

# Emergency abdominal surgery in Zaria, Nigeria

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## Summary

**Background.** The causes of abdominal surgical emergencies in a particular setting may change because of alterations in demographic, socio-economic or geographical factors. We present the pattern, management and outcome of such emergencies in Zaria, Northern Nigeria.

**Methods.** This is a retrospective review of prospectively collected data conducted in a tertiary health centre between 2001 and 2005. Patients aged 14 years and over with abdominal surgical emergencies were consecutively entered into the study at the time of admission. The frequencies of different diagnoses, management and outcome were recorded. The indications for and outcome of operative treatment were compared with a similar study performed about two decades ago in our institution.

**Results.** There were 3 717 patients, accounting for 29.5% of all emergency surgical admissions. The mean age was 32.5 years. The most common diagnoses were appendicitis (996, 26.8%), nonspecific abdominal pain (871, 23.4%), intestinal obstruction (498, 13.4%) and abdominal trauma (245, 6.6%). In all, 1 788 patients (48.1%) had operations during their emergency admission compared with 37.0% in our previous study. Appendicectomy (903, 50.5%) was the most common operation. Operations for abdominal trauma and typhoid ileal perforation have increased, while operations for strangulated external hernia and perforated duodenal ulcer have decreased. Of the 169 (4.5%) patients who died, 107 (6.0%) died after an operation. Delayed presentation increased mortality.

**Conclusions.** Operations for appendicitis, infectious diseases and trauma have increased while those for strangulated external hernia have decreased. The expense of surgery contributes to late presentation and delayed intervention, which impact negatively on treatment outcome.

Abdominal surgical emergencies constitute a significant portion of a surgeon's clinical experience and often present diagnostic and treatment challenges, particularly in poorly

resourced environments with a lack of modern medical facilities. Although ancillary investigations may improve diagnostic accuracy, a reasonable differential diagnosis can be made at the bedside in the majority of patients. The major causes of abdominal emergencies vary from region to region, and even within the same region socio-economic, cultural or geographical factors may alter the pattern. Periodic review is therefore needed.

There are significant differences in the prevalence of most gastro-intestinal emergencies in tropical compared with temperate countries.<sup>1</sup> Recent reports indicate a change in the clinical spectrum of abdominal emergencies in the West African sub-region.<sup>2,3</sup> In the past, intestinal obstruction from strangulated inguinal hernia was the leading cause of abdominal emergencies in developing countries.<sup>2</sup> While the prevalences of acute appendicitis and nonspecific abdominal pain (NSAP) have increased, postoperative adhesions have become the leading cause of acute intestinal obstruction.<sup>2,3</sup> Penetrating abdominal injury has also become a common reason for emergency admission.<sup>2</sup>

In our institution, acute appendicitis has become the leading cause of emergency admissions. Infection and surgical complications of communicable diseases transmitted by the faeco-oral route or by sexual contact, including typhoid ileal perforation, HIV infection, abdominal tuberculosis and pelvic inflammatory disease, have increased. In many cases investigations, and occasionally even laparotomy, led to no specific diagnosis. These are considered to be cases of NSAP.<sup>4</sup> Late presentation to hospital is frequent in our population. Coupled with delays in access to theatre due to limited availability, this contributes to increased morbidity and mortality.

This study was conducted to document the pattern of abdominal surgical emergencies in our institution. Their management and outcome was also reviewed and compared with a similar study performed in our institution about two decades ago.<sup>5</sup>

## Patients and methods

This study was carried out in Zaria, Northern Nigeria. The population is served by several private and public clinics. However, only Ahmadu Bello University Teaching Hospital, a tertiary health centre, has specialised surgical services, so

the majority of patients requiring emergency surgery are admitted there. Patients aged 14 years and over, admitted with general surgical abdominal conditions between 2001 and 2005, were consecutively entered into the study at the time of admission, monitored until death or discharge from hospital, and reviewed prospectively. Gynaecological and urological diseases that were clinically misdiagnosed as acute general surgical conditions were included. Investigations performed included full blood count and measurement of serum urea and electrolytes. Ultrasound facilities were available only during daytime hours. In appropriate cases, a screening test for HIV antibodies was performed by parallel testing using enzyme-linked immunosorbent assay (ELISA) with Immunocomb II HIV-1 and HIV-2 Combifirm (M/S Orgenics Ltd, Israel) and Stat Park (Trinity Biotech, Wicklow, Ireland). As per protocol, patients were resuscitated with appropriate fluids and electrolytes. Although patients were given appropriate peri-operative broad-spectrum antibiotics, the drug regimen was not uniform. Frequency of abdominal surgical emergency admissions, proportions of the different diagnoses, proportions of patients undergoing surgery during their emergency admission, and mortality were studied. The intervals between onset of symptoms and presentation at hospital and between presentation and surgical intervention were recorded, as was the age and sex distribution of the patients.

