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Journal

Western Journal of Emergency Medicine: Integrating Emergency Care with Population Health, 6(4)

ISSN

1936-900X

Authors

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Publication Date

2005

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ORIGINAL RESEARCH

Incidence of Negative Appendectomy: Experience From a Company Hospital in Nigeria

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ABSTRACT

Objective: The aim of this study was to determine the rate of negative appendectomy in a company hospital in Nigeria. **Background:** Appendicitis is one of the most common abdominal conditions requiring surgical intervention. Appendectomy, like most surgical procedures, has its complications and therefore should only be undertaken when indicated. Case series have reported the incidence of negative appendectomy in Western nations. The purpose of this retrospective study is to evaluate the incidence of negative appendectomy in a Nigerian hospital, where all the operations were carried out by consultant surgeons. **Methods:** All case files of patients who received an appendectomy at Chevron Hospital in Warri, Nigeria between January, 1999 and December, 2003 were reviewed. **Demographic data, symptoms and signs on presentation, intra-operative findings and histological reports on the excised vermiform appendixes were extracted from the case files and analyzed. Results:** The incidence of negative appendectomy in this study was 16.1%; all nine

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patients that had negative appendectomy were female. Conclusion: The incidence of negative appendectomy observed at Chevron Hospital in Warri, Nigeria is lower than that reported by most studies; one factor may be that all the patients in the present study were evaluated and operated on by consultant surgeons.

INTRODUCTION

Acute appendicitis is probably the most frequently considered differential diagnosis at any hospital dealing with acute surgical conditions. It is also the most common abdominal emergency in both developed and developing countries.^{1,2} Approximately six percent of the population will suffer from acute appendicitis during their lifetime.^{3,4} Delay in operation may lead to perforation and the attendant morbidity and mortality, a problem especially common in children. Consequently, the practice has been early surgery in cases of suspected appendicitis. With this concept however, there is an increased chance of having high rates of negative appendectomy. Various authors have reported different rates of negative appendectomy, with an acceptable range being between 5 and 20 percent.¹⁻⁴ Appendectomy has its associated complications and negative appendectomy (removal of a normal appendix) is not exempt from such complications. Negative appendectomy also has financial implications.

Several factors have been considered to influence the incidence of negative appendectomy. The experience of the surgeon is of great importance. Some investigators have also considered the availability of various diagnostic tests (abdominal ultrasonography and CT) as being very useful in minimizing the incidence of negative appendectomy.

The purpose of this study is to review the cases of appendectomy done in a company clinic in Nigeria and to determine the rate of negative appendectomy and compare the findings with previous studies on negative appendectomy.

METHODS

All appendectomies carried out at the Chevron Hospital in Warri, Nigeria between January, 1999 and

December, 2003 were studied retrospectively. The case files of the patients were retrieved from the medical records library and analyzed. All clinicodemographic data relating to age, sex, clinical symptoms and signs, laboratory investigations, operative findings and procedures, and postoperative follow-up were obtained. All the specimens were examined and reported on by one pathologist. The histopathological reports of all the patients were also reviewed. A diagnosis of positive appendectomy was made when the histopathological report confirmed appendicitis, while the diagnosis of negative appendectomy was made in patients who presented with clinical features of appendicitis but were found to have a normal appendix at histology. The results were analyzed using simple tables.

RESULTS

A total of 56 case files of patients who had appendectomy during the study period were analyzed. The histopathological reports were available for all the cases. Forty-seven patients had a histopathological confirmation of acute appendicitis, while nine patients had a histopathological diagnosis of a normal appendix.

