Effect of preoperative stoma site marking on early and late outcomes of intestinal stoma creation

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Purpose
To evaluate how preoperative markings of the stoma site influence patients' quality of life (QOL), whether they improve patients' independence, and what is their effect on the rates of postoperative early and late complications.
Patients and methods
This is a nonrandomized prospective cohort study that included 60 patients who underwent elective intestinal stoma creation in Alexandria Main University Hospital. Patients were divided into two groups. Group A included 30 patients who experienced preoperative marking of their stoma site according to the educational guide developed by the American Society of Colon and Rectal Surgeons and the Wound, Ostomy and Continence Nurse Society, and group B included 30 patients who did not experience preoperative marking of their stoma site. A structured, validated questionnaire was used to assess patients' QOL and the stoma QOL 1 month after surgery. The occurrence of complications was noted during regular outpatient follow-up encounters, with median follow-up of 1 year, and was evaluated by stoma and equipment-related complication scale.
Results
A total of 60 patients (48.3% females and 51.7% males) were included. Their mean age was 48.32±14.10 years. It was found that the QOL score of patients whose stoma site was marked (group A) was significantly better (45.03–65.01 vs. 33.58–56.19). Overall satisfaction was significantly better in group A (5.27±1.78 vs. 2.73±2.32).
Conclusion
The patients whose stoma sites were preoperatively marked had significantly better QOL and significantly fewer early postoperative complications, and these results are irrespective of the stoma type.

Keywords:
intestine, site marking, stoma

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Introduction

The creation of intestinal stoma (IS) is a very common procedure. ISs may be performed under elective or emergency conditions from small or large bowel. IS can be temporary or permanent and may be made during curative or palliative operations [1–3]. Despite this heterogeneity, the ideal IS should show optimum vascularity of the exteriorized bowel, no tension, passage through the rectus sheath, and optimum opening in both fascia and skin [4–6]. Clinical practice guidelines for IS surgery also stated that whenever possible, IS should be fashioned to protrude above the skin surface to improve the function and appliance fitting of the IS [4].

Patients facing with the prospect of bowel surgery are often anxious about the possibility of having an IS and rarely prefer it, despite the fact that the construction of an IS may lead to a significant improvement in quality of life (QOL) [7,8]. Moreover, QOL after stoma creation may be affected by many factors including nature of the disease, severity of the symptoms, general condition of the patient, and attitude of the patient toward the disease. Therefore, QOL measures are important part of surgical decision making and my help patients by providing realistic expectations of surgical outcomes [7–11].

One of the major factors affecting QOL after IS creation is the incidence of the stoma complications, which occur with a rate ranging between 21 and 70%. IS complications can occur early (metabolic derangements, skin irritation, ischemia, and stoma retraction) or late (parastomal hernia, stoma prolapse, and stoma stenosis) [12–14].

There are several risk factors for complications after stoma construction, including high BMI, diabetes, emergency surgery, and technical aspects of IS formation such as stoma height and inappropriate stoma location [15,16].

If stomas are to be electively created during scheduled surgical cases, then proper preoperative planning is needed to achieve successful postoperative management of the patient [1,2,4]. This planning includes both preoperative counseling and stoma site marking [17–20]. Enough time should be allowed to the counselor to explore the patient's knowledge of the disease and understanding of why a stoma may be required. The counseling must encompass several critical aspects for the patient [1,4,18].

Several outcomes may be affected by IS site marking, including IS-related complications and patients' ability to adapt to the stoma and self-care independently [10,21,22]. Although site marking by a certified IS nurse is ideal, preoperative choice of the IS site is frequently done by the surgeon, especially in emergency situations [15,23–25].

MacDonald and colleagues studied the ability of surgeons and surgical trainees to choose an appropriate IS site and found that surgeons choose sites different from the stoma nurse (the standard). Colorectal surgeons were found to choose sites more concordant to the ostomy nurse specialists [15,25].

The purpose of this study was to evaluate how preoperative marking of the stoma site influences patients' QOL and incidence of complications related to IS.