Significant changes in the prevalence of various diseases were determined by comparing the above data with a similar study performed in our hospital about two decades ago.<sup>5</sup> Data were analysed using SPSS statistical software (version 14.0, SPSS, Chicago, IL). Quantitative data were expressed as means (standard deviation (SD)). For non-parametric data, median values with 95% confidence intervals and ranges were presented. Categorical variables were presented as percentages. Statistical comparative analysis was performed using Student's *t*-test. A *p*-value of less than 0.05 was taken as significant.

## Results

During the study period 3 717 patients were admitted as abdominal surgical emergencies, accounting for 29.5% of emergency admissions. Their ages ranged from 14 to 86 years (mean 32.5 (SD 3.8) years). The male/female ratio was 1.6:1. Duration of symptoms before presentation to hospital ranged from 3 hours to 14 days (mean 3 (SD 1.2) days). The final clinical diagnoses are shown in Table I. The most common diagnosis was appendicitis (996 patients, 26.8%). Intestinal obstruction, mainly from strangulated external hernia, accounted for 498 admissions (13.4%). Of the 245 patients (6.6%) with abdominal trauma, 122 (49.8%) had penetrating injuries, of which 48 (39.3%) resulted from road traffic accidents, 27 (22.1%) from gunshots and 43 (35.2%) from assaults with knives or machetes. About one-third of these patients were treated by observation. Gynaecological conditions, seen in 250 patients (6.7%), consisted of acute pelvic inflammatory disease in 135 (54.0%), ruptured ectopic pregnancy in 38 (15.2%) and ruptured graffian follicle in 21 (8.3%). In 871 cases (23.4%) no specific diagnosis had been made by the time of discharge from hospital. These patients were considered to have NSAP.

The operations performed were compared with a similar study undertaken from 1979 to 1983 in our hospital (Table II).<sup>5</sup> Operations for appendicitis, infectious diseases and trauma have increased significantly, while those for strangulated external hernia and perforated peptic ulcer have decreased. Overall, 1 788 (48.1%) patients underwent surgery during their emergency admissions, compared with 37.0% in the earlier period, the most common operation being appendectomy (903 patients, 50.5%). Among the patients who underwent appendectomy, 172 (19.0%) had a negative appendectomy, 548 (60.7%) had an acutely inflamed appendix, and 183 (20.3%) had complicated appendicitis including gangrenous and perforated appendix. Emergency colonic resections were carried out in 42 patients, 25 (59.5%)

**TABLE I. DIAGNOSES IN 3 717 EMERGENCY ABDOMINAL SURGICAL ADMISSIONS**

Diagnosis	Frequency	Cumulative frequency	Relative frequency
<b>Appendicitis</b>	<b>996</b>	<b>996</b>	<b>0.268</b>
<b>Nonspecific abdominal pain</b>	<b>871</b>	<b>1 867</b>	<b>0.234</b>
<b>Intestinal obstruction</b>	<b>498</b>	<b>2 365</b>	<b>0.134</b>
<b>Gynaecological disease</b>	<b>250</b>	<b>2 615</b>	<b>0.067</b>
<b>Abdominal trauma</b>	<b>245</b>	<b>2 860</b>	<b>0.066</b>
<b>Typhoid ileal perforation</b>	<b>214</b>	<b>3 074</b>	<b>0.057</b>
<b>Urological diseases</b>	<b>104</b>	<b>3 178</b>	<b>0.028</b>
<b>Abdominal malignancy</b>	<b>96</b>	<b>3 274</b>	<b>0.026</b>
<b>Peptic ulcer disease</b>	<b>94</b>	<b>3 368</b>	<b>0.025</b>
<b>Superficial abscess</b>	<b>81</b>	<b>3 449</b>	<b>0.022</b>
<b>Peri-anal suppuration</b>	<b>78</b>	<b>3 527</b>	<b>0.020</b>
<b>Gastro-enteritis</b>	<b>23</b>	<b>3 550</b>	<b>0.006</b>
<b>Cholecystitis/biliary colic</b>	<b>47</b>	<b>3 597</b>	<b>0.013</b>
<b>Acute gastro-intestinal bleeding</b>	<b>37</b>	<b>3 634</b>	<b>0.010</b>
<b>Intra-peritoneal abscess</b>	<b>37</b>	<b>3 671</b>	<b>0.010</b>
<b>Other*</b>	<b>46</b>	<b>3 717</b>	<b>0.012</b>
<b>Total</b>	<b>3 717</b>		<b>1.000</b>

\*Includes acute pancreatitis – 8; acute tuberculous peritonitis – 10; entero-cutaneous fistula – 13; spontaneously ruptured umbilical hernia – 3; liver abscess – 6.

