

Morbidity and Mortality after Gut Resection and Anastomosis Western Kenya

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Abstract

The objective of this study was to determine the morbidity and mortality after gut resection and anastomosis in a tertiary centre in Kenya. To do this a retrospective, hospital-based study, cohort study of patients who underwent resection and anastomosis in the period 2002 - 2006, both years inclusive. The general surgical wards of Moi Teaching and Referral Hospital (MTRH), a 750 teaching and referral hospital in the Western region of Kenya was used for the study. Two hundred and twenty patients of all ages underwent gut resection and anastomosis for various reasons over the period of study. The primary outcome measures were morbidity and mortality in this group of patients. Morbidity was considered in terms of postoperative complications and hospital length stay. The secondary outcome measures were the patient demography, vital signs at admission and delay in surgery. The morbidity rate was 22.7 % while the mortality rate was 15.9 %. The principal indicators of morbidity were the intra-abdominal pathology, the duration from onset of symptoms to surgery and the type of anastomosis. The patient's age, type of anastomosis and postoperative complications were key determinants of mortality. In conclusion, pre-operative resuscitation in patients who underwent gut resection and anastomosis influenced morbidity and mortality. Delay in surgery and the type of anastomosis done were determinants of post-operative complications which in turn influenced the outcome of treatment.

Keywords: Gut resection, anastomosis, morbidity, mortality

Introduction

Morbidity and mortality in abdominal surgery are matters of great concern to surgeons [1]. To make abdominal surgery better, a good understanding of the factors that determine complications, duration of hospital stay and the outcome of treatment is required [2-6]. This study shares the determinants of morbidity and mortality after gut resection and anastomosis in the hope that it adds to the body of knowledge on the effective management of abdominal surgery especially in the developing world where patients present late and clinical acumen is of utmost significance due to limited resources.

Materials and methods

Patients who had undergone gut resection and anastomosis in the period 2002 - 2006 were identified from the theatre register of operations. The corresponding files were retrieved from the Health Records and Information Department. Those complete for the sought data were entered into the study and information extracted in line with the set objectives as reflected in a pre-designed data sheet. Files that contained inadequate information on the sought data were excluded from the study in spite of the patients having undergone resection and anastomosis. The gathered data was checked for completeness and consistency before being coded and subsequently transferred into a computer using the SPSS version

17.0 software that was used for analysis. The data was analyzed for measures of central tendency and dispersion as well as correlations. Inferential statistics assumed a 95 % confidence interval with an alpha and significant value at $p \leq 0.05$.

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Results

Two hundred and twenty of the 280 files were complete and constituted the study sample. There was a 2.5:1 male to female ratio. The age

ranged from 2 days to 94 years with a mean and standard deviation of 34.7 ± 21.3 years.

Most (54.1 %) of the patients presented 3 days after the onset of symptoms with only 5 % presenting within hours. Two thirds had deranged vital signs at admission. The intra-abdominal pathology was found to positively correlate with the clinical presentation at admission ($p < 0.001$) with intestinal obstruction accounting for the overwhelming majority of patients with deranged vital signs. Preoperative resuscitation was needed in 97.7 % of the patients but only 1 trauma patient required blood transfusion prior to surgery.

Fifty patients developed postoperative complications ranging from wound infection, dehiscence, burst abdomen, anastomotic leak to fistulas. This gave a complication rate of 22.7 %. All the complications were predominantly in the age group 0 - 20 years as seen in **Table 1**.

Table 1 Age and type of complication.