Patients and methods

This is a prospective cohort study that included 60 patients who underwent elective IS creation in Alexandria Main University Hospital from January 2016 to September 2016. Patients were categorized into two groups. Group A included 30 patients who experienced preoperative marking of their stoma site, and group B included 30 patients who did not experience preoperative marking of their stoma site.

Informed consent was obtained from each patient. The study protocol was registered and approved by the Committee of Postgraduate Studies and Medical Research, Faculty of Medicine, University of Alexandria. Emergency cases and children aged less than 18 years were not included in the study.

Preoperative workup

Patients in both groups were subjected to history taking and thorough clinical examination. All available data from investigations done to the patient were collected.

Patients in group A experienced preoperative stoma site marking according to the educational guide developed by the American Society of Colon and Rectal Surgeons (ASCRS) and the Wound, Ostomy and Continence Nurse Society (WOCN) [26].

Intraoperative workup

Data were collected about type of surgery, laparoscopic or open; type of the stoma; experience of surgeon who constructed the stoma; operative time; and time needed for stoma construction.

Postoperative workup

All patients in both groups received the same postoperative care according to the Practice Guidelines for Clinicians published by WOCN [26,27]. A 20-question structured, validated questionnaire was used to evaluate patients' QOL and stoma QOL 1 month after surgery [28]. A longer version of the same questionnaire was used to assess self-confidence and independence parameters [29].

Postoperative stoma and equipment-related complications were noted during regular outpatient follow-up, with median follow-up period of 1 year, and was evaluated by stoma and equipment-related complication scale [29].

Statistical analysis of the data

Data were fed to the computer and analyzed using the Statistical Package for Social Sciences (IBM SPSS, version 20, New York, United States). Qualitative data were described using number and percent. Quantitative data were described using range (minimum and maximum), mean, SD, and median. Significance of the obtained results was judged at the 5% level. The used tests of significance were χ^2 test, Fisher exact or Monte Carlo correction, Student t test, Mann–Whitney test, and regression.

Results

The study included 60 patients, comprising 51.7% males, with mean age of 48.32±14.10 years. No statistically significant difference between both groups was found regarding age, sex, and BMI, as shown in Table 1.

Table 1 Demographic data

	Group A (*N*=30) [*n* (%)]	Group B (*N*=30) [*n* (%)]	Total (*N*=60) [*n* (%)]	Test of significance	*P*
Sex					
Male	18 (60.0)	13 (43.3)	31 (51.7)	χ^2=1.669	0.196
Female	12 (40.0)	17 (56.7)	29 (48.3)		
Age (years)					
Minimum–maximum	26.0–73.0	21.0–70.0	21.0–73.0	*t*=0.427	0.671
Mean±SD	47.53±14.44	49.10±13.94	48.32±14.10		
BMI					
18.5–24.99	15 (50.0)	8 (26.7)	23 (38.3)	χ^2=3.665	0.160
25–29.99	10 (33.3)	13 (43.3)	23 (38.3)		
≥30	5 (16.7)	9 (30.0)	14 (23.3)		
Minimum–maximum	20.10–33.90	22.0–36.20	20.10–36.20	*t*=1.887	0.064
Mean±SD	25.86±3.89	27.77±3.94	26.81±4.0		

χ^2, *P*, χ^2 and *P* values for χ^2 test for comparing between the two groups. [t,] *P*, *t* and *P* values for Student *t* test for comparing between the two groups.

Table 2 Operative data

	Group A (*N*=30) [*n* (%)]	Group B (*N*=30) [*n* (%)]	Total (*N*=60) [*n* (%)]	χ^2	*P*
Type of stoma					
Ileostomy	22 (73.3)	20 (66.7)	42 (70.0)	0.317	0.573
Colostomy	8 (26.7)	10 (33.3)	18 (30.0)		
Indication of stoma					
Permanent	5 (16.7)	9 (30.0)	14 (23.3)	1.491	0.222
Temporary	25 (83.3)	21 (70.0)	46 (76.7)		
Mode of surgery					
Laparoscopic	15 (50.0)	10 (33.30)	25 (41.70)	1.714	0.190
Open/conversion	15 (50.0)	20 (67.70)	35 (58.30)		
Experience of surgeon					
Senior resident	19 (63.3)	15 (50.0)	34 (56.7)	3.756	0.153
Assistant lecturer	8 (26.7)	6 (20.0)	14 (23.3)		
Lecturer/assistant professor/professor	3 (10.0)	9 (30.0)	12 (20.0)		

χ^2, *P*, χ^2 and *P* values for χ^2 test for comparing between the two groups.

