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Outcome of Emergency Abdominal Surgery at Kigali University Teaching Hospital: A review of 229 cases.

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Background: ***Surgical abdominal emergencies constitute an entity of pathologies requiring immediate medical and surgical management in most of the cases. There is little information regarding the clinical spectrum of disease in these patients and the outcome after admission to hospital. This study was conducted at Kigali University Teaching Hospital (KUTH) and the main objective was to determine the outcome of emergency abdominal surgery at Kigali University Teaching Hospital.***
Methods: ***This was a case series study of 229 patients who underwent emergency abdominal surgery at Kigali University Teaching Hospital over a period of 9 months. Variables analysed included the socio-demographic, clinical features, management and outcome of treatment. The multivariate analysis was applied to different factors to analyze their statistical correlation with mortality and morbidity.***
Results: ***The patients' ages ranged from 3 months to 87 years with an average of 28.8 years ± 18.2. The male to female sex ratio was 1.7:1.The majority of patients were referred (83.4%). The average time interval between onset of symptoms and admission was 3.6 days. Abdominal pain (100%) and constipation (51.1%) were the commonest complaints and abdominal distension (59%) and tenderness and guarding (45.4%) the most frequent physical findings. Abdominal trauma accounted for 11.8% of the cases. The most common operative findings were peritonitis (41.5%), intestinal obstruction (28.4%) and acute appendicitis (11.8%). Postoperative complications included wound infection (8.7%) and septicaemia (4.8%). The overall mortality was 18%. Variables influencing morbidity and mortality included the transfer (p=0.027), red cell count <4.10^6 (p = 0.002), haematocrit < 21% (p= 0.023), abnormal leukocytosis (p= 0.008), duration of surgery more than 1 hour (p= 0.034), presence of peritonitis (p = 0.005) and duration of hospitalization >7 days (p = 0.009).***
Conclusion: ***Many patients requiring emergency abdominal surgery presented relatively late with an average of 3.6 days time interval between onset of symptoms and admission, serious attention is needed for these patients because the mortality is high.***

Introduction

Surgical abdominal emergencies constitute an entity of pathologies requiring immediate medical and surgical management in most of the cases[1]. We considered two groups: Non traumatic acute abdomen and abdominal trauma. Emergency surgery represents over 50% of general surgical practice in UK. This rises in some hospitals, which provide regional Accident and Emergency services, to nearly 70%, and acute abdominal pain represents approximately half of all emergency surgical admissions[2]. Non traumatic acute abdomen represented 54% of general surgical admissions in Saudi Arabia[3]

There is little information regarding the clinical spectrum of disease in these patients and the outcome after admission to hospital[4]. Several causes are observed with varying incidence in different populations[5]. There may be a variety of reasons for these differences and for the outcome of the interventions. The presentation of different causes of acute abdomen overlap but there are some signs and symptoms that may help to narrow the differential diagnosis. The most common symptoms were abdominal pain and vomiting whereas tenderness and guarding were the most

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frequent clinical signs[6]. The leading cause of acute abdomen in several African countries was intestinal obstruction, whereas acute appendicitis is reported in many developed country studies[7, 8, 9, 10,11].

The management of patients with abdominal conditions like any other surgical condition needs to be followed by the fewest number of complications possible. In many poor communities worldwide, acute abdominal conditions continue to cause many deaths[12,13, 14]. The overall morbidity and mortality of patients admitted with acute abdominal pain is, not surprisingly, much higher than for elective surgery[2]. Emergency abdominal surgery is associated with a high mortality estimated at 5% to 25% [15, 16, 17].

Many factors have been described as responsible for surgical morbidity and mortality of patients who underwent emergency abdominal surgery. These include age of the patient, increased time between the onset of symptoms and the hospital admission, the hospital admission and surgery, nature of operation, haematocrit level, malignant disease with metastasis, presence of peritonitis, a delayed diagnosis, management, complication detection time and postoperative stay[4,5,17,18,19,20,21]. In Rwanda, very little is known about abdominal emergencies and the relative incidence of their causes; this study was conducted with the aim of assessing the pattern of acute abdomen in general and factors attributable to the outcome of emergency abdominal surgery in Kigali University Teaching Hospital (KUTH).

