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## Management of acute appendicitis epidemiological, diagnostic, therapeutic and outcomes aspects: 103 cases

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### Abstract

Acute appendicitis is the most frequent surgical emergency. The aim of this study was to describe the epidemiological, diagnostic, therapeutic and the outcomes aspects of the management of acute appendicitis at the Ziguinchor Peace Hospital.

**Materials and Methods:** This was a retrospective, cross-sectional, descriptive, monocentric study conducted over a period of 2 years, based on the records of patients who underwent appendectomy for acute appendicitis in the general surgery department of the Ziguinchor Peace Hospital.

**Results:** A total of 103 patients underwent appendectomy for acute appendicitis. The mean age was 23.53 years, with a male predominance and a sex ratio (M/F) of 2.21. The average consultation time was 4.53 days, with extremes of 1 day and 22 days. Abdominal pain was present in all our patients, located in the right iliac fossa in 88.35%, with right iliac fossa tenderness in 78.64%. Fever was present in 25 patients (24.27%). All our patients' blood counts reported hyperleukocytosis in 53.31%. C-reactive protein was positive in 87 patients. Abdominal ultrasound was performed in 92 patients, with a sensitivity of 85.86%. The mean diameter of the appendix on ultrasound was 10.37 mm. Appendectomy by Mac Burney incision was performed in 58 cases (56.31%), and laparoscopy in 45 patients (43.69%). Surgical findings revealed simple acute appendicitis in 74 cases (71.84%). Post-operative management was favorable in 97.09% of cases.

**Conclusion:** Acute appendicitis is a very frequent surgical pathology in our context, which can be life-threatening due to its complications if not treated early.

**Keywords:** Appendicitis, emergency, appendectomy, Ziguinchor

### Introduction

Acute appendicitis (AA) is one of the most frequent causes of admission to emergency departments for acute surgical abdomen worldwide, accounting for 7-10% of admissions [1]. It corresponds to acute inflammation of the ileo-caecal appendix. The incidence was 8% in Western countries, 9% in the USA and 2% in Africa [2]. In Africa, it varies from country to country, and was ranked as the third most common cause of digestive surgical emergencies, after acute peritonitis and acute intestinal obstruction [3, 4]. Our study of digestive surgical emergencies in Ziguinchor showed that acute appendicitis was the leading cause of acute surgical abdomen [5]. The average age of onset of AA is between 10 and 30 years [6]. The complication rate varies between 16 and 40% with a higher frequency at the extremes of life, