variables in the bivariate analyses were entered into a forward logistic regression model to correct for selection bias and to identify independent predictors of CR.  $P < 0.05$  was considered statistically significant.

## RESULTS

Of 116 patients, 67 (58%) patients were male and 49 (42%) were female. The median age was  $57 \pm 16$  years (range: 17–87 years) and the median BMI was  $26.6 \text{ kg/m}^2$  (range:  $18.1\text{--}35.2 \text{ kg/m}^2$ ). A BMI greater than  $30 \text{ kg/m}^2$  was detected in 16 (14%)

**Table 1.** Surgical diagnoses

Diagnoses	n
Malignant colorectal cancer	87
Inflammatory bowel disease - Benign colorectal disease	12
Benign anorectal diseases	3
Primary non-colon tumors	9
Other	5

patients. Forty-three (37%) patients had 1 or more chronic diseases, such as hypertension, ischemic heart disease, diabetes mellitus, and/or chronic obstructive pulmonary disease. Nineteen (17%) patients were smokers, and 97 (84%) patients were non-smokers. The reason for surgery was benign disease in 23 (20%) patients, whereas 93 (80%) patients underwent surgery due to malignant disease. The ratio of emergency operations was 16% (n=19), and 97 patients

(84%) were operated on electively. The details of the surgical diagnoses are provided in Table 1.

Preoperative stoma marking was performed in 72 (62%) patients; however, 38% of patients (n=44) were not preoperatively evaluated for stoma marking. Analysis of the education level of the patients indicated that 29 (25%) had received elementary school education, and 87 (75%) patients had achieved a high school level education or higher. The stoma type was a colostomy in 29 (25%) patients and an ileostomy in 87 patients (75%). Stoma-related complications were observed in 40 (35%) patients, while 76 patients (65%) had no stoma-related complications (Fig. 1a).

Thirty-nine (34%) patients of the 116 managed their stoma care by themselves, whereas 77 patients (66%) had support from relatives. Fifty-six of the 93 (48%) patients who underwent surgery for malignant disease received adjuvant therapy after surgery.

**Table 2.** Univariate analysis of stoma-related complications

	Complication (+)		Complication (-)		p
	n	%	n	%	
Sex					
Female	15	37.5	34	44.7	0.291
Male	25	62.5	42	55.3	
Concomitant chronic disease (+)	19	47.5	24	31.6	0.69
Body mass index <30 kg/m <sup>2</sup>	36	90	64	84.2	0.288
Body mass index ≥30 kg/m <sup>2</sup>	4	10	12	15.8	
Smoking (+)	7	17.5	12	15.8	0.503
Education					
≥ Secondary education	31	77.5	56	73.7	0.415
< Secondary education	9	22.5	20	26.3	
Tumor type					
Benign	10	25	13	17.1	0.219
Malignant	30	75	63	82.9	
Type of surgery					
Emergency	13	32.5	9	11.8	0.02*
Elective	27	67.5	67	88.2	
Preoperative stoma marking	12	30	60	78.9	<0.0005
No preoperative stoma marking	28	70	16	21.1	
Stoma type					
Ileostomy	28	70	59	79.7	0.247
Colostomy	12	30	15	20.3	
Stoma caretaker					
Patient	9	22.5	30	39.5	0.05*
Relative	31	77.5	46	60.5	
Adjuvant therapy	13	32.5	43	56.6	0.004*

\*p&lt;0.05

**Table 3a.** Risk factors for patients undergoing colostomy

	p	OR
Sex	0.16	0.286 (0.047–1.727)
Chronic disease	0.637	1.020 (0.228–4.573)
Smoking	0.329	2.500 (0.348–17.941)
Education level	0.182	0.218 (0.022–2.171)
Tumor type	0.178	5.333 (0.480–59.144)
Emergency-elective	0.295	2.33 (0.413–13.171)
Stoma marking	<0.0005	0.027 (0.003–0.221)
Patient as stoma caretaker	0.007	0.064 (0.007–0.612)
Body mass index	0.444	2.357 (0.214–25.905)

