Abdominal Surgical Emergencies at Tikur Anbessa Specialized Hospital in Ethiopia; A Shifting Paradigm

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Background: ***Developing nations in Africa may be experiencing changing demographics for abdominal surgical emergencies. In the past, intestinal obstruction has been the major diagnosis, but this may be changing.[123] This study analyzed the causes and outcomes for abdominal surgical emergencies (ASE) in Tikur Anbessa Specialty Hospital (TASH) in Addis Ababa, Ethiopia.***
Methods: ***TASH is a tertiary medical center and teaching hospital. This is retrospective study included patients treated for ASE from July 1, 2010 to June 30, 2012. Information was collected in de-identified manner for analysis from the operating room logbook and from chart review. We analyzed demographics, clinical presentation and outcomes of emergency surgery in these patents using SAS 9.2 software. Univariant analysis was performed. P value < 0.05 was considered significant.***
Results: ***A total of 530 patients presented with ASE, representing 18.6% of all surgical emergencies. Of these, 328 charts were available for review. 237 (72.3%) were males and the mean age was 36 years. Appendicitis (simple and complicated combined) were the most common cause of ASE accounting for 92 (28.0%). Bowel obstruction and penetrating trauma were present in 17% and 13% of the time respectively.***
The Overall Morbidity and mortality rates were 30% and 18% respectively. Wound infection and Pneumonia were the two most common post operative complications accounting for 25% and 12% respectively. A total of 61 patients (18.6%) died following ASE. Septic complications accounted for over 50% of the death. Mortality was significantly higher in patients with age >60 years (p< 0.0001) and in those who developed post operative complications. (p< 0.0001)
Conclusion: ***The causes for ASE at TASH in Ethiopia have changed with appendicitis being the most common. This study shows a higher morbidity and mortality rates when compared to previous reports. Further study is required to understand better specific interventions needed to reduce this high mortality due to sepsis.***

Introduction

The etiologies for abdominal emergency surgery in Ethiopia appear to be changing. Understanding this shift will be important for future medical interventions in Ethiopia. The few studies that have evaluated the epidemiology of abdominal surgical emergencies in this area of the world found intestinal obstruction to be the most common cause for acute surgical intervention. In the developed world, however, it has held true for some time that appendicitis is the major cause of abdominal surgical emergencies. Some of these studies suggest socioeconomic factors and cultural diet accounting for the differences of causation for abdominal surgical emergencies (ASE) between developed and less developed countries in the past.

Little is known about the change in the causative patter[1,2,3] n of ASE in Ethiopia. The purpose of this retrospective study was to investigate the causes of ASE and asses the surgical outcomes as it relates to morbidity and mortality in an urban tertiary care hospital setting in Ethiopia.

Methods

This retrospective study was conducted in a tertiary medical care facility, Tikur Anbessa Specialized Hospital (TASH). TASH is located in the capital of Ethiopia, Addis Ababa. This hospital is the main referral hospital for the country. Ethiopia's population was estimated to be 93.8 million in July 2012 with approximately 3 million people living in Addis Ababa[1]. TASH has 600 beds and 8 operating theaters. As of February 2011 a separate additional operating theater was built for emergency surgeries only.

Inclusion criteria for this study required patients to be over the age of 18 presenting with abdominal surgical emergencies (ASE) between July 1, 2010 and June 30, 2012. The data was collected from operating room logbooks and patient charts were reviewed based on initial diagnosis documented in the logbook. Data from these charts were collected in a de-identified manner and entered into an excel spreadsheet. Variables including demographic information, presenting symptoms, duration of symptoms, lab values, post-operative complications and mortality were recorded. All data was subsequently analyzed using SAS 9.2 software. Univariant analysis was performed. P value < 0.05 was considered significant.

Results

A total of 2,842 emergency surgeries were logged from July 1, 2010 to June 30, 2012. This number included pediatric surgeries. Of these surgical emergencies, 530 were abdominal surgical emergencies (ASE) in patients over the age of 18, accounting for 18.6% of the emergency surgeries performed at TASH. 328 of these patient charts were available for further review. This study used all available data in the patient's chart, even if certain aspects of the charts were missing, the chart was still included in the study. Most (237) of the patients were males with a male to female ratio of 2.6:1. The mean age was 35.6 ($\pm$ 15.8 years). The majority of the patients were found to be between the ages of 18-24 years. Two hundred and six patients (63%) reported to be living in the city of Addis Ababa, while 81 patients (25%) claimed to have traveled more than 100km to TASH. The remainder of the patients traveled from outside of Addis Ababa, but not further than 100km. The most common cause of ASE was appendicitis (simple: N=59 and complicated: N=33 combined) representing 28% of all of the cases (N=92) (Table 1). Intestinal obstruction was the second most common cause of ASE with 56 patients (17%). There were 42 (13%) penetrating abdominal injuries and 12 (3.7%) penetrating thoracoabdominal injuries reported.