The ages of the patients with histologically confirmed appendicitis ranged from 10 to 57 years with a mean age of 25 ± 12.6 years, while the ages of the patients with negative appendectomy ranged from 15 to 27 years with a mean age of 20 ± 3.5 years. The peak age of incidence of appendicitis was in the second decade (49%), followed by the third decade (15%) (see Table 1). The 21–30 year age group had a higher incidence of negative appendectomy (56%), while the 11–20 year age group accounted for 44%. Tables 2 and 3 show the signs and symptoms elicited in both the positive and negative appendectomy cases, with pain over the right lower abdomen being the most common feature. Only 13 patients (10 females and 3 males) underwent ultrasonography; of the three female patients in whom a diagnosis of appendicitis was suggested on ultrasonography, two had histologically confirmed appendicitis. None of the patients had a computerized axial tomography (CT) scan investigation because it was not available in the center where this study was carried out. Of the histologically

confirmed cases of appendicitis, 16% had a total white cell count of $>10,000 \times 10^6/L$, while 84% had a total white cell count of $<10,000 \times 10^6/L$. Of the cases of negative appendectomies, 22% had a total white cell count of $>10,000 \times 10^6/L$, while 78% had a total white cell count of $<10,000 \times 10^6/L$. Of the cases of positive appendectomies, 14.9% had a neutrophil differential of $>70\%$ and 85.1% had a neutrophil differential of $<70\%$. All the cases of negative appendectomies had a neutrophil differential count of $<70\%$.

Age Range	Male	Female	Total	%
0 – 10	1	1	2	4
11 – 20	5	18	23	49
21 – 30	1	6	7	15
31 – 40	5	3	8	17
41 – 50	4	0	4	9
51 – 60	3	0	3	6
> 60	0	0	0	0
Total	19	28	47	100
%	40%	60%	100%	100%

Table 1. Age and sex distribution of cases of histologically confirmed appendicitis.

DISCUSSION

The incidence of negative appendectomy in this study was 16% and all the patients that had negative appendectomy were females. Okobia et al. in Benin City, Nigeria reported an incidence of 32.2% with representation of both males and females.¹ Similarly, Ogonna et al. reported a negative appendectomy rate of 29.7% in males and 47% in females over a five year period in Jos, Nigeria.² Kakande and colleagues in Uganda reported a negative appendectomy rate of 29.5% over a five year period.³ Chang et al. reviewed 184 cases of acute appendicitis in Taiwan and found a 79% diagnostic accuracy rate in men as opposed to 54% in women.⁴ In this series, there was an overall misdiagnosis rate of 33%. Gilmore in England reported a negative appendectomy rate of 22%.⁵

Signs/Symptoms	No of cases		Total	Percentage
	Male	Female		
Right lower abdominal pain	19	28	47	100
Right iliac fossa tenderness	19	27	46	98
Central abdominal pain	3	6	9	19
Nausea	9	15	24	51
Fever	4	7	11	23
Vomiting	4	10	14	30
Anorexia	3	8	11	23
Diarrhea	2	9	11	23

Table 2. Signs and symptoms of presentation in cases of histologically confirmed appendicitis (47 cases).

Signs/Symptoms	No of cases		Total	Percentage
	Male	Female		
Right lower abdominal pain	0	9	9	100
Right iliac fossa tenderness	0	9	9	100
Central abdominal pain	0	2	2	22
Nausea	0	4	4	44
Fever	0	3	3	22
Vomiting	0	2	2	22
Anorexia	0	2	2	22

Table 3. Signs and symptoms of presentation in cases of negative appendectomy (9 cases).

Females have a consistently higher reported incidence of negative appendectomies.³⁻⁶ The main reason for this is thought to be due to the high incidence of gynecologic disorders in females, especially in the second and third decades of life. Such disorders include pelvic infections, ruptured ovarian cysts, and ectopic pregnancies. In the present study, the range of ages of females with a negative appendectomy was

15 to 27 years. This finding is in keeping with other studies on negative appendectomy in females.⁴⁻⁷ In some cases of negative appendectomy, the exact pathological diagnosis may not even be made intra-operatively; in these cases the histology report determines the diagnosis of negative appendectomy. What may appear as an inflamed appendix to the surgeon, may truly show no inflammation on histological review.

