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ORIGINAL RESEARCH

Appendiceal Diseases in Children in a University Teaching Hospital in Southwest Nigeria

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Abstract

Background: Appendicitis is common, with a lifetime occurrence of 7 per cent. It is an urgent surgical illness with a wide range of manifestations and extensive overlap with other clinical syndromes.
Objective: To examine the presentation, differential diagnoses and complications of appendiceal diseases.
Methods: An eight-year retrospective study (18 July 2016 - 18 August 2023) was carried out in a Nigerian Teaching Hospital. All cases of appendiceal diseases managed in children during the study were included. Case notes of patients who were managed from admission through surgical intervention, discharge from the hospital, and complete follow-up at the paediatric outpatient clinic were selected for data retrieval and further processing.
Results: Four hundred children with appendiceal diseases were seen during the study period. However, only 250 patients' case records were studied. Out of the 250 children studied, 170 were males (68%), giving a male-to-female ratio of 2.1:1. The age range was one year to 15 years. Those aged 7-12 years were in the majority (175; 70%). Most of the children (80; 32%) presented late to the hospital with the presence of complications, which occurred more in those aged less than 7 years (150; 75%). The complications included a ruptured appendix with generalised peritonitis (40; 50%), localised peritonitis (18; 22.5%), appendiceal mass (16; 20%), and gangrene of the appendix (6; 7.5%).
Conclusion: Acute appendicitis is one of the causes of acute abdominal conditions in children. Delayed presentation is common. Complications at presentation were associated with young age and late presentation.

Keywords: Appendiceal disease, Appendicitis, Abdominal pain, Acute abdomen, Children, Generalised Peritonitis.

Introduction

Acute appendicitis is one of the common abdominal emergencies; appendicectomy is the most common abdominal emergency operation performed worldwide. [1] The clinical presentation of acute appendicitis may vary from non-specific, vague abdominal pains to the

classical presentation of right iliac fossa pain, tenderness and rebound tenderness. Acute appendicitis presents as a surgical abdominal emergency most of the time; sometimes, it may be characterised by recurrent, episodic symptoms of right lower abdominal pain, which may be associated with lower-grade fever, vomiting and anorexia. [2-4] Left untreated, appendicitis has the potential for severe complications such as appendiceal mass, appendiceal abscess, gangrene, perforation and generalised peritonitis, which may ultimately lead to septicaemia and even death. [5,6] Other disease conditions that could be found in the appendix include tuberculosis, appendiceal parasites, and neoplasm. [7]

The diagnosis of acute appendicitis and other related disease conditions is essentially clinical, through adequate history and thorough clinical examination. Laboratory tests and imaging investigations (such as abdominal ultrasonography and abdominal computerised tomography scans, especially in equivocal and complicated cases) help to determine the definitive diagnosis in most cases. The definitive diagnosis of acute appendicitis and other appendiceal diseases may be difficult to make pre-operatively in a number of cases. [8,9] Achieving a definitive diagnosis of appendiceal diseases may be easier. Still, the clinical presentation may sometimes simulate other intra-abdominal surgical disease conditions, which makes the confirmation of appendiceal diseases difficult even with modern investigative modalities. Early appendicitis is defined as appendicitis without evidence of perforation or gangrene. Once the diagnosis of early appendicitis has been made, the patient should be prepared for appendectomy.

Delayed presentation is characterised by hospital presentation beyond 24 hours of the onset of symptoms; this usually increases the risk of morbidity and mortality as a result of the presence of complications. Prompt and accurate diagnosis is essential in minimising morbidity and reducing mortality risk. Confirmation of the differential diagnoses of the aetiology of appendiceal disease follows a histological examination of the surgical specimen of the appendix during appendicectomy or exploratory laparotomy. [10,11] This study was aimed at determining the presentation, differential diagnosis and complications of appendiceal diseases in our environment.

Methods

This study was conducted retrospectively over the period (18 July 2016 - 18 August 2023). The case notes of all patients who presented with features of acute appendicitis were retrieved. Relevant information such as the age, sex, symptoms, findings on physical examination, investigations carried out with their results, duration of hospitalisation, mode of treatment, complications and mortality, period of follow-up and documentation of residual problems that needed further treatments were retrieved.

Inclusion criteria: Age between 1 year to 15 years; definitive diagnosis of appendiceal disease; available data covering admission to discharge or death; availability of a histological report on the surgical specimen; and availability of records of follow-up care at the outpatient clinic.

Exclusion Criteria: Non-availability of the full range of data and documentation.

The outcome was measured by the duration of stay in the hospital, post-operative complications such as surgical site infections, residual intra-abdominal abscess, wound dehiscence and deaths. Duration of hospital stay was defined as the number of days between presentation and discharge from the hospital or death. Average hospital stay was considered for patients who

spent about seven days from presentation to discharge. In comparison, prolonged hospital stay referred to patients who stayed beyond 7 days between presentation and discharge.

The data was analysed using descriptive statistics.

Results

Four hundred cases of appendiceal diseases were managed during the study period, but only 250 case records met the criteria for further analysis. There were 170 (68.0%) were males. In comparison, eighty (32%) were females, giving a male-to-female ratio of 2.1:1. The age range was one year to fifteen years. Those aged between 7-12 years were in the majority (175; 70%), while complications of acute appendicitis at presentation occurred more in those aged less than 7 years (150; 60%). Eighty (32.0%) children presented pre-operatively with complications of acute appendicitis (Table I).

