Nigerian Journal of Surgical Research
Vol. 6, No. 1 - 2, 2004: 49 – 52

ORIGINAL ARTICLE

Anastomotic leakage: experience from a colorectal unit

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Abstract
Background: Whilst the incidence of anastomotic dehiscence is decreasing, it remains a significant setback to the patients and their surgeons. In most centres, minor leaks are treated conservatively but surgery remains an options. Major leaks are best treated aggressively by surgical means, as the mortality among this group of patients remains unacceptably high.
Methods: We reviewed all case-notes, radiological records and histology reports of all patients who underwent major colonic restorative resection between July 1997 and September 199 in order to determine the leak rate and their outcomes. Seven Surgeons (3 Consultant Colorectal surgeons and 4 Senior Colorectal Registrars) were involved in these resections.
Results: Of the 348 restorative resections performed during the study period, 6% leaked. In 52%, the leak was classified as major and all of these patients underwent further surgery. Most leaks followed anterior resection and in most patients the anastomoses were below the peritoneal reflection. Among the minor leaks, four of the patients were defunctioned primarily. Mortality rate among patients with major leaks remain significantly high.
Conclusion: Anastomotic dehiscence remains a significant problem. Although blood supply, nutritional factors, the level of anastomosis and the experience of the surgeon are perhaps the two most important factors that determine the outcome of anastomosis

Key words: Anastomotic dehiscence, outcome,

Introduction

Anastomotic leakage is a major source of post-operative morbidity and mortality after resection for colorectal cancer. It reflects the quality of colorectal surgical care. Although the exact mechanism leading to anastomotic dehiscence remains largely unknown, several factors such as blood flow, bacterial contamination, anastomotic technique, emergency operation, anastomosis in an unprepared bowel and inexperienced surgeon have been implicated. This paper aims at determining the local leak rate and the outcomes among these patients.

Patients and methods

We reviewed case-notes, cross sectional imaging and histology reports of all patients who underwent restorative resection of large bowel and rectum in a major colorectal unit between July 1997 and September 199. Three dedicated consultant colorectal surgeons with four junior surgeons of Specialist Registrar grade were involved in 348 consecutive restorative colorectal resections (M: F = 185: 163, Age range = 16 – 91, Mean age = 66 years). The followings were specifically sought: indication for surgery, type of restorative resection, grade of surgeon, level of anastomosis, and morbidity and mortality.

Anastomotic breakdown was diagnosed if there was: 1) presence of faecal fistula; 2) Anastomotic breakdown identified at laparotomy for peritonitis or during post mortem; 3) Clinical features of a leak confirmed by signmoidoscopy, rectal examination or contrast computed tomography (CT). A leak was considered manor if there was peritonitis, with systemic features such as fever, tachycardia, confusion or signs of shock, whereas a leak that lacks these features and does not warrant surgical intervention was considered minor. Those with leaks were identified as the index group. These patients were compared with other patients who had similar operations but did not leak. This group forms the control.

Except in emergencies, all patients were routinely prepared with Picolax and a low residue diet before the operation. All patients received prophylactic antibiotics (Cefotaxime 1gm and Metronidazole 500mg IV) at induction of anaesthesia. Nasogastric suction was used routinely as was indwelling catheter for up to 5th postoperative day.

In all left-sided resections, the splenic flexure was routinely mobilised. Bowel was transacted between

occlusion clamps and the resection lines cleaned with Betadine/Cetrimide swabs. All anastomoses were stapled except in four cases where this was found to be inadequate and reinforced with hand placed ethibond sutures. Anastomotic integrity was tested by air insufflation test. After anastomosis, gloves were changed in all cases and peritoneal lavage using saline was used in all patients. Abdominal wound was closed by mass closure technique.

In the initial stage of the study, the patients were required to undergo single contrast enema on the 14th postoperative day to ascertain the integrity of the anastomosis. This was later abandoned.

