De-functioning loop ileostomy: creating more problems from solving one?

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ABSTRACT

Background and aims: De-functioning loop ileostomies are used currently in anterior resection to reduce the consequences of anastomotic leak. However, this practice remains controversial as the complication associated with the de-functioning stoma has been overlooked. The objectives of this paper were to study the complication associated with de-functioning loop ileostomy in the patient undergoing an anterior resection.

Method: Patient sample identification obtained from local colorectal registry and data reviewed retrospectively. Only anterior resection with or without de-functioning loop ileostomy for the indication of rectal cancer or pre-cancerous polyps were included. 150 patients satisfied the inclusion criteria. Statistical analysis of Chi-square test was applied for two-group comparisons of categorical data and Mann Whitney for continuous numerical variables.

Results: Overall, 50% of 74 patients in the stoma group had stoma-related complication either acutely or later that resulted in unplanned re-admission with re-admission rate of 17.6%. Closure rate was 77%, with a mean interval of 7.4 months. A further 28% (16 of 57) of the reversed group experienced complications. Combined length of stay after anterior resection and reversal surgery was 19.3 days vs. 8.1 days in the non-stoma group (p=0.001).

Conclusion: The creation of de-functioning loop ileostomy is associated with a significantly increased risk of stoma-related morbidity with low anterior resection. The perceived benefits and risks of routine creation of de-functioning loop ileostomy in anterior resection should be reconsidered while planning for surgery and only selective of suitable candidates that are of high risk of severe anastomotic leak.

INTRODUCTION

Colorectal cancer is the third most common cancer for both men and women in the United Kingdom, and about one-third of colorectal cancer is rectal cancer.[1] Anterior resection (AR) is now the standard surgical radical treatment for rectal cancer though exact techniques depend on the exact location of the tumour.[2] The procedure could be seriously complicated by anastomotic leak (AL) and lead to peritonitis and pelvic sepsis that increases the morbidity and affects oncological outcomes.[3] Despite the improvement in perioperative care and the development of novel surgical techniques, the reported rate of AL can reach 20%, with stable incidence over the last decade.[4] Several systematic reviews and meta-analysis reported that diverting stoma can prevent AL or its consequences.[5,6] Questions arise whether such protective stomas are necessary for most patients and have the complications related to the stoma including morbidity surrounding reversal been undermined.

A retrospective data analysis was performed with the primary aim to study the complication associated with de-functioning loop ileostomy in anterior resection (both high and low).

MATERIAL AND METHODS

Study population

Using the regional colorectal surgical registry of the University Hospitals of Morecambe Bay NHS Trust, a retrospective analysis was performed of patients who underwent anterior resection for rectal cancer between January 2015 and December 2019.

Inclusion/exclusion criteria

Patients presenting with a primary rectal/rectosigmoid adenoma or adenocarcinoma at the time of diagnosis were included in the study. Anterior resection with or without a de-functioning loop ileostomy was performed for both benign and malignant tumours. Patients who underwent anterior resection for other indications or with the formation of colotomy were excluded.

Study variables

The data was divided into three categories: patient characteristics, stoma-related complications, and postoperative complications. The primary outcome measure was the total complication rate in the stoma group.

The following patient characteristics information was collected: age; sex; ASA physical status, and pre-existing comorbidity. The comorbidity was scored using Charlson Comorbidity Index.[7] The tumour height was determined endoscopically and radiologically from the anal margin to the distal end of the tumour.

Stoma-related complications that occurred acutely in the same admission or re-admission included the presence of high output stoma, acute kidney injury (AKI), small bowel obstruction, irritant dermatitis, and parastomal herniation. High output stoma was defined as a recorded stoma output of more than two litres in a 24-hour period.[8] Diagnosis of AKI was based on Kidney Disease: Improving Global Outcome (KDIGO) definition irrespective of stage or severity.[9] Small bowel obstruction was recorded when there was a finding of transition point near the stoma. Symptomatic parastomal herniation was defined as presentation to the hospital with symptoms associated to herniated stoma that were treated either conservatively or surgically. A patient who experienced one or more complications is counted as a single unit for the analysis. However, of these, each complication was contributed to an individual category to illustrate the observed frequency of respective complications.