Table I: Complications of appendicitis

Appendiceal diseases	Frequency	Percentage
Ruptured appendicitis with generalised peritonitis	40	50.0
Localised peritonitis	18	22.5
Appendiceal mass	16	20.0
Gangrene of the appendix	6	7.5

The differential diagnoses of acute appendiceal diseases managed during the study period included acute appendicitis (237; 94.8%), parasitic infection of the appendix (7; 2.8%), tuberculosis of the appendix (4; 1.6%), and neoplasm of the appendix (2; 0.8%) (Table II). The majority (180; 72.0%) of the children presented beyond 72 hours from the onset of symptoms, while 70 (28.0%) presented early within 24 hours of the onset of symptoms (Table II).

Table II: Differential diagnoses of appendiceal disease

Appendiceal Diseases	Frequency	Percentage
Acute appendicitis	237	94.8
Parasitic infestation of the appendix	7	2.8
Tuberculosis of the appendix	4	1.6
Neoplasm of the appendix	2	0.8

One hundred (40.0%) patients were discharged early, while one hundred and fifty (60.0%) patients stayed longer than seven days from admission to discharge or death. Surgical site infections occurred in 17 (6.8%) of patients, residual intra-abdominal abscess in 7 (2.8%) patients, and wound dehiscence in 5 (2%) patients. The mortality rate was 18 (7.2%).

Discussion

Appendiceal diseases are clinical conditions that affect the vermiform appendix. The most common disease condition of the appendix is known as acute appendicitis. It accounted for over three-quarters of the cases of appendiceal disease managed during the study period. Acute appendicitis may be classified as inflammatory or obstructive; both conditions manifest as an initial peri-umbilical pain which later settles at the right lower quadrant of the abdomen with nausea, anorexia and vomiting. [12,13]

Other disease conditions of the appendix featured in this study included appendiceal parasites, neoplasm of the appendix, and tuberculosis of the appendix. This is similar to the findings in other studies. [14,15] The diagnosis of acute appendicitis and other appendiceal diseases is predominantly clinical through detailed history taking and findings on physical examination. The common symptoms are abdominal pain, right lower quadrant colicky abdominal pain, nausea, anorexia, vomiting, occasional fever and abdominal swelling. [15,16] As

a result of the various conditions that affect the appendix as outlined above, the definitive diagnosis of the nature of an appendiceal disease in children comes after appropriate radiological investigations had been carried out in addition to intra-operative findings and histological examination of the surgical appendiceal specimen. [17,18]

The findings in the present study suggest a male preponderance similar to the findings of Ayoade and co-workers [19] at the same centre and Edino at Kano. [20] On the contrary, Ademola and co-workers at reported a female preponderance in Ile-Ife. [21]

Most of the children in this review presented late with attendant complications such as ruptured appendix with localised or generalised peritonitis, appendiceal mass, gangrene of the appendix, intestinal obstruction and appendiceal abscess; these findings are similar to the reports of other workers. [22,23] The complications that followed surgical intervention for the treatment of appendiceal diseases included residual intra-abdominal abscess, surgical site infection, wound dehiscence, incisional hernia and enterocutanous fistula. Our experience corroborates the findings of other authors. [24,25] The surgical approach used by our team to remove the diseased appendix at surgery was lance and gridiron incision for early presentation and uncomplicated acute appendicitis, but exploratory laparotomy was adopted for complicated cases of appendiceal diseases and indeterminate pre-operative causes of acute abdominal conditions in children. [26,27] Early presentation of appendiceal diseases with prompt surgical intervention usually gives good outcomes and prognoses.

The pattern of morbidity and mortality resulting from appendiceal diseases has been extensively studied. [28,29] Delay in presentation and prolonged intervals of surgical intervention with attendant complications are known risk factors for morbidities and mortalities. [30,31] The present study recorded morbidities and mortalities in patients with delayed presentation and those with rare appendiceal pathologies such as neoplasm of the appendix, [32,33] tuberculosis of the appendix, [34,35] and appendiceal parasites. [36,37] A mortality rate of 7.2% was recorded in the present study, while other researchers reported lower mortalities ranging between 1% and 5%. [38,39]

Limitations of study

Being a retrospective study, the findings in the present study are limited by the difficulty in retrieving all the required data about all identified cases. Due to attrition, the total number of cases managed during the study period was not adequately represented.

Conclusion

The present study has documented the various differential diagnoses of appendiceal diseases and their modes of presentation. Acute appendicitis and its complications remained the most frequent pathology in the cohort. Rare pathological causes of acute appendiceal diseases, such as tuberculosis of the appendix, parasitic appendicitis, and neoplasm of the appendix, were also highlighted. Early presentation and prompt surgical intervention should be encouraged to improve outcomes.

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Authors Contributions: NCC conceived the study. OAR and KEA did a literature review. ALO and OIO analysed and interpreted the data. NCC drafted the manuscript, while ALO and OIO revised it for sound intellectual content. All the authors approved the final version of the manuscript.

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