In all patients the American society of Anaesthesiologists (ASA) status, Haemoglobin level, serum protein, presence of systemic illnesses (diabetes mellitus, hypertension, ischaemic heart disease, chronic lung disease), steroid therapy were determined as these are known factors that may affect the outcome of anastomosis. The mode of admission/operation whether elective or emergency was also determined.

Postoperative mortality is defined as any death occurring within 30 days of surgery. Death within leak group (index group) was compared with deaths among the no leak group (control group).

Results

Of the 348 consecutive patients, 272 underwent elective resections whilst 76 patients underwent restorative resections during the 26 month study period. Twenty-one patients (6%) had clinical and radiological evidence of anastomotic leak (Male – 11, Female = 10). There was no significant difference in the age (Mean = 58 years) and sex distribution between the index and control groups (Table 1). The indications for surgery and cancer stage were similar in both groups.

A 6.5 %(n=5) anastomotic leak rate was reported among the emergency resection as compared to 5.8 %(n=16) among elective resections. There were 11 major and 10 minor leaks.

All eleven patients (male = 6, Female = 5) who had major leaks underwent surgical treatment. One patient in this group leaked during routine gastrograffin enema on the 14th postoperative day.

All ten patients with minor leaks (male = 5, Female = 5) were treated conservatively with antibiotics and total parenteral nutrition. Four of these patients were defunctioned electively at the time of the primary resections.

Except in one case, all leaks followed anterior resection (AC) and left sided resection (Table 2). Of the AR, the average the anastomosis was 6cm.

Fifteen leaks occurred in the first year of the study. Eight (53%) of these were performed by junior surgeon. In the second year, 6 leaks ewer recorded but not of these were by trainees.

Of the 83 patients with co-morbidities, eight were on steroid therapy. One of these patients leaked. This patient suffers from chronic obstructive airway disease. He responded to surgical treatment on total parenteral nutrition. He was discharged on the 42nd postoperative day.

Most of our patients were healthy and belong to ASA classes 1 – 111 (n=290). In this group, 6 patients (2%) leaked with 2 deaths. Of the remaining 58 patients belonging to ASA class IV and V, 15 (25%) leaks occurred with 10 deaths. These patients were optimised preoperatively but still succumbed to septic complication.

Twenty-five (7.1%) patients were found to be malnourished and offered nutritional supplement (index group =14, control group = 11). Age appears to be the single most important factor among these malnourished patients. Of the 25 malnourished patients, 92 %(n=23) were over 70 years, male and lived alone.

In most patients the average duration of in-patient stay after operation was 10 days. For those with co-morbidities, the average in-patient stay was 14 days and 30 days for those with a leak.

Eight of the 11 major leaks succumbed to septic complications. Four deaths were recorded among the minor leaks but none of these were of a surgical cause. Two patients died after the 30 days period but as the deaths were due to septic complication following a leak they were included in the final analysis. Thus the overall postoperative morbidity for all comers was 16%, anastomotic leak rate 6% and mortality was 3%.

Table 1: Profile of index and control groups

	Index (n=21)	Control (n=327)
Mean age (years)	59	58
Sex ratio	M: F = 11:10	M: F = 174: 153
Indication of surgery		
Benign	1	33
Malignant	20	294
Dukes Stage		
A	2	20
B	12	216
C	7	58

Table 2: Type of restorative resection, anastomotic leakage and mortality

Types of operation	Number of operations	Anastomotic leaks	Outcome (deaths)
Anterior resections	172	16	12
Total colectomy	31	2	0
Sigmoid colectomy	51	1	0
Right hemicolectomy	45	1	0
Others	49	1	0
Total	348	21	12

Discussion

Over the past few decades, there has been a notable but progressive decline in the incidence of major anastomostic complications, following major restorative resections. [1-3] The present study continues this trend. Despite this improved outcome, complications are often met with dire consequences and result in considerable morbidity, mortality and expense.

