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ACUTE APPENDICITIS IN A KENYAN RURAL HOSPITAL

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## ACUTE APPENDICITIS IN A KENYAN RURAL HOSPITAL

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### ABSTRACT

**Objectives:** The literature on appendicitis in Africa is almost all derived from urban teaching hospitals. As most of Africa's people are from rural areas, we sought to review our experience from a rural hospital in Kenya.

**Design:** Retrospective chart review.

**Setting:** A rural Kenyan church hospital.

**Subjects:** One hundred and twelve cases of acute appendicitis presenting at Kijabe Hospital over a five year period were reviewed.

**Intervention:** Appendicectomy.

**Main outcome measures:** Sex, age, pre-hospital delay, operative findings, wound infection, post-operative length of stay.

**Results:** The male to female ratio was 1.8:1. The median age was 29 (4-71 years). Median pre-hospital delays were one day (normal appendix), one and a half days (simple appendicitis), three days (perforated appendix) and six and a half days (appendical abscess). Operative findings were 14% normal appendix, 42% simple appendicitis, 22% perforated, 21% abscess. Overall wound infection rate was 22%; ranging from 11% for simple appendicitis to 46% for an appendiceal abscess. The mean post-operative length of stay was nine and a half days.

**Conclusions:** Acute appendicitis in rural Kenya is similar to patterns reported in urban African centres. The main difference from western data is the high complicated appendicitis rate which is most likely related to prolonged pre-hospital delay.

### INTRODUCTION

Acute appendicitis was extremely rare in rural African populations fifty to sixty years ago, and is now thought to have increased in incidence. This is postulated to be due to the adoption of more western patterns of life(1). In some parts of the African continent, it has become one of the commonest surgical emergencies(2,3).

The body of literature on appendicitis in Africa mostly comes from large urban teaching hospitals, while very little is reported from the rural hospitals, providing much of the health care to Africa's large rural populations(4).

Kijabe Hospital is a 210 bed rural general and acute church hospital 60 km northwest of Nairobi in Kenya. It is a referral centre for many surrounding rural health centres. This study was undertaken to document the patterns of incidence, presentation and management of acute appendicitis at a rural Kenyan hospital, and to compare them with other African and western patterns.

### MATERIALS AND METHODS

The surgical billing database, operative log and pathology database at Kijabe hospital (May 1995- May 2000) were searched for appendicectomy cases. All cases with a preoperative or postoperative diagnosis of acute appendicitis or appendiceal abscess were included.

The following details were recorded from each medical record as available: year of birth, sex, tribe, home district, time of onset of abdominal pain, date and time first seen by the hospital staff, discharge date, presentation, operative findings, pathology, morbidity and mortality. Results are given as median (+ range) or mean ( $\pm$  standard error of the mean). The Student's t-test was used for comparisons of means and a p-value of <0.05 was considered significant.

### RESULTS

All methods generated a total of 181 records. Thirty six of these records were unretrievable. Thirty-three records were discarded (incidental appendicetomies or surgery for chronic abdominal pain). The 112 cases of acute appendicitis found represent 0.29% of total admissions and 0.56% of operations performed between May 1995 and May 2000.

The male to female ratio of acute appendicitis patients and mean ages can be seen in Table 1. The median age was 29 (4-71) years. The age distribution is shown in Figure 1. 76% of the patients were from the Kikuyu tribe prevalent in this area. 8% of patients were Maasai, 5% were Kamba, 3% were Somali and 2% were Caucasian. The remaining patients were from a wide variety of tribes. Ninety five per cent of patients were from rural districts.

Table 1

Comparison of presentation and outcome statistics between operative findings groups.

Operative finding	No. (%)	M:F ratio	Age mean $\pm$ SEM	Pre-hospital delay (days) median (range)	Wound infection rate (%)	Length of stay (days) mean $\pm$ SEM
Normal	16 (14)	0.2:1	19.3 $\pm$ 2.7	1 (0.25-60)	13	8.5 $\pm$ 2.4
Inflamed	47 (42)	2.4:1	27.6 $\pm$ 1.8	1.5 (0.08-14)	11	5.8 $\pm$ 0.7
Perforated	25 (22)	7.3:1	34.0 $\pm$ 3.7	3 (0.33-7)	28*	9.7 $\pm$ 1.2†
Abscess	24 (21)	1.4:1	32.2 $\pm$ 4.6	6.5 (0.75-180)	46**	17.7 $\pm$ 4.3‡
Total	112 (100)	1.8:1	28.9 $\pm$ 1.6	2 (0.08-180)	22	9.7 $\pm$ 1.1

\* p=0.049 versus inflamed

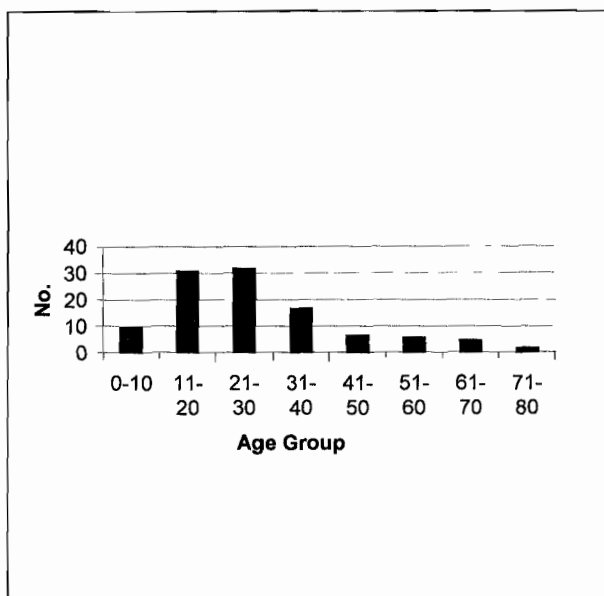
\*\* p=0.002 versus inflamed

† p=0.003 versus inflamed

‡ p = 0.006 versus inflamed, p=0.041 versus perforated

Figure 1

Age distribution of appendicitis at Kijabe



Twenty five per cent of patients took longer than five days to reach the hospital after the onset of abdominal pain while only 33% of patients presented within a day. The median pre-hospital delay was two days (range: 2 hours - 180 days) for all patients. The differences in pre-hospital delay between operative findings groups are shown in Table 1.

At surgery, 44% of the patients were found to have complicated appendicitis (Table 1). 42% of patients had simple acute appendicitis and 14% had a normal appendix. Of those the surgeon found to be normal, one was found to be inflamed by the pathologist. The discharge diagnoses from patients with a normal appendix are as follows: abdominal pain of undetermined cause(5), pelvic inflammatory disease(3) and miscellaneous(8). The negative appendicectomy rate was 33% in women and 4% in men. It was highest in children aged 4-10 (50%, n=10) and zero in patients over the age of 40 (n=20).

There was no mortality during the study period. The wound infection rates in the different groups are as shown in Table 1.

The median post-operative length of stay was five (2-103) days. The differences in mean stay between operative finding groups can be seen in Table 1. A wound infection increased the hospital stay by a mean of 10.3 days (p=0.01 vs no wound infection). Five patients stayed in the hospital longer than four weeks. The longest stay occurred in a 30 year old HIV positive woman who presented with a six month history of lower abdominal pain, vomiting, dysuria and an umbilical abscess and fistula. At surgery several intra-abdominal abscesses were found due to a perforated appendix. The woman survived to leave the hospital.

## DISCUSSION

The incidence of patients presenting with acute appendicitis to Kijabe hospital is low (22 cases per year). This is lower than the published caseload at large urban African teaching hospitals. However, it is similar to Consolata hospital in Nyeri, another rural Kenyan hospital(4). A more realistic estimate of true incidence is shown by the appendicitis per hospital admission or appendicitis per operation ratios which are much lower at Kijabe than at other African reports suggesting that appendicitis is less common in rural Kenya than in urban Africa(3,5).

Calculating prevalence data for appendicitis for the area around Kijabe is complicated by several factors. The first is that Kijabe is not the only option open to local people to have their appendix removed. There are a number of local health care providers including a government district hospital and two other Church hospitals within one hour's drive of Kijabe. The second factor is that many patients come from long distances. A recent review of patient statistics at Kijabe revealed that over 75% of the hospital's outpatients travel over two hours by public transport to reach the hospital.

A male to female ratio of 1.8:1 is consistent with many other African series. Most other African studies

have reported similar ratios(2,6-11). Interestingly, the only other Kenyan rural appendix study showed a male to female ratio of 0.6:1(4) while a similar ratio to that at Kijabe was reported from a large urban teaching hospital in Kenya(11).

The age distribution for appendicitis cases at Kijabe is similar to other African reports, however, compared to other reports it appears that a greater number of older individuals (>age 51) are seen at Kijabe. As is the case in the western world, the incidence of appendicitis is greatest in the second two decades of life.

Over 20% of appendicitis patients at Kijabe presented more than five days after the onset of abdominal pain. Others(6,13) report similar percentages of patients presenting after five days; 20% and 25% respectively. It is interesting to note that rates of complicated appendicitis in these two studies were also similar at 49% compared to 44% at Kijabe.

Reported negative appendectomy rates range from 4% to 86% in Africa(12,14). The rate of 14% at Kijabe is within the generally accepted 10-20% recommended to reduce the risk of perforation(15). Of concern is the 50% error rate in the 0-10 years age group. Out of 10 children, two had perforated and one had an abscess (30% complicated appendix rate). Negative appendectomy rates of up to 50% are not unheard of in children and may in fact be reasonable in the paediatric population given the high rates of perforation (80-90%) reported in the literature(15,16). Three paediatric series from Africa have reported negative appendectomy rates of 4% to 16% with associated complicated appendicitis rates of 21% to 63%(6,17,18) suggesting a benefit from increased diagnostic suspicion. However, the small size of the paediatric group at Kijabe precludes reliable conclusions.

The rate of complicated appendicitis at Kijabe (44%) is quite high compared to the generally reported 10-20% in western literature(15). The proposed correlation between complicated appendicitis and pre-hospital delay has already been noted. The rate of complicated appendicitis at Kijabe increased with age (75% after age 40) which is a common pattern familiar to all surgeons. The high wound infection rate at Kijabe is probably related to the high incidence of complicated appendicitis. Wound infection rates reported across Africa vary from 2.8% reported in Mali(19) (complicated appendicitis rate of 40%) to 41% reported in Ethiopia(8) (complicated appendicitis rate of 45%). As a wound infection adds a mean of 10 days to a patient's hospital stay at Kijabe, it is imperative that everything possible is done to reduce this morbidity.

In conclusion, acute appendicitis at rural Kijabe hospital to a considerable degree conforms to patterns already reported from large urban African teaching

hospitals. Patients tend to present late, have complicated appendicitis, and have a high incidence of wound infection. The pattern of disease differs from that in the west predominantly due to long pre-hospital delays. Efforts of district and mission hospitals must be directed towards community education to prevent unnecessary pre-hospital delay with severe abdominal pain.

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