Table 3 Comparison between the two studied groups according to stoma site

Stoma site	Group A (*n*=30) No. (%)	Group B (*n*=30) No. (%)	Total (*n*=60) No. (%)	χ^2	*P*
Stoma site					
Right	22 (73.3)	20 (66.7)	42 (70.0)	0.317	0.573
Left	8 (26.7)	10 (33.3)	18 (30.0)		
Stoma site (above/below/same level of umbilicus)					
Below	15 (50.0)	12 (40.0)	27 (45.0)	4.216	0.121
Same	5 (16.7)	12 (40.0)	17 (28.3)		
Above	10 (33.3)	6 (20.0)	16 (26.7)		

χ^2, *P*, χ^2 and *P* values for χ^2 test for comparing between the two groups.

The operative data showed no statistically significant differences between both groups regarding the nature of the primary pathology, type of stoma, indication of stoma, experience of surgeon, and mode of surgery (laparoscopic or open), as shown in Table 2. Moreover, there were no statistically significant differences between both groups regarding total operative time (group A: 163.33±61.06 min vs. group B 179.0 ±54.49 min, *P*=0.195) or operative time of stoma construction (group A: 14.01±3.41 min vs. group B: 14.03±4.37 min, *P*=0.472).

There was also no statistically significant difference in results between both groups regarding the site of the stoma, neither being on the right or left abdominal side, nor its level compared with the umbilical level (Table 3).

QOL score of patients whose stoma site was marked (group A) was significantly better than that of group B (Table 4). Group A patients expressed significantly higher overall satisfaction regarding self-confidence and independence in caring for their stomas. There

Table 4 Quality of life score 1 month after surgery

QOL score	Group A (*N*=30) [*n* (%)]	Group B (*N*=30) [*n* (%)]	Total (*N*=60) [*n* (%)]	Test of significance	*P*
25–49.99	5 (16.7)	29 (96.7)	34 (56.7)	χ^2=39.095*	<0.001*
50–75	25 (83.3)	1 (3.3)	26 (43.3)		
Minimum–maximum	45.03–65.01	33.58–56.19	33.58–65.01	*t*=8.845*	<0.001*
Mean±SD	54.78±5.04	43.51±4.84	49.15±7.50		

QOL, quality of life. χ^2, *P*, χ^2 and *P* values for χ^2 test for comparing between the two groups. *t*, *P*, *t* and *P* values for Student *t* test for comparing between the two groups. *Statistically significant at *P* value less than or equal to 0.05.

Table 5 Independence parameters

Independence parameters	Group A (*N*=30) [*n* (%)]	Group B (*N*=30) [*n* (%)]	Test of significance	*P*
Do you care for your stoma yourself?				
No	6 (20.0)	11 (37.9)	χ^2=2.311	0.128
Yes	24 (80.0)	18 (62.1)		
Do you need help caring for your stoma from family or friends?				
No	14 (46.7)	26 (86.7)	χ^2=10.800*	0.001*
Yes	16 (53.3)	4 (13.3)		
Do you require frequent changes of the base plate?				
No	6 (20.0)	19 (63.3)	χ^2=27.805*	<0.001*
Yes	24 (80.0)	11 (36.7)		
Does changing the base plate take a long time?				
No	4 (13.3)	7 (23.3)	χ^2=1.002	0.317
Yes	26 (86.7)	23 (76.7)		
Was postoperative appliance fitting difficult?				
No	3 (10.0)	22 (73.3)	χ^2=24.754*	<0.001*
Yes	27 (90.0)	8 (26.7)		
Was it difficult to adjust to living with a stoma?				
No	16 (53.3)	21 (70.0)	χ^2=1.763	0.184
Yes	14 (46.7)	9 (30.0)		
Do you feel confident caring for your stoma?				
No	9 (30.0)	21 (70.0)	χ^2=9.600*	0.002*
Yes	21 (70.0)	9 (30.0)		
Overall satisfaction				
Min. – Max.	2.0–7.0	0.0–7.0	*U*=179.500*	<0.001*
Mean±SD	5.27±1.78	2.73±2.32		