Age in years	Type of complication						Total
	Wound infection	Burst abdomen	Fistula	Anastomotic leak	Others	None	
0 - 20	4	2	14	2	2	51	75
21 - 40	3	1	4	0	3	49	60
41 - 60	3	2	4	1	0	42	52
61 - 80	1	2	0	0	0	23	26
> 80	1	0	0	0	1	5	7
Total	12	7	22	3	6	170	220

The type of anastomosis done ($p = 0.001$) and the duration before surgery ($p = 0.022$) positively correlated with the likelihood of complications after gut resection and anastomosis. Eighty-eight percent of the complications arose in patients who had ileum as a component in the anastomosis. Postoperative complications increased after 6 h of waiting for surgery. Linear regression showed the type of anastomosis done as the strongest predictor of postoperative complication ($p = 0.001$) when compared to intra-abdominal problems ($p = 0.043$) and delay in

surgery ($p = 0.022$). Clinical observations at admission had no significant correlations with postoperative complications ($p = 0.625$).

About 77 % of those who stayed beyond 2 weeks had complications. The type of complication determined the duration of hospital stay ($p < 0.001$) and the outcome of management ($p = 0.006$); fistulas took the longest in the ward, especially when managed conservatively. **Table 2** shows the specific complications and duration of hospital stay.

Table 2 Complications and hospital stay.

Complication	Hospital stay in days				Total
	< 7	7 - 10	11 - 14	> 14	
Wound infection	1	0	1	10	12
Burst abdomen	0	0	1	6	7
Fistula	1	2	2	17	22
Anastomotic leak	0	0	0	3	3
Others	0	1	1	4	6
None	31	87	40	12	170
Total	33	90	45	52	220

Thirty-five patients died, giving a mortality rate of 15.9 %. There was no significant correlation between the state of the patient at admission and outcome of management. The majority of deaths were in the 0 - 20 years age group, accounting for 54.3 % of all deaths. Age ($p = 0.035$), the type of anastomosis done ($p = 0.031$) and the presence of complications ($p < 0.001$) positively correlated with the outcome of treatment. Multivariate analysis found the presence of complications to be the principal determinant in the outcome ($p < 0.001$).

Discussion

The age of patients undergoing resection and anastomosis can vary based on institutional settings and geographical influences. The developing world may have patients of all ages attended at a single unit while in developed countries specialties will have influence on the ages in studies. The mean and standard deviation (mean 34, SD) in this study compares favourably with the mean and SD 30 years found by Chatterjee and colleagues in India [3]. The young population as in this study in which the range was 2 days to 94 years of age will have lower means and standard deviation as compared to the 59.1 SD years [7] and 46.7 SD years [4] mean ages noted in studies in United States of America and Iran respectively. The male: female ratio of 2.5:1 in this study compares well with the 2.2:1 in the Indian study [3].

The inordinate delay in seeking medical attention can explain the deranged vital signs at admission and the need for resuscitation close to 98 % of the patients studied. This is probably an

indication of both the health seeking habits of the patients and the infrastructural deficiencies in the developing world and their impacts on surgical health care.

Postoperative complications after gut resection and anastomosis may be influenced by a number of factors including whether the surgery was elective or emergency. Chatterjee and others found the duration prior to admission to be a determinant [3]. This is in keeping with the findings in this study that the lapse of time before surgery predicted likely postoperative complications. The complication rates vary from study to study. Neil *et al.* found an anastomotic leak of 2.7 % [7] while Seyd and others had a surgical site infection rate of 17.4 % [4]. When looked at in totality, complications after gut resection and anastomosis can range from 15 % [8] to 44 % [9]. The study's 22.7 % fits well within this wide range.

The peritoneal condition has been found in studies to be a determinant of the success or failure of anastomosis. Perforations and peritonitis tend to yield poor results of primary gut anastomosis [10,11]. Ahrendt and his colleagues found ileostomy more appropriate in a soiled peritoneum than an anastomosis that stood high chances of dehiscence [11]. Our study did not consider fashioning of ileostomies and some of the anastomotic failures could be attributed to the routine anastomosis of gut given that the bulk of the complications arose in those who had a contaminated peritoneum.