Total length of hospital stays and interval to chemotherapy were recorded. Postoperative complications included ileus, AL, hospital re-admission, reoperation and 30-day mortality. Postoperative ileus was determined by the placement of nasogastric tube without mechanical obstruction clinically. AL defined as clinical and radiological diagnosis of leak.[10] Total length of hospital stays included subsequent stay for ileostomy reversal. Severity of postoperative complications was scored according to the Clavien-Dindo classification.[11]

Statistical analysis

Continuous data are presented as median and interquartile range (IQR) or mean ± standard deviations (SD). Categorial data are presented as numbers with percentages. Continuous data were assessed using Mann-Whitney U test. Chi square test was applied for two-group comparisons of categorical data. A two-sided p-value lower than 0.05 was considered statistically significant.

RESULTS

A total of 150 patients (93 male, 57 female) were included in this analysis and divided into two groups of patients with or without ileostomy and subsequent reversal, as shown in Figure 1. Patient characteristics are illustrated in Table 1. The median (range) age of the patients was 66 (30-90) years. There was no statistical difference of ASA grade, BMI and Charlson score between the two groups. However, the stoma group has a higher proportion of male patient, open laparotomy and neoadjuvant population (p<0.05).

The pooled findings showed that 37 of 74 (50%) patients had stoma-related complications. In total, 25 (33.8%) experienced a high output stoma before their discharge, while 4 (5.4%) experienced the problem after discharge and had to be readmitted. AKI resulting from the high output stoma occurred in 13 (17.6%) patients during the same admission, whilst another 3 (4.1%) patients were readmitted with similar circumstances. A small number of patients experienced local irritant dermatitis around the stoma site 1 (1.4%) in the same and another admission. Small bowel obstruction was relatively rare in the same surgical admission but still noted to have one reported case; 3 (4.1%) resulting in re-admission. Incidental findings of parastomal herniation during reversal were not included and 2 (2.7%) patients presented to the hospital with symptomatic parastomal herniation that required intervention. Overall, the re-admission rate due to stoma-related complications was 17.6%. The stoma was reversed in 57 (77%) of the patients, and the average interval closure was 258 ±135 days. Stoma-related complications are illustrated in Table 2. Further complications were observed in 16 of 57 (28%) patients post-reversal such as ileus, wound infection or intra-abdominal collection, urinary retention, pneumonia, and re-admission for small bowel obstruction – see Table 3.

Postoperative outcomes were compared between two groups in two different ways (low vs high AR and stoma vs non-stoma). No mortality was observed in our study group. The present study revealed that postoperative ileus was significantly higher in the low AR group (40 (51.2%) versus 15 (20.8%), p=<0.001). The anastomotic leak rates were similar with 10 (12.8%) for low AR and 4 (5.6%) for high AR. The mean total length of stays were 19.3 ± 11.0 days for patient with a stoma including the admission for reversal, which was substantial compared to 8.1 ±10.7 days in patients after anterior resection without stoma.

The stoma group also encountered longer waiting times for chemotherapy (P=0.036) where the reasons were not clearly identified and not specifically stoma related on case note entry. The comparison is illustrated in Table 4.

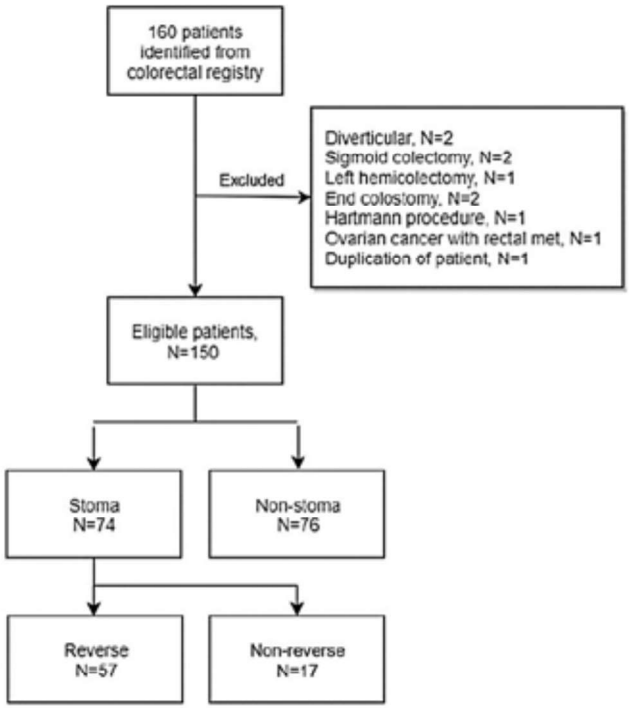

Figure 1: Illustration of patient selection process.