χ^2, *P*, χ^2 and *P* values for χ^2 test for comparing between the two groups. *U*, *P*, *U* and *P* values for Mann–Whitney test for comparing between the two groups. *Statistically significant at *P* value less than or equal to 0.05.

were statistically significant differences in results between both groups in four of the seven independence parameters, as patients of group A were better than those of group B (Table 5).

Less than 50% of group A patients needed help caring for their stoma from family or friends compared with more than 85% group B patients, whereas 19 (63%) patients in group B required frequent change of the base plate compared with only six (20%) patients in group A. Moreover, 70% of patients in group A felt confident caring for their stoma compared with 30% of patients in group B (Table 5).

The occurrence of various complications was significantly less frequent in patients in group A. There was a statistically significant lower incidence of stoma appliance leakage and fitting problems in group A, whether during the first postoperative month or 6 weeks after the surgery (Table 6).

Postoperative appliance leakage was reported by less than 25% of patients in group A compared with more than 85% of those in group B. However, there was no statistically significant difference in results between both groups regarding peristomal skin problems, parastomal hernia, and prolapse throughout the whole follow-up (Table 6).

Discussion

In the current study, it was found that preoperative stoma site marking leads to significantly better QOL, improved patients' confidence, independence, and lower rates of incidence of early postoperative complications.

Table 6 Stoma-related and equipment-related complication scale

Stoma-related and equipment-related complication scale	Group A (*N*=30) [*n* (%)]	Group B (*N*=30) [*n* (%)]	Test of significance	*P*
Did your appliance often leak in the first month after the operation?				
No	7 (23.3)	26 (86.7)	χ^2=24.310*	<0.001*
Yes	23 (76.7)	4 (13.3)		
Does your appliance often leak now?				
No	0 (0.0)	9 (30.0)	χ^2=10.588*	^{FE}P=0.002*
Yes	30 (100.0)	21 (70.0)		
Did you have frequent fitting problems in the first month after the operation?				
No	5 (16.7)	20 (66.7)	χ^2=15.429*	<0.001*
Yes	25 (83.3)	10 (33.3)		
Do you have fitting difficulties now?				
No	0 (0.0)	9 (30.0)	χ^2=10.588*	^{FE}P=0.002*
Yes	30 (100.0)	21 (70.0)		
Do you have parastomal skin irritation?				
No	13 (43.3)	17 (56.7)	χ^2=1.067	0.302
Yes	17 (56.7)	13 (43.3)		
Do you have a parastomal hernia?				
No	3 (10.0)	7 (23.3)	χ^2=1.920	0.166
Yes	27 (90.0)	23 (76.7)		
Did you have a parastomal hernia repair operation?				
No	0 (0.0)	4 (13.3)	χ^2=4.286	^{FE}P=0.112
Yes	30 (100.0)	26 (86.7)		
Did you have other operations because of parastomal-related or stoma-related complications?				
No	0 (0.0)	4 (13.3)	χ^2=4.286	^{FE}P=0.112
Yes	30 (100.0)	26 (86.7)		
Do you have a stomal prolapse?				
No	3 (10.0)	4 (13.3)	χ^2=0.162	^{FE}P=1.000
Yes	27 (90.0)	26 (86.7)		
Did you require frequent professional consultations because of stoma-related problems?				
No	10 (33.3)	17 (56.7)	χ^2=3.300	0.069
Yes	20 (66.7)	13 (43.3)		
Overall satisfaction				
Minimum–maximum	5.0–10.0	2.0–10.0	*U*=187.500*	<0.001*
Mean±SD	8.63±1.54	6.10±2.55		

χ^2, *P*, χ^2 and *P* values for χ^2 test for comparing between the two groups. FE, Fisher exact for χ^2 test for comparing between the two groups. *U*, *P*, *U* and *P* values for Mann–Whitney test for comparing between the two groups. *Statistically significant at *P* value less than or equal to 0.05.