Out of the 530 cases, only 328 charts were available for complete review. There were 61 deaths recorded during the study period (18.6%) and 98 post-operative complications accounting for a morbidity rate of 30% (46 charts were missing data on post-operative complications). Almost half of the patients who developed complications (N=52) died. The most common cause of death was septic shock at 29.5%, followed by sepsis at 19.7%. 10 patients (16%) died of cardiac arrest. Intestinal obstruction was the most common diagnosis (14 cases, 23%) of patients associated with mortality, followed by perforated PUD (6 cases, 9.8%) while acute appendicitis (simple + complicated) accounted for 3.3% of post-operative mortality (Table 2). Of the 328 patients reviewed for ASE, 65 were operated for trauma. Gunshot wounds (13 cases), stab injuries (40 cases), or road traffic accidents (12 cases) accounted for these surgeries. Mortality in this group of patients included 5 (39%) of the patients presenting with gunshot wounds. Mortality rates of the stab wound injuries and road traffic accident patients were 10% and 25% respectively. The mean age of patients who died was 46.6, while the mean age of surviving patients was 32.9; however there was no statistically significant difference.

Table 1. Diagnosis by age group

Age	Simple Appendicitis No. (%)	Complicated Appendicitis No. (%)	Intestinal Obstruction No. (%)	Blunt Abdominal Injury No. (%)	Penetrating Abdominal Injury No. (%)	Perforated PUD No. (%)
18-24	26 (44)	16 (48)	7 (13)	3 (12)	14 (33)	4 (16)
25-30	16 (27)	6 (18)	6 (11)	11 (44)	14 (33)	6 (24)
31-40	14 (24)	5 (15)	9 (16)	10 (40)	10 (24)	11 (44)
41-50	1 (1.7)	3 (9.1)	9 (16)	0 (0)	1 (2.4)	2 (8.0)
51-60	2 (3.4)	2 (6.1)	13 (23)	0 (0)	1 (2.4)	2 (8.0)
>60	0 (0)	1 (3.0)	12 (21)	1 (4)	2 (4.8)	0 (0)
Total	**59**	**33**	**56**	**25**	**42**	**25**

Table 2. Diagnosis and Associated Mortality and Morbidity

Refined Diagnosis	Mortality No. (%)	Morbidity No. (%)	Total No. (%)
Simple Appendicitis	0 (0)	2 (2.1)	59 (18.0)
Intestinal Obstruction	14 (23.0)	22 (22.9)	56 (17.1)
Penetrating Abdominal Injury	5 (8.2)	12 (12.5)	42 (12.8)
Complicated Appendicitis	2 (3.3)	7 (7.3)	33 (10.1)
Blunt Abdominal Trauma	5 (8.2)	9 (9.4)	25 (7.6)
Perforated PUD	6 (9.8)	7 (7.3)	25 (7.6)
Abscess	4 (6.6)	5 (5.2)	12 (3.7)
Penetrating Thoracoabdominal Injury	4 (6.6)	3 (3.1)	12 (3.7)
Perforated Viscus	5 (8.2)	8 (8.3)	9 (2.74)
Hernia	1 (1.64)	1 (1.0)	8 (2.44)
Sigmoid Volvulus	4 (6.56)	4 (4.2)	7 (2.13)
Cancer	2 (3.28)	2 (2.1)	5 (1.52)
Peritonitis	1 (1.64)	2 (2.1)	5 (1.52)
Perianal Injury	1 (1.64)	4 (4.2)	4 (1.22)
Missing	1 (1.64)	2 (2.1)	6 (1.83)
Other	6 (9.84)	8 (8.3)	20 (16.4)
TOTAL	**61**	**98**	**328**

Table 3. Mortality and Morbidity by Age

Age	Mortality No. (%)	Morbidity No. (%)	Total No. (%)
18-24	4 (6.56)	11 (11.2)	91 (27.7)
25-30	11 (18.0)	24 (24.5)	76 (23.2)
31-40	14 (23.0)	24 (24.5)	76 (23.2)
41-50	10 (16.4)	12 (12.2)	27 (8.23)
51-60	9 (14.8)	10 (10.2)	30 (9.15)
>60	13 (21.3)	17 (12.35)	28 (8.54)
Total	61	98	328

In the subgroup analysis by age, 14 patients (23% of all deaths) between the ages of 31-40 and 13 patients (21.3% of all deaths) over 60 years died following ASE. Mortality was significantly higher in patients with age >60 years ($p< 0.0001$) as well as in those who developed post-operative complications ($p< 0.0001$). The peak age group of patients presenting with ASE were between the ages of 18-24 years with 91 cases, only 4 of these patients died post operatively (Table 3).