**TABLE II. COMPARISON OF DIAGNOSES FOLLOWING EMERGENCY ABDOMINAL OPERATIONS**

	1979 - 1983 (N=1 725) <sup>5</sup>		2001 - 2005 (N=1 788)		1981 - 2005, confidence interval	p-value
	N	%	N	%		
<b>Significant increase in prevalence</b>						
Appendicitis	576	33.4	903	50.5	79.3 - 152.0	<0.01
Typhoid ileal perforation	47	2.7	168	9.4	8.6 - 45.4	<0.01
Trauma	102	5.9	164	9.2	3.4 - 37.0	<0.05
Cholecystitis/biliary colic	6	0.4	26	1.5	1.7 - 7.6	<0.05
Intra-perineal abscess	23	1.3	38	2.1	2.6 - 8.1	<0.05
Superficial abscess	5	0.3	25	1.4	1.3 - 5.4	<0.04
Gynaecological disease	-	-	44	2.5	0.5 - 14.8	<0.01
Intra-abdominal malignancy	20	1.1	26	1.5	1.2 - 7.2	<0.01
Adhesions, intestinal obstruction	28	1.6	59	3.3	4.8 - 13.5	<0.05
<b>Significant decrease in prevalence, or remained the same</b>						
Strangulated external hernia	737	42.7	261	14.6	-35.7 - -86.2	<0.001
Perforated peptic ulcer	41	2.4	23	1.3	-2.4 - -9.5	<0.01
Volvulus	38	2.2	10	0.6	-2.0 - -7.4	<0.05
Primary peritonitis	28	1.7	9	0.5	-1.8 - -6.1	<0.05
Intussusceptions	39	2.3	18	1.0	-2.4 - -7.5	<0.05
Internal hernia	10	0.6	7	0.4	-0.8 - 2.8	>0.05
Others	25	1.4	7	0.4	-0.7 - 13.5	>0.05

of whom had had malignant large-bowel obstruction, 15 (35.7%) gangrenous bowel and 2 perforations. Twenty-two patients underwent colonic resection and primary anastomosis, and of these 1 had a relaparotomy because of an anastomotic leak with peritonitis. Twenty patients (47.6%) had a colostomy, which was closed between 2 weeks and 6 months after resection in 13 cases (65.0%). The mean time that elapsed between presentation at hospital and surgical intervention was 18 hours (SD 4.5 hours).

The duration of hospital stay ranged from 3 to 46 days (mean 7 (SD 3.7) days). Of the patients 169 died, giving a mortality rate of 4.5%, the postoperative mortality rate being 6.0%. Of the 62 non-operative deaths, 20 occurred while the patient was being prepared for surgery. Most non-operative deaths were in elderly patients with massive gastro-intestinal haemorrhage and advanced intra-abdominal malignant disease. Postoperative mortality rates were high in patients with intra-abdominal malignancy (28.0%), perforated duodenal ulcer (23.1%), typhoid ileal perforation (18.0%) and intestinal gangrene (9.5%). Ten HIV-infected patients whose HIV status was not known pre-operatively died after operation. Screening for HIV antibodies was performed on the basis of clinical suspicion (7 cases) or the patient's declaration (3). The duration of patient follow-up in the surgical outpatient department ranged from 2 weeks to 38 months; 2 058 patients (55.4%) were followed up for more than 6 months and 859 (23.1%) for more than 12 months.

## Discussion

Abdominal diseases accounted for 29.5% of our emergency admissions, in keeping with a prevalence of 13 - 48% in previous series.<sup>3,4</sup> Of our patients 48.1% underwent surgery, which is in agreement with other reports,<sup>2,3</sup> although it is markedly higher than the 4.4% reported from Kenya.<sup>6</sup> Our high rate of emergency operations could be due to the large number of trauma patients and the tertiary referral nature of

our institution. Appendicitis was the most common diagnosis, and accounted for 50.5% of operations in this study compared with 33.4% in the previous report from our centre.<sup>5</sup> An increased rate of enteric infections due to low standards of sanitation, which may trigger lymphoid tissue reaction in the appendix wall and initiate inflammation,<sup>7</sup> could explain the rising prevalence of both typhoid fever and appendicitis in our setting.<sup>2,3,6</sup> Because of late presentation 45.0% of our patients with appendicitis presented with advanced disease, similar to other reports from our sub-region.<sup>2,3</sup> These patients presented with gangrene or perforation of the appendix and generalised peritonitis, which are associated with increased morbidity. The negative appendectomy rate of 19.0% in this study compares favourably with other reports.<sup>3,6</sup> Although observation may reduce the rate of unnecessary appendectomy, such a policy will increase the rate of perforation, which undoubtedly results in increased morbidity and mortality. Unnecessary appendectomy in our patients was mainly due to misdiagnosis of appendicitis in patients with NSAP. The rate of misdiagnosis is higher than that in developed countries, probably because self-medication and late presentation were common in our patients.<sup>4</sup> In this study, discharge of fit patients with NSAP was delayed because of having to wait for inpatient investigation results. However, such caution is justified in elderly patients, in 10% of whom malignant disease was found to be the cause of NSAP.<sup>8</sup>