These finding were not related to the type of stoma, which can be supported by the results of many studies that found no significant differences in the QOL between patients with temporary ileostomies or colostomies [30,31].

Better QOL, improved patients' confidence, independence, and lower rates of early postoperative complications may be mainly owing to less incidence of stoma that lies near a skin crease or bony prominence and better vision of the stoma by the patient.

Bass and colleagues found that patients with preoperative stoma site marking experienced significantly fewer early complications, and this was associated with less incidence of improperly located stomas in this group of patients. However, unlike the current study, Bass and colleagues included patients who had urinary stoma surgery and cases of nontraumatic emergency that needed stomas. Therefore, selection bias is likely [32].

Gulbiniene and colleagues studied the effect of preoperative IS site marking and patients teaching on health-related quality of life (HRQOL) in a group of patients managed at two university-based hospitals in Lithuania. Subjects were divided into three groups; one group received preoperative stoma siting and preoperative education, one group received preoperative education but no IS siting, and a third (control) group received neither intervention. The results showed that subjects who received both preoperative teaching and stoma siting achieved higher scores on several HRQOL instruments than did control subjects who received neither intervention. However, subjects who received preoperative teaching

alone did not have significantly different scores than control subjects [33].

Arumugam *et al*. [15] prospectively evaluated stomal and peristomal complications in a group of 97 consecutive patients. They found that patients who underwent preoperative stoma site marking had a lower incidence of having a stoma placed in a skin crease, but this difference was not statistically significant. Although this study has the advantage of using a prospective study design, the combination of emergency with elective surgical cases, the combination of preoperative stoma site marking between stoma nurses and other nurses, and the comparatively small number of nonsited stomas (n=15) limit the value of this study in the evaluation of the influence of stoma site marking on postoperative complications [15]. However, it was recommended by WOCN in 2007 that site-selection procedure should include the use of multiple positions (especially the sitting position) with avoidance of skin folds and the priority is a flat surface [4].

Pittman *et al.* [10] studied QOL variables related to stoma complications, severity of skin irritation, problems owing to leakage, and difficulty in adapting to the stoma. They reported that preoperative IS site marking was associated with less difficulty in adapting to the stoma, and preoperative stoma education was associated with less severe skin irritation and leakage.

Millan *et al.* [16] reported that early skin irritation and dermatitis occurred at a significantly lower rates in preoperatively IS sited patients compared with nonsited IS patients. The study reported also that patients with preoperative IS site marking experienced significantly less anxiety.

McKenna *et al.* [34] studied the effect of preoperative stoma siting on HRQOL instead of stoma-related QOL. Despite having similar results to the current study, McKenna and colleagues included patients who underwent emergency surgery, and only the patients who had their stoma marked preoperatively received preoperative education.

Persson *et al.* [19] followed methods similar to the current study, but they did not exclude the urinary stoma, and also the type of the stoma (permanent or temporary) was not normally distributed in both groups. The same questionnaire in the current study was used by Persson *et al.* [19] to assess patients' QOL and found that the QOL of patients who underwent stoma site marking preoperatively was significantly better than that of the unmarked patients (P<0.05 in 18 of 20 items).

In the current study, it was found that preoperative stoma site marking does not result in significantly lower incidence of late postoperative complications mainly parastomal hernia. A similar finding was reported by Bass *et al.* [32], which may be explained by the fact that the most important factor to prevent parastomal hernia is to locate the stoma through the rectus muscle which does not depend on preoperative site marking [26].

Conclusion

The patients whose stoma sites were preoperatively marked have significantly better QOL and significantly fewer early postoperative complications, and these results are irrespective of the stoma type.

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Conflicts of interest

There are no conflicts of interest.

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