Patients and Methods

This was a prospective descriptive case series study conducted over a period of 9-months at Kigali University Teaching Hospital. It is a national referral hospital located in the city of Kigali, and serves the surrounding population and patients referred from other health facilities across the country. The study population consisted of 229 patients. The youngest patient was aged 1 month. Neonates and patients and who died immediately before surgery were excluded. Data concerning socio-demographic characteristics, duration of illness, visit to other health institutions, presenting symptoms and signs, operative findings, post operative course and outcome were extracted and filled in a previously prepared protocol sheet. It was then analyzed using SPSS version 16.0 statistical software. A student t-test was used to compare significant differences and chi-square/Fisher's exact test was used in testing association of categorical variables. Multivariate analysis by step down method was carried out and all factors corresponding to $p \leq 0.05$ were included in the simple regression to confirm the statistical association between dependent and independent variables with confidence interval of 95%.

Results

During a period of 9 months, 229 patients were operated on for abdominal emergencies. Emergency laparotomy for non-traumatic acute abdomen were 202 (88.2%) and abdominal trauma accounted for the remaining 27 (11.8%) of the patients. The ages ranged from 3 months to 87 years and the mean age was 28.8 years. Males dominated comprising 63.8% of the cases. The male to female sex ratio was 1.7: 1. Forty two per cent of patients came from Kigali City and 58% were from outside Kigali. The duration of symptoms on admission ranged from 12 hours to 10days (mean = 3.6 days).

The majority (64.2%) of the patients presented to the hospital more than 48 hours after the onset of symptoms; 191 (83.4%) of the patients had visited other health institutions at least once before their coming to KUTH. Abdominal pain and constipation were the most frequent symptoms being recorded in 100% and 51.1% respectively. Abdominal distention and guarding were the two commonest clinical signs found in 59% and 45.4% respectively (Table1). The most common cause

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of abdominal emergency surgery was peritonitis followed by intestinal obstructions 65(28.4%) and acute appendicitis (11.8%) as shown in Table 2.

Table 1. Clinical Features of Patients Who Had Emergency Abdominal Surgery

Variables	N (%)
Pulse at admission (n=208)	
Normal	101 (48.6)
Tachycardia	107 (51.4)
Oxygenic saturation at admission (n=204)	
< 95 %	33 (16.2)
95-100 %	171 (83.8)
Symptoms	
Abdominal pain	219 (100)
Constipation	117 (51.1)
Vomiting	93 (40.6)
Signs	
Abdominal distension	137 (59.0)
Guarding	104 (45.4)
Reboud tenderness	36 (15.7)

Table 2. Causes of Acute Abdomen in Patients Who Had Emergency Abdominal Surgery

Operative diagnosis	N (%)
Peritonitis(n=95)	**41.5**
Intestinal	27(28.4)
PPUD	26(27.3)
Appendicular	22(23.1)
Primary	17(17.9)
PID/ Pelviperitonitis	2(2.1)
Biliary	1(1.05)
Intestinal obstruction(n=65)	**28.4**
Volvulus(Sigmoid and small bowel)	24(37.4)
Intussusception	20(31.3)
Adhesion	9(13.8)
Hernia	5(7.8)
Ileus	4(6.4)
Tumors	3(4.7)
Acute appendicitis(n=27)	**11.8**
Abdominal trauma/Wound (n=27)	**11.8**
Spleen rupture	13(48.1)
Bladder's injuries	5(18.5)
Gastric perforation	3(11.1)
Others*	6(22.2)

*Retroperitoneal haematoma(7.4%), intestinal perforation(7.4%), hepatic wound(3.7%), diaphragmatic rupture(3.7%).

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Table 3. The Outcome of Patients Who Had Emergency Abdominal Surgery

Variables	Means ± SD	No (%)
Deaths		**41(18)**
Morbidity		**47(20.5)**
Postoperative complications(n=229)		
Wound infection		20(8.7)
Septicemia		11(4.8)
Abdominal sepsis		8(3.5)
Anastomotic leak (fistula)		7(3.1)
Chest infection		5(2.2)
Hydro electrolytic disorders		5(2.2)
Wound dehiscence		2(0.9)
Intestinal obstruction		1(0.4)
Postoperative hospital stays(n=228)	**12 ± 0.5**	
< 7days		82(36.0)
≥ 7days		146(64.0)

Table 4. Correlation between Mortality and Independent Variables

Variables	Deaths	Patients no	%	x^2	p value
Transfer				**7.230**	**0.007**
Yes	40	191	20.9		
No	1	38	2.6		
Time from hospital admission to surgery				**6.101**	**0.014**
<24 hrs	1	36	2.8		
≥ 24 hrs	35	178	19.7		
Pulse at admission				**4.943**	**0.026**
Normal	11	101	10.9		
Tachycardia	24	107	22.4		
Intraoperative blood loss				**7.570**	**0.006**
<500 ml	18	143	12.6		
≥500 ml	23	85	27.1		
Red cell count				**7.407**	**0.006**
< 4. 10^6	10	28	35.7		
4-10. 10^6	10	80	12.5		
Postoperative Hospital stays				**8.798**	**0.003**
< 7 days	18	146		12.3	
≥ 7 days	23	82		28	