\*p&lt;0.05

**Table 3b.** Risk factors for patients undergoing ileostomy

	p	OR
Sex	0.567	1.027 (0.417–2.532)
Chronic disease	0.047*	2.471 (0.974–6.266)
Smoking	0.509	0.871 (0.232–2.874)
Education level	0.474	1.173 (0.428–3.214)
Tumor type	0.409	1.306(0.450–3.786)
Emergency-elective	0.043*	3.600 (1.028–12.609)
Stoma marking	<0.0005	0.173 (0.065–0.460)
Patient as stoma caretaker	0.405	0.780 (0.292–2.081)
Body mass index	0.416	1.500 (0.373–6.035)

\*p&lt;0.05

Univariate analysis that included all of the factors mentioned above revealed that emergency surgery ( $p=0.02$ ), preoperative stoma marking ( $p<0.001$ ), receiving adjuvant therapy ( $p=0.004$ ), and the stoma caretaker (patient or relative) ( $p=0.05$ ) were associated with stoma-related complications, whereas sex ( $p=0.291$ ), BMI ( $p=0.288$ ), smoking ( $p=0.503$ ), patient level of education ( $p=0.415$ ), concomitant chronic disease ( $p=0.690$ ), reason for surgery (benign or malignant) ( $p=0.219$ ), and stoma type (ileostomy or colostomy) ( $p=0.247$ ) had no effect on stoma-related complications (Table 2). A separate evaluation of colostomy and ileostomy patients in terms of stoma-related complications indicated that the stoma caretaker and preoperative stoma marking were risk factors in patients undergoing a colostomy, and concomitant chronic disease, emergency surgery, and preoperative stoma marking were detected as risk factors for patients undergoing an ileostomy (Table 3a and b). However, logistic regression analysis revealed that only the type of surgery (emergency or elective), preoperative stoma marking, and the stoma caretaker increased stoma-related complications (Table 4).

**Table 4.** Logistic regression analysis

Factor	Adjusted-OR (95% CI)	p	R <sup>2</sup>
Stoma marking	0.114 (0.048–0.274)	<0.0005	0.23
Emergency surgery	3.224 (1.175–8.845)	0.02	0.048
Stoma caretaker	0.445 (0.186–1.066)	0.05	0.029

\*p&lt;0.05

**Table 5.** Patient quality of life

	Stoma marking group	Non-marking group	p
Survey 1	46.29±12.61	38±15.18	0.002*
Survey 2	57.34±6.33	54.53±5.75	0.016*
Survey 3	57.26±16.15	39.04±17.15	<0.0005

\*p&lt;0.05

To evaluate patient quality of life, 3 different surveys were administered to the patients. Each indicated that preoperative stoma marking decreased stoma-related complications and also improved the patients' quality of life (Table 5).

In the present study, it was determined that preoperative stoma marking was performed statistically more frequently in patients undergoing elective surgery than in patients who underwent emergency surgery [11% ( $n=2/19$ ) vs. 72% ( $n=70/97$ );  $p<0.001$ ]. This result prompted a re-evaluation of the insufficient level of importance given to stoma marking before emergency surgeries.

## DISCUSSION

The results of our retrospective study indicated that no stoma siting before surgery, stoma creation during an emergency surgical intervention, and stoma care undertaken by patients themselves increased the frequency of stoma-related complications. Upon separately evaluating the patients who had a colostomy or an ileostomy, we found that more often patients with a colostomy had risk factors regarding stoma siting before surgery and a stoma caretaker, and patients with an ileostomy more frequently had risk factors for stoma-related complications associated with stoma siting before surgery, concomitant diseases, and emergency surgical interventions. Stoma siting before surgery was a risk factor for stoma-related complications regardless of the type of a stoma (ileostomy or colostomy). In addition, it was also found that the rate of stoma site marking before surgery was lower in cases of an emergency surgical intervention than an elective surgery in our clinic.

The American Colorectal Surgeons and Wound Ostomy Continence Nurses Association recommends that all patients who are candidates for ostomy surgery should be evaluated