Of the 237 males presenting with ASE, 41 died (17.3%). While 20 of the 91 females (22%) died following ASE. The male to female ratio of deaths was 2:1. Of the 98 patients with post-operative complications, 64 were male and 34 were female.

Discussion

There are few studies discussing the causes of ASE in Ethiopia. In these studies, intestinal obstruction was almost always cited as the major cause of ASE.[1, 2,3] However few studies have noted the shift in diagnosis from intestinal obstruction to appendicitis in African populations[5]. This trend of lower rate of intestinal obstruction could likely be due to the Westernization (i.e. diets consisting of lower portions of fiber) in certain regions in Africa. It could also be accounted for by improved hygiene methods, which help to lower parasites and worms in the gut that can cause obstruction. A study conducted at Yirgalem hospital (a rural hospital 312 km south of Addis Ababa) in 1997 analyzed 229 patients admitted for acute surgical abdomen. This study found 48.9% of their patients to have intestinal obstruction as the most common cause, followed by acute appendicitis at 31.4%. It has been suggested that populations in urban areas generally have a lower intake of dietary fiber as well as better hygiene. It is thought that these factors may contribute to a lower incidence in intestinal obstruction in these populations. Similar to other reports from Africa, our study found that the majority of patients with simple and complicated appendicitis were under the age of 30, while the majority patients with intestinal obstruction were over the age of 30. The mortality rate of these 229 patients was 13.5%, which is lower than the mortality rate observed in our study.[1]

A study conducted at TASH between 2002-2006 found that overall mortality among all surgical admissions was 6.9% with a postoperative mortality rate of 4.5%. This same study found the mortality rate among surgical patients admitted for emergency surgery was 16%. This is only slightly lower than our mortality rate of 18.6%. The authors of this study stated that the high mortality rates were due to the referral pattern where patients admitted to TASH present with more advanced stages of illness and critical conditions. For this reason, there is little curative surgery can do at that point[6].

Wound infection rate in sub-Saharan African countries is an ongoing problem. A study in Nigeria found that wound infection rate for surgeries involving the small bowel and colon to be 17.4%. Our study reported an infection rate of 25% (4/16) for patients undergoing surgeries for intestinal obstruction, 20% (8/40) infection rate for penetrating injuries, 13.5% (4/22) for peritonitis and 0% (0/27) for appendicitis. Of the abdominal surgeries observed in this study, 106 of the 144 were emergent. 23 of these emergency surgeries reported wound infection following operation. The authors noted that abdominal surgical emergencies are more likely to produce wound infections due to the less sterile environment and the involvement of the gastrointestinal tract[7].

Sepsis and infection related mortality in our study population is very high. Due to the retrospective nature of the study and incomplete records, we could not obtain detailed information regarding the nature of these overwhelming infections. Clearly this seems to be an area of utmost importance in improving outcomes in ASE patients at TASH.

Our study was limited by a few factors. The retrospective nature of the study was limiting factor for us. Only patients with abdominal surgical emergencies that were over 18 years of age were included. Pediatric patients or those that sought care elsewhere remains unaccounted for. For these reasons, it might be argued that, this study cannot be used as a reference to the general population in Ethiopia.

Another challenge this study faced was the restricted record keeping at TASH. Operating room logbooks and patient charts were limited to paper only record keeping with no access to electronic data collection. Due to this limitation, there was often missing or conflicting records found. This is a remediable challenge that needs to be addressed at the hospital in order to continue systems reviews in the future.

The patient charts were often found to be inadequate as well. Many of the patient charts were missing information or had conflicting notes in the chart. There were also patient charts that were simply not found or totally destroyed.

Conclusions

- This data demonstrates clear evidence in a shift in causes for ASE in a developing country in Africa and an increase in mortality in patients presenting with ASE to TASH. This high mortality highlights the disparities in health care access in the developing world. Further study is needed to investigate the high rates of sepsis and septic shock in patients undergoing ASE.
- The lack of proper record keeping is further evidence that a complete systems approach for improvement is necessary at TASH. Further review is required to understand the appropriate and specific interventions necessary to reduce the high morbidity and mortality at this leading tertiary care center in Ethiopia.
- As records improve, more accurate data will emerge, however the clinical reality as demonstrated by the data available is real and demands further analysis and response to achieve a goal of optimal clinical care for all patients presenting to TASH.

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