Of the nine negative appendectomy cases in the present study, there were two cases of ovarian torsion and two cases of urinary tract infection. In the other five cases, there was no other detectable pathology—findings similar to those reported in other studies.⁸⁻⁹

The morbidity and mortality that could accompany negative appendectomy is reported by some authors to be significant.^{1,9-10} Additionally, there may be a significant loss of staff hours and financial resources.¹⁰ Consequently, there have been various studies on ways of reducing the incidence of negative appendectomy.

The use of detailed clinical history, examination and active observation of the patients has also been suggested.¹¹⁻¹³ Most patients with acute appendicitis will present with complaints of right lower abdominal pain, nausea, vomiting and anorexia. Tenderness is often elicited over the right iliac fossa. However, some other abdominal conditions may also present with these features. On the other hand, some patients with acute appendicitis may not present with nausea, vomiting and anorexia. Okobia et al. reported nausea, vomiting and anorexia in only 43.6%, 41% and 24.4% of cases, respectively.¹ In our study, the incidences of nausea, vomiting and anorexia were 51%, 30% and 23% respectively in those patients with histologically confirmed appendicitis. These features clearly cannot be entirely relied upon in making a diagnosis of acute appendicitis. In other studies the incidence of nausea, vomiting and anorexia was found to be higher and more reliable in patients who had histologically confirmed appendicitis.^{8,14-15}

Some studies have also shown that the rate of negative appendectomy can be reduced if the patients are examined by senior surgeons (senior registrars and consultants) before a decision for appendectomy is reached.¹⁶⁻¹⁸ We believe that our lower incidence of negative appendectomy resulted from our examination of all patients by the senior surgeons. In other studies with relatively higher rates of negative appendectomies, most of the cases were examined by junior residents without input from the senior physicians.¹⁸⁻¹⁹ This may arise in teaching hospitals, where the junior residents are usually the first to attend to the patients. They may be more likely to have cases

of negative appendectomy compared to senior residents and consultant surgeons.

The use of various diagnostic tools has also been suggested as a means of reducing the rate of negative appendectomy. Ogbonna et al. reported a significant reduction in the rate of negative appendectomy following the introduction of laparoscopy for doubtful cases of acute abdominal pain in their center.² The use of high resolution ultrasound scan and CT scan has improved the diagnostic yield of acute appendicitis in some studies.²⁰⁻²¹ In the present study, use of ultrasound scan was not particularly helpful. Of the 13 patients (10 females and 3 males) that had ultrasound scan, a diagnosis of appendicitis was suggested only in the three female patients, while the rest were reported as normal scan. Of these three female patients, two had histologically confirmed appendicitis while the third turned out to have a normal appendix. Accuracy of ultrasound diagnosis in appendicitis is likely to be very operator dependent; in this center and other centers in developing countries, the use of ultrasound scan may not be diagnostically helpful in making a diagnosis of appendicitis. CT scan is readily available in most developed countries, however is not readily available in Nigeria; and where it is available, it is rather expensive. In the center where the present study was done, there is no CT scan. Consequently our diagnosis of appendicitis rested mainly on clinical assessment. The use of leukocyte count (and determination of the neutrophil fraction) has been suggested as a means to aid diagnostic accuracy. Kpolugbo et al. in Benin City reported a reasonable correlation between neutrophilia and acute appendicitis.²² However, other investigators have not found these parameters to be very useful.²³⁻²⁴ In the present study, use of leukocytosis and neutrophilia in making a diagnosis of acute appendicitis was not particularly helpful. Out of the 47 cases of histologically confirmed appendicitis, only 16% had a leukocytosis and 15% showed neutrophilia.

The use of various scoring systems has been advocated. However, while some authors found them to be very useful in reducing the rate of negative appendectomies, others have not found similar results.²⁵

CONCLUSION

Despite efforts at reduction, negative appendectomies continue. It does appear however, that a very careful clinical assessment of these patients still remains the main mode of reducing the incidence of negative appendectomies. This is very important in developing countries where most of the sophisticated investigative tools that could help in making an accurate diagnosis of acute appendicitis are not readily available. We suggest, therefore, that a senior surgeon examine the patient before a decision for appendectomy is reached in order to reduce the incidence of negative appendectomies and the associated morbidity and mortality.

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