for stoma site marking before surgery by physicians who are educated and experienced in this field.<sup>[1]</sup> The gold standard is for care and education to be provided by stoma care nurse.<sup>[4]</sup> Also, during this assessment, patients and their relatives should receive education about stomas and stoma care.<sup>[1]</sup> However, earlier studies have indicated that the majority of patients were provided with care and education services postoperatively (following stoma creation) during their stay in the hospital.<sup>[5]</sup> If the hospitalization period after the operation is short, this limits the education given by the stoma care nurses.<sup>[6]</sup> Therefore, in such cases stoma care education should be provided during out-patient follow-up visits and/or at home.<sup>[4]</sup> However, determining the stoma site and providing education to the patient and relatives before surgery reduces postoperative visits to the hospital due to leakage, adaptor siting problems, stoma bag changing problems, using more adaptors and bags because of frequent changing, pain, dressing issues, and other stoma-related complications. Inappropriate location of a stoma increases the frequency of the complications listed above and the likelihood of patient dissatisfaction, as these problems negatively affect the quality of life of both patients and caretakers of the stoma.<sup>[2,4]</sup> Determining a stoma site before surgery during a clinical examination is possible in a sitting, standing, or supine position, and enables detection of the ideal location for the stoma. Person et al.<sup>[7]</sup> established that stoma site determination before surgery reduced complications after surgery and increased the patients' quality of life. The authors used a quality of life scale that consists of 20 parameters; 18 of those parameters were statistically positively affected by determining the stoma site before the operation. In the same study, it was reported that the permanent or temporary nature of a stoma did not affect quality of life. Moreover, it was observed that patients could move more freely and that their quality of life was greater when their stoma site had been marked preoperatively.<sup>[7]</sup> In our study, consistent with the literature, statistical analysis indicated that marking the stoma site before surgery reduced stoma-related complications in cases of both ileostomy and colostomy. We also observed that marking before surgery statistically increased the quality of life scores based on 3 different quality of life scales.

Another result that was clear in our study was that the rate of stoma site determination performed before surgery was lower in emergency surgical interventions than in elective surgeries conducted in our clinic (16% vs. 84%;  $p=0.02$ ). In addition, it was discovered in the multivariable analysis that emergency surgical intervention was a parameter that affected stoma-related complications. In a Spanish study of 270 patients, 75% of the patients underwent elective surgery and 25% underwent emergency procedures. The rate of stoma site marking in patients who underwent elective surgeries was 58.8%, whereas no patients who underwent emergency interventions were marked; the occurrence rate of early skin irritation and dermatitis was statistically higher in patients who underwent

emergency intervention than those who had elective surgery. The authors stated that stoma site marking was neglected before surgery even in specific colorectal surgery centers, especially in emergency interventions. Furthermore, it was found that the effect of educating patients about stoma care before the operation was disregarded by the surgical team even though patients wanted to be a part of the effort to participate in their cure and care-taking process.<sup>[8]</sup>

The stoma creation process is the last part of long and difficult operations and is followed by the completion of critical elements (resection +/- anastomosis). Stoma creation is most often performed by candidate surgeons, who are less experienced with stoma site determination and the stoma creation procedure. This suggests that surgeons give importance to saving patients' lives, but they do not care much about their quality of life.<sup>[9]</sup> The stoma creation procedure is the most important factor that affects patients' lives for 3 months after the surgery, though this is often not given much consideration during the operation.<sup>[9]</sup>

Considering the data, we conducted a simple survey of our 23 residents who had completed one year of education at our clinic to evaluate their knowledge of and experience with stoma site marking. All of the residents stated that they had created a stoma in the previous 6 months and that they had participated in stoma creation interventions during their emergency surgery shifts. All of the residents who participated in the survey remarked that stoma site marking before surgery would reduce stoma-related complications and that this would positively affect the patient's quality of life. However, only 4 (17%) stated that they marked the stoma site before the operation on emergency surgery shifts and only 8 (34%) residents reported that the on-call specialist physician or senior assistant surgeons wanted the stoma site to be determined before emergency gastrointestinal interventions. Although the vast majority of residents (91%,  $n=21/23$ ) claimed that they knew the criteria for determining stoma sites, only 3 could correctly define how the stoma site was determined. In addition, only 8 (34%) residents followed up with patients for whom they had created a stoma during their shifts and stated that they relied on insights from the associated stoma therapy nurses. These data correspond with our findings that the high rate of complications encountered in stomas created during emergency surgeries is related to the low level of stoma site determination before these emergency interventions.