The incidence of anastomotic leaks varies widely because of the differences in what constitute a leak. If a leak is defined on the basis of only those requiring surgery, the cited rate is 1.9%[4] but may be as high as 15.9% for radiologically sought leaks. Although in the present series the leak rate was 6%, it is difficult to compare this with other series, as there is no universally acceptable definition for what constitute a leak. This difficulty is compounded by differences in the case mix as well as the level of anastomosis.

Although the effects of co-morbidities, steroid therapy and malnutrition on the outcome of an anastomosis are well-documented, we identified the level of anastomosis to be the most important factor that determines the outcome of a left-sided colonic anastomosis. In the present series, of the patients that underwent anterior resection, the mean level of the anastomosis was 6cm. Of those whose level of anastomosis was less than 6cm, 9.3% leaked compared to 2.3% in patients whose level of was greater than 6cm. Our finding concurs with the report from Cleveland where the level of anastomosis appears to be a significant factor that determines the occurrence of a leak. [5] We are also in agreement with the previously held view that the lower the level of anastomosis, the greater is the risk of a leak. Ideally, such low anastomosis should be preferentially defunctioned. Whilst a stoma may not prevent a leak, the consequences of such a leak can be ameliorated.

Total mesorectal excision (TME) was performed in all patients who underwent anterior resection. The role of TME in preventing tumour recurrence is unquestionable, but it is possible that it compromises the blood supply in this group of patients and therefore predisposes them to a higher leak rate.

There was no signiicant difference in the incidence of leak between emergency and elective resection (6.5% Vs 5.8%). This may be due to the relatively small number of emergency resection. Emergency resection were regarded as high risk and therefore we have a low threshold for referring these patients to intensive care unit.

Although the large bowel cancer project identified the experience of the surgeon and the level of anastomosis as the two factors that significantly influence the outcome of an anastomosis., surgical technique appears to be the most important factor as the incidence of clinical leak for various surgeons involved in the study varied from 0.5% to over 30% [2] In the first year of this study, junior surgeons performed 8 of the15 leaks recorded. By the second year, it was decided that all major colorectal resections must be supervised and no leaks was recorded among the juniors. We believe that this is the way forward especially in all anterior resections and in all high-risk patients.

Following an ‘iatrogenic anastomotic dehiscence’ in a patient during routine gastrograffin enema, we found this unacceptable and have a now abandoned this procedure. Instead, we have found CT-scans to be a satisfactory alternative. In a series by Alves et al [6] CT scan positively identified 89% of leaks compared to 54% by contrast radiography. Our experience is similar.

When anastomotic breakdown occurs, the management is critical to the outcome. Conservative treatment is associated with high mortality except in minor leaks. Right-sided leaks without established peritonitis can be managed by resection of the anastomosis and primary re-anastomosis. In the presence of peritonitis, the anastomosis should be taken down and an end stoma formed.

In left sided leaks, the anastomosis must be inspected by laparotmy to assess the extent of disruption and degree of peritoneal contamination. If peritoneal contamination and anastomotic disruption are minimal, some advocate suturing the point of disruption, but others oppose this because such attempted closure is doomed to failure. [7] The safest option is to take down the anastomosis, resect the two ends of the bowel and exteriorise them with the proximal end as a stoma and distal end as mucous fistula. The peritoneal cavity is lavaged preferably with antibiotics and the abdominal cavity drained.

In minor leaks, conservative management with antibiotics, total parenteral nutrition and adequate resting of the bowel is an acceptable treatment option. These patients must be closely

monitored, as deterioration in their clinical state requires urgent surgical intervention. Localised abscess cavity can be drained under CT guidance.

Anastomotic dehiscence is a significant setback to the patient and the surgeon. A high index of suspicion is required. If in doubt regarding a leak, contrast CT scan is a safe and effective means of confirming the presence of the leak. The threshold for laparotomy where doubt exists should be low. Preoperative optimisation of patients with co-morbidity is paramount to a successful anastomosis. Tension free anastomosis should be employed at tall times and stoma should be used liberally. All anterior resection performed by trainees require a consultant supervision and there is a case for this to be extended to all newly appointed consultant colorectal surgeons at least for the first years of such appointment.

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