Variables	Stoma	Non-stoma	Total	p-value
n	74	76	150	
Median age (range)	65.5 (40-83)	66.4 (30-90)	66.0 (30-90)	0.27
Sex, n (%)				<0.001
Male	58 (78.38%)	35 (46.05%)	93 (62.0%)	
Female	16 (21.62%)	41 (53.95%)	57 (38.0%)	
ASA grade, n (%)				0.22
I	19 (25.68%)	17 (22.37%)	36 (24.0%)	
II	44 (59.46%)	54 (71.05%)	98 (65.3%)	
III	11 (14.86%)	5 (6.58%)	16 (10.7%)	
BMI	26.8 ± 3.7	27.3 ± 4.7	27.1 ± 4.2	0.27
Charlson Score,	n (%)			0.29
2	48 (64.86%)	52 (68.42%)	100 (66.7%)	
3	13 (17.57%)	17 (22.37%)	30 (20.0%)	
≥4	13 (17.57%)	7 (9.21%)	20 (13.3%)	
Neoadjuvant	30 (40.5%)	1 (1.3%)	31 (20.7%)	<0.001
Tumour height, cm	9.4 ± 3.8	18.5 ± 6.5*		<0.001
Surgery, n (%)				0.002
Laparoscopic	28 (37.84%)	48 (63.16%)	76 (50.7%)	
Open laparotomy	46 (62.16%)	28 (36.84%)	74 (49.3%)	

Table 1: Patient baseline characteristics.

Complications (N=74)	Same admission	Re-admission
High output stoma	25 (33.8%)	4 (5.4%)
Acute kidney injury	13 (17.6%)	3 (4.1%)
Small bowel obstruction	1 (1.4%)	3 (4.1%)
Irritant dermatitis	1 (1.4%)	1 (1.4%)
Symptomatic parastomal herniation	0 (0%)	2 (2.7%)

Table 2: Stoma-related complications.

Post-reversal complications (N=57)	N (%)
Ileus	6 (10.5%)
Intra-abdominal/surgical site infection	6 (10.5%)
Small bowel obstruction	1 (1.7%)
Faecal incontinence	1 (1.7%)
Urinary retention	1 (1.7%)
Pneumonia	1 (1.7%)

Table 3: Post-reversal complications.

Variables	**Low AR** (N=78)	**High AR** (N=72)	p-value
Ileus	40 (51.2%)	15 (20.8%)	<0.001
Anastomotic leak	10 (12.8%)	4 (5.6%)	0.126
Complications according to severity			
Clavien-Dindo 0 (no complication)	30 (38.5%)	53 (73.6%)	0.001
Clavien-Dindo 1	24 (30.8%)	9 (12.5%)	
Clavien-Dindo 2	13 (16.7%)	7 (9.7%)	
Clavien-Dindo 3a	1 (1.3%)	1 (1.4%)	
Clavien-Dindo 3b	8 (10.3%)	2 (2.8%)	
Clavien-Dindo 4	2 (2.6%)	0 (0%)	
Reoperation	13 (16.7%)	2 (2.8%)	0.005
	Stoma (N=74)	**Non-stoma** (N=76)	
Mean length of stay	19.3 ± 11.0	8.1 ± 10.7	0.001
Median interval to chemotherapy	64 (29-127)	55 (27-93)	0.036

Table 4: Post-op complication low vs high AR; with vs without stoma.

DISCUSSION

Overall, one in two patients experienced stoma-related complications. Stoma complications were mostly related to excessive output, resulting in AKI. In our study, there were 33.8% of patients experiencing high output stoma in the same admission, which is higher than the other published rate of 16% in patients with stomas.[12, 13] The excessive output with electrolyte loss and the influences of the additional ileocolic manipulation during the creation of protective ileostomies might be attributed to the ileus.[14]

Ideally, the optimal period of stoma reversal is suggested between three and six months. The prolonged interval to closure also exposed the patients to the vast number of stoma-related complications and recurring causes of hospital re-admission.[15] The increased risk of stoma-related complications, either in the same admission or re-admission with additional reversal surgery had cost a significant extra number of bed days in the stoma group comparatively. The reversal surgery is often thought of as a simple procedure; nonetheless, 28% were noted to have further complications in the present study. The prolonged interval to closure could be due to the fact that the time to closure of ileostomy is not subjected to national targets under the National Health Service.

Our studies further illustrated that the low anterior resection, being an inherently more complex and higher risk procedure, entails numerous cases of post-op complication as seen in Table 4 with a higher rate of ileus, Clavien-Dindo score, and reoperation rate ($P<0.05$). AL rate remained higher in the former but failed to show a statistical significance.