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Table 5. Correlation between Morbidity and Independent Variables

Variables	Morbidity	Patients no	%	x^2	p value
Transfer				**4.455**	**0.035**
Yes	44	191	23.0		
No	3	38	7.9		
White cell count				**7.290**	**0.026**
< 4.10^3 µl/l	3	9	33		
4 -10.10^3 µl/l	13	50	26.0		
>10.10^3 µl/l	5	59	8.5		
Red cell count				**6.388**	**0.011**
< 4. 10^6	10	28	35.7		
4 – 10.10^6	11	80	47.6		
>10.10^6	21	108	19.4		
Haematocrit				**6.918**	**0.031**
< 21%	3	5	60.0		
21 -40%	18	75	24.0		
> 40%	7	53	13.2		
Time of surgery				**6.819**	**0.033**
<1 hr	7	42	16.7		
1-2 hrs	22	129	17.1		
>2 hrs	17	50	34.0		
Operative Diagnosis(n=229)				**15.622**	**0.008**
Peritonitis	28	95	29.5		
Intestinal obstruction	8	65	12.3		
Acute appendicitis	2	27	7.4		
Abdominal trauma/wounds	3	27	11.1		
Type of procedures				**19.263**	**0.014**
Appendectomy	8	47	17.0		
Laparotomy and peritoneal toilet	11	40	27.5		
Repair of perforations	5	37	13.5		
Intestinal resection and anastomosis	7	25	28.0		
Intestinal detorsion and desinvagination	3	24	12.5		
Stoma	10	20	50.0		
Splenectomy	2	13	15.4		
Adhesiolysis	0	11	0.0		
Postoperative hospital stays				**4.056**	**0.044**
< 7days	36	146	24.7		
≥ 7days	11	82	13.4		

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The abdominal trauma was found in 27 patients and the spleen was the most organ injured (48.1%) in abdominal trauma followed by the bladder in 18.5% of the cases. Peritonitis accounted 95 (41.5 %) of the patients, of whom 63 (66.3%) were males and 32 (33.7%) were females (M: F =2:1). Death occurred in 25 (26.3%) of the peritonitis cases. The most frequent causes of peritonitis were intestinal perforation and peptic ulcer perforation contributing 28.4% and 27.3% of peritonitis respectively. The causes of intestinal obstruction are shown in Table 2. Small bowel and sigmoid volvulus and intussusception were the leading causes of intestinal obstruction represented by 37.4% and 31.3% of patients respectively. Adhesions took the third position with 13.8%. The average hospital stay was 12 days with 64% of the patients being hospitalized for more than 1 week (Table 3).

There was a significant correlation between mortality and different variables (transfer, time from admission to surgery, pulse at admission, red cell count, intra operative blood loss and postoperative hospital stays), but the multivariate by simple logistic regression analysis found that only the transfer, the time from admission to surgery and the red cell count less than 4.10^6 were statistical associated with the mortality (Table 4). Table 5 shows that these variables (Transfer, white cell count, red cell count, haematocrit, time of surgery, operative diagnosis, type of procedures and postoperative hospital stays) were correlated with morbidity but only the transfer, the red cell count, haematocrit level, leucocytes, time of surgery and the presence of peritonitis were statistical associated with the morbidity when the logistic regression analysis was applied on those correlated variables.

Discussion

Emergency abdominal surgery is one of the most common operations in general surgical practices in Kigali University Teaching Hospital. It is also one of the most common causes of admission at accident and emergency department in KUTH and represents approximately 50% of general surgery. A total of 229 emergency abdominal surgery were performed over a period of 9 months under review. Almost 12% of the operations were laparotomy for abdominal trauma and the rest for non traumatic acute abdomen.

In this study, male patients were more affected than females and male to female sex ratio was 1.7:1. The male dominance is similar to what was reported in other studies in Ethiopia[5,6,22,23,24], in Uganda[20] and some other studies in Africa[25] and in Canada[26] where the male to female sex ratio is 2:1. The majority of patients were in their 2nd and 3rd decades of life, which was in agreement with previous studies done in other African countries[6,22,23,26,27]. The age and sex of the patients did not significantly affect the outcome of the emergency abdominal surgery. A study in the USA indicated that increasing age was strongly associated with risk of complications but surprisingly, the risk declined for patients older than 79 years of age [28].