Anastomoses in which ileal segments were used had higher rates of complications than in colonic segments. Neil and his colleagues have

noted the same in the USA [7] and it is presumed that the ileum has higher levels of peritoneal soiling as opposed to, for example, sigmoid volvulus that has minimal contamination. Raveenthiran found that only the gangrenous colon had infections comparable to ileal anastomosis [12].

The presence and type of complication determined the duration of hospital stay. The longest period was 71 days for a patient who developed enterocutaneous fistula and was managed conservatively. A policy of clinical decisions that best help the patients may be required as suggested by Thomas and Tom who proposed maximisation of experienced clinical opinions in the management of patients [5]. Such a policy would minimise morbidity.

The mortality rate of 15.9 % witnessed in this study is in trend with the findings that mortality after gut resection and anastomosis may be as low as 9.7 % [8] and as high as 28.2 % [3]. Kirk found mortality as high as 42.5 % among those who developed postoperative complications [13]. In this study, 36 % of those who got postoperative complications died, compared to 10 % in those who had no complications and the group's 15.9 % overall mortality rate.

Conclusions

Pre-operative resuscitation in patients who underwent gut resection and anastomosis influenced morbidity and mortality. Delay in surgery and the type of anastomosis done were determinants of post-operative complications which in turn influenced the outcome of treatment.

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References

[1] EA Ameh, PM Dogo, MM Attah and PT Nmadu. Comparison of three operations for typhoid perforation. *Br. J. Surg.* 1997; **84**, 558-9.
[2] RB Galland and J Spencer. Surgical management of radiation enteritis. *Surgery* 1986; **99**, 133-9.

[3] H Chatterjee, D Pai, S Jagdish, N Satish, D Jayadev and P Srikanthreddy. Pattern of nontyphoid ileal perforation over three decades in Pondicherry. *Trop. Gastroenterol.* 2004; **24**, 144-7.
[4] MR Seyd, I Mohammed, SK Ahmad and J Ali. Abdominal surgical site infections: incidence and risk factors at an Iranian teaching hospital. *BMC Surg.* 2005; **5**, 1-5.
[5] ER Thomas and B Tom. Preoperative risk scores for the prediction of outcome in elderly people who require emergency surgery. *World J. Emerg. Surg.* 2007; **2**, 1-10.
[6] MM Arden, B Laura-Mae, M Barbara, JA Dominitz, WE Barlow, SA Dobie and KG Billingsley. Reoperation as a quality indicator in colorectal surgery: a population-based analysis. *Ann. Surg.* 2007; **245**, 73-9.
[7] H Neil, LM Thomas, O Turner, B Burns and PA Cataldo. Anastomotic leaks after intestinal anastomosis: it is later than you think. *Ann. Surg.* 2007; **245**, 254-8.
[8] S Hennekinne-Muci, JJ Tuech, O Brehant, E Lermite, R Bergamaschi, P Pessaux and JP Arnaud. Emergency subtotal/total colectomy in the management of obstructed left colon carcinoma. *Int. J. Colorectal. Dis.* 2006; **21**, 538-41.
[9] EH Farthmann, A Imdahl and S Eggstein. Radiation enteropathy. *Strahlenther Onkol.* 1994; **170**, 437-40.
[10] E Gurlevik and G Gurlevik. Small bowel volvulus: a common cause of mechanical intestinal obstruction in our region. *Eur. J. Surg.* 1998; **164**, 51-5.
[11] GM Ahrendt, K Gardener and A Barbul. Loss of colonic structural collagen impairs healing during intraabdominal sepsis. *Arch. Surg.* 1994; **129**, 1179-83.
[12] V Raveenthiran. Restorative resection of unprepared left colon in gangrenous vs viable sigmoid volvulus. *Int. J. Colorectal. Dis.* 2004; **19**, 258-68.
[13] RM Kirk. Reoperative surgery for early complications following abdominal and abdominothoracic operations. *J. Roy. Soc. Med.* 1988; **81**, 7-9.