This brought us back to the focus of the study; the complication associated with a de-functioning loop ileostomy. Routine creation of loop ileostomies in anterior resection has always been a controversial practice as various conflicting studies showed similar total leakage rates for patients with stoma and those who were not diverted.[3]

The present study has limitations as it was a retrospective analysis and is therefore subject to selection bias. With respect to tumour location, patients with or without stoma are two different cohorts and direct comparison of outcomes could be contentious. The surgeon's decision for creation of a de-functioning stoma could be influenced by the surgeon's training background and personality. Most likely it would relate to the perceived increased risk of anastomotic leak based on several potential risk factors, be it being a male patient, lower location of tumour and neoadjuvant received.[16, 17]

CONCLUSION

This study demonstrated that one in two patients with the de-functioning stoma experienced stoma related complication during the perioperative and post-discharge period. Further complications associated with reversal surgery and cumulative prolonged hospital stay should not be neglected as well. Nevertheless, people could argue that their use reduces the impact of adverse patient outcomes associated with anastomotic leaks or the formation of permanent colostomy.[11, 18]

We appreciate the benefit of a de-functioning loop

ileostomy, but our study simply intended to highlight the creation of the de-functioning stoma in low anterior resection, increases various other stoma-related morbidity that should factored into consideration. A potential short-term benefit of a routine de-functioning loop ileostomy needs to be balanced against potential long-term risks. Therefore, selective use of de-functioning loop ileostomy should only be considered in high-risk patients and when the overall leak and stoma closure-related mortality does not exceed 0.9%.[19, 20] A joint discussion between the patient and surgeon with the complication risk of having an ileostomy in anterior resection should be encouraged to make an informed decision prior to the surgery.

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The Immortal Life of Henrietta Lacks – Rebecca Skloot

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The Immortal Life of Henrietta Lacks is a fascinating and harrowing book which chronicles the life and death of Henrietta Lacks. Henrietta was a black woman, a descendent of slaves, who grew up working Virginia's tobacco fields, and who died in 1951 aged 31 from an aggressive form of cervical cancer. Leaving behind a husband and five young children who had been unaware of the palliative nature of her condition, Lacks died alone on a "coloured ward" in the John Hopkins Hospital, which in 1950s America was the only hospital offering medical treatment to the black community free of charge.

It was during her cancer treatment at the John Hopkins Hospital that samples of the tumour growing on her cervix were removed, without her knowledge or consent, and given to Dr George Gey for cancer research. Medical researchers had previously found it impossible to keep human cell lines alive, but the cancer cells taken from Henrietta thrived in the laboratory and grew at a rapid rate, creating the cell line which would be named HeLa. In developing the HeLa cell line, Gey and his team realised that they had cultured a research tool that could be widely distributed throughout America and the world, and in doing so, created a multibillion-dollar industry – making Henrietta, or at least her cells, immortal. Unbeknown to her family at the time, the HeLa cell line was being used to make huge medical breakthroughs, including in the development of the polio vaccine.

In a book that could very easily have simply become an analysis of the science behind cell culturing, and an account of the scientific and medical advances that were made using the HeLa cell line, Skoot never loses the people, and the person, behind the story. It is written in part as a novel, with the interviews that Skoot carried out with Henrietta's family presented as dialogue. She sets the scene perfectly in each chapter, and at times the back stories of people who were closest to Henrietta do read almost like they could be characters from a work of fiction. Skoot has clearly invested time and energy into building relationships with the Lacks family, and evidently feels a responsibility to tell their story in their own words, which is evident in the tone that the book takes.

While the book predominantly focuses on the life of Henrietta, and the events surrounding her death and the culturing of the HeLa cell line, Skoot also investigates the treatment of Henrietta's eldest daughter, Elsie, who had been institutionalised in the Hospital for the Negro Insane in Crownsville, with the diagnosis of "idiocy". Skoot is persistent in her investigation into the treatment of Elsie, and other patients hospitalised during this time, and touches on the inequalities of the treatment of coloured patients in such institutions, and the history of medical experimentation on them. Skoot's motives behind this line of her investigation do in part appear to be a calculated method of further winning the trust of the Lacks family, but in doing so she does expose some of the more controversial medical practices of the time.

Skoot has seamlessly weaved the history of the Lacks family with scientific explanation, and in doing so tells us the story of a family whose name has become famous in science, with sensitivity and empathy. The Immortal Life of Henrietta Lacks is a must read for those with an interest in medical ethics, and in the development of the technologies used in culturing cell lines. It is a memorable book that documents a story that needs to be told, and which challenges the reader to get to know, and care about, some of the people behind the science.