More than half of our patients (58%) were from the rural regions; this was found in Ethiopia where the majority of the patients were from rural areas (58.2%)[5]. A total of 83% of patients were referred from other health facilities and the average time from onset of symptoms to first medical visit was 24 hours and the average time from onset of symptoms to hospital admission was 3.6 days. Kotiso[22] in Addis Ababa, Ethiopia found that the duration of illness at admission ranged from 6 hours to 21 days with a mean of 4.6 days, and where 72% of the patients had visited other health institutions once or more before their transfer. This long time of consultation in our setting was probably due to poor knowledge of mid and lower level health professionals on the diagnosis of acute abdomen and or the health system in Rwanda where except the trauma cases, the majority of the population had to consult first the health centres then the district hospital before reaching the referral hospital and many hospitals are far from the University hospital. The transfer affect the

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outcome of the surgery, the patients referred had higher risk to develop complications and die than those none referred (p=0.027 (mortality) and p=0.046 (morbidity)).

Abdominal pain and constipation were the most frequent symptoms (95.6%.and 51.1%. respectively) whereas guarding and abdominal distension were the most frequent clinical signs found (45.4% and 59% respectively). This was found in others studies whereby the most frequent symptoms and signs in acute abdomen are respectively abdominal pain, vomiting, abdominal distension and guarding [5, 22]. Acute peritonitis was found to be the leading cause of non traumatic acute abdomen in our study and the rupture of the spleen was leading indication of surgery in abdomen trauma. This is in contrast to the studies done in several African and European countries in which intestinal obstruction was the leading cause[5,6,7,9,10,12,20,25,29-,34]. However, appendicitis was found to be on top in the list in some studies[7,8,22,24,29,34,35]. The most common causes of peritonitis were intestinal perforation in 28.4% and perforated peptic ulcer in 27.3%.The most common cause of intestinal obstruction was volvulus (37.4%) followed by intussusception (31.3%). This was in agreement with studies done in Ethiopia in which the commonest cause of Peritonitis was PPUD[22] and the commonest cause of intestinal obstruction was sigmoid volvulus[22,36,37]. The operative diagnosis in emergency abdominal pathologies was not statistical associated with the outcome but it was found that the presence of peritonitis was strongly associated with the development of postoperative complications (p=0.006).

The overall mortality of our series (18%) is similar to the rates in the majority of published reports where the mortality rate is between 9.3% to 24 %[5,6,18,20,22,38]. The morbidity was evaluated on 20.5% and the most frequent postoperative complication was wound infection (8.7%) followed by septicaemia (4.8%). Kitara, Kakande and Mugisa[20] in Kampala reported the morbidity rate of 35.4 % and the commonest postoperative complication was the respiratory tract infection (28.2%), but Arenal in Spain[18] found that the most frequent complication was wound infection (17%) which correlates with the result of our study. The average hospital stay in this study was 12 days and 64% of patients were hospitalized more than 7 days. In some studies done in Africa, in UK and USA the mean hospital stay was reported between 8 and 10 days[5,20,39,40]. Many authors found that the outcome of patients who underwent emergency abdominal surgery are associated by many factors. These include malignant disease with metastasis, increased time lapse from the appearance of symptoms to hospital admission, hospital admission to surgery[18], nature of operation, postoperative stay[20], a delayed diagnosis and management[21,41]. Tsegaye, Osman and Bekele[5] in Ethiopia showed that the outcome of emergency laparotomy may be affected by different factors , some of them were duration of illness, age, presence of peritonitis, haematocrit level and complication detection time .

In our study three factors has been associated with the mortality those included referred patients (p= 0.027), delayed surgical operation more than 24 hours after admission (p= 0.037) and low red cell count (p= 0.009) and the morbidity was influenced by: transfer (p=0.046), abnormal leukocytes (p=0.011), low red cell count (P=0.015), low level haematocrit (p=0.023), duration of surgery more than 1hour (p=0.034) and presence of peritonitis (p=0.006). This result was compared with the findings of authors quoted below, but in our series the age, the duration of illness, the delayed diagnosis and the complication detection time were not associated with the outcome of the treatment.

Conclusion

This study has shown that the outcome of emergency laparotomy at KUTH may be affected by different factors. The overall mortality rate was 18% and post operative hospital morbidity rate was 20%. It is therefore essential to identify and make appropriate decision on those patients who are at high risk of developing serious complications considering the reported factors so that it

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could help to reduce the observed high mortality. This could be achieved by increasing public awareness on clinical features of acute abdomen as well as by improving the knowledge of mid and lower level health professionals on the diagnosis, resuscitation and importance of early referral to higher center.

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