## Conclusion

The results of our retrospective study demonstrated that stoma site marking before surgery reduces the risk of stoma-related complications (ileostomy or colostomy) and has a positive effect on patients' quality of life. Multivariable analysis indicated that preoperative stoma site marking was the only factor that affected stoma-related complications, whether it

was performed in an emergency or elective surgery. Stoma sites are rarely determined before an emergency surgical intervention. Even though residents on emergency shifts were aware of the importance of marking the stoma site, they were not provided with enough education to properly determine the stoma location and they neglected the necessity of the procedure. Therefore, since residents will encounter the need to perform stoma procedures during their professional careers and they will not always have the opportunity to work with stoma therapy nurse, additional stoma care education should be provided during their internship education, and they must be encouraged to determine stoma sites before surgery for all potential stoma cases.

Conflict of interest: None declared.

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## ORIJİNAL ÇALIŞMA - ÖZET

### Komplike ya da değil: Acil abdominal cerrahi öncesinde stoma yeri işaretlenmesi

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**AMAÇ:** Stoma bölgesinin ameliyat öncesi işaretlenmesi stomada problem olma olasılığını azaltır ve ameliyat sonrası dönemde hastaların yaşam kalitesini artırır. Bu prosedür için en iyi uygulayıcılar ostomi hemşireleri ve kolorektal cerrahlardır, çünkü eğitim programları sırasında stoma tedavisi alırlar. Bu çalışmada, stoma oluşturulan hastalarda (elektif veya acil) ameliyat öncesi stoma yeri işaretlenmesi yapılan ve yapılmayan hastalar arasındaki stoma problemi oranını ve ameliyat sonrası yaşam kalitesini karşılaştırmayı amaçladık. Ayrıca cerrahi asistanlarının nöbet şartlarında stoma oluşturma konusundaki yaklaşım ve davranışlarını değerlendirdik.

**GEREÇ VE YÖNTEM:** Ocak 2012–Aralık 2013 tarihleri arasında gastrointestinal cerrahi geçiren hastalar değerlendirildi. Ameliyat sonrası stoma oluşturulan toplam 116 hasta ameliyat sonrası dönemde stoma tedavisi hemşiresi tarafından takip edildi ve bu çalışmaya alındı. Ayrıca asistanlara stoma oluşturma ve stoma bakımı hakkındaki bilgilerini değerlendirmek üzere bir anket yapıldı.

**BULGULAR:** Yüz on altı hastanın 67'si (%58) erkekti. Ortanca yaş 57±16 yıldır (dağılım 17–87). On altı hastada (%14) beden kitle indeksi 30 kg/m<sup>2</sup>'nin üzerinde tespit edildi. Ameliyat nedeni 93 hastada (%80) malign hastalık idi. Doksan yedi hasta (%84) elektif olarak ameliyat edildi. Ameliyat öncesi stoma işareti 72 hastaya (%62) yapıldı. Stoma 87 hastada (%75) ileostomi idi. Stoma ile ilgili komplikasyonlar 40 hastada (%35) gözlemlendi. Acil cerrahi (p=0.02), ameliyat öncesi stoma işaretlenmesi (p<0.0005), adjuvan tedavi (p=0.004) ve stoma bakımını yapan kişi ya da kişiler (hastanın kendisi veya akrabaları) (p=0.05) stomaya bağlı komplikasyonlarla ilişkiliydi. Lojistik regresyon analizinde sadece cerrahi tip (acil veya elektif), ameliyat öncesi stoma işaretlenmesi ve stoma bakımını yapan kişinin stomaya bağlı komplikasyonları arttırdığını ortaya koydu.

**TARTIŞMA:** Stoma yerinin ameliyattan önce işaretlenmesi, stomaya bağlı komplikasyon riskini azaltır ve hastaların yaşam kalitesini olumlu yönde etkiler. Çok değişkenli analiz, stoma bölgesini ameliyattan önce işaretlenmenin, acil bir durumda veya elektif bir ameliyatta yapılmasına rağmen stomaya bağlı komplikasyonları değiştirebilecek tek faktör olduğunu göstermektedir. Cerrahların profesyonel kariyerleri sırasında her zaman stoma prosedürü ile karşılaşacakları ve stoma terapi hemşiresi ile çalışma fırsatlarına her zaman sahip olamayacakları göz önüne alındığında, asistanlık eğitimi sırasında stoma bakım eğitimi verilmeli ve teşvik edilmelidir. Nöbetlerde tüm potansiyel stoma vakalarının ameliyat öncesi stoma lokalizasyonunun belirlenmesi için asistanlar teşvik edilmelidirler.

**Anahtar sözcükler:** Acil cerrahi; stoma komplikasyonları; stoma yeri işaretleme.

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