Gynaecological emergencies accounted for 6.7% of our admissions, compared with 9.5% in Ghana.<sup>2</sup> About 28% of these underwent surgery, compared with 24% reported by others.<sup>9</sup> In these cases it was often difficult to differentiate between acute appendicitis and an acute gynaecological condition on clinical examination alone. A recent report from Kenya showed that of women presenting with abdominal pain, 65.3% and 16.3% had ectopic pregnancy and acute appendicitis, respectively.<sup>6</sup> Lack of ultrasound facilities makes it difficult to diagnose these conditions early. The high preva-

lence of gynaecological conditions in this study implies that surgical training programmes need to equip surgeons to deal with gynaecological pathology that may present as an acute abdomen.

Previous studies from our sub-region have consistently shown strangulated external hernia to be a major cause of intestinal obstruction.<sup>3,5</sup> While it was the leading cause of small-bowel obstruction in our study, its prevalence has decreased. This may be because elective hernia repair is becoming more widely available and accepted. Intestinal obstruction resulting from adhesions is increasing and has become the leading cause of intestinal obstruction in some reports.<sup>2,10</sup>

Colon cancer was the most common cause of large-bowel obstruction in our study, in contrast to a report from Ghana, in which volvulus was the leading cause of such obstruction.<sup>10</sup> As has been reported by others, we treated patients who did not have generalised peritonitis and were haemodynamically stable at the time of surgery by resection and primary anastomosis without on-table lavage.<sup>11,12</sup> However, it should be stressed that a safe colocolonic anastomosis depends on appropriate judgement, a good blood supply, a tension-free anastomosis and meticulous technique. In 20 (48.1%) of our patients colostomy was necessary in order to avoid anastomotic leak, which is often associated with high mortality and morbidity.

Penetrating abdominal injuries were uncommon in the past, but the rate has increased to 49.8% in this report. Previously gunshots caused 2.5% of penetrating abdominal injuries, compared with 22.0% in this study.<sup>5</sup> Others have observed a 10-fold rise in the incidence of abdominal gunshot injuries, as in a 1990s report from Lagos, Nigeria.<sup>13</sup> In this report 30 patients with stab wounds were observed, 5 (16.7%) of whom underwent exploration, which was negative in 2 cases. There were 11 patients with gunshot injuries, 3 (27.3%) of which were later explored. Delayed exploration was not associated with increased morbidity. In this as in other reports selective observational treatment of penetrating abdominal injuries was found to be safe and superior to routine exploration.<sup>10,13</sup> In our setting, operations for perforated peptic ulcer have decreased from 2.4% to 1.3% of emergency operations.<sup>5</sup> In Ghana, however, operations for closure of peptic ulcer perforation are reported to have increased and to account for 17.3% of emergency abdominal operations.<sup>10</sup> Haemorrhage has remained an uncommon mode of presentation in our patients.

Our mortality rate of 4.5% compares favourably to other reports.<sup>2,3,10</sup> The highest postoperative death rate in this study was associated with laparotomy for abdominal malignancy. In this situation mortality can be reduced by the use of laparoscopy rather than laparotomy. Ten of 14 patients who died following evacuation of an abscess had an HIV-

related infection that we did not know about before the operation. In areas of high HIV prevalence routine clinical evaluation may miss a significant number of asymptomatic immunocompromised patients. This situation calls for the routine application of uniform guidelines for the prevention of transmission of infections in surgical patients.

The limitations of this study include lack of long-term follow-up, which precludes assessment of long-term outcome. In addition, laparoscopy and regular abdominopelvic ultrasonography would have improved the diagnostic yield, especially of gynaecological pathology, and probably reduced the prevalence of NSAP.

In conclusion, our data show a change in the pattern of emergency abdominal surgery in our institution. Diagnoses that have become more frequent include appendicitis, nonspecific abdominal pain, typhoid ileal perforation and abdominal trauma. These can be reduced by health education, improved sanitation and enactment and enforcement of appropriate road traffic regulations. Initial management includes fluid resuscitation and treatment of any sepsis with antibiotics and analgesics. Prompt laparoscopy or laparotomy may be indicated, particularly if a perforated viscus is suspected. It is hoped that this study will provide guidelines for future surgical training and help surgeons who practise in our setting to determine the proportional risks attached to different types of operations and diseases and the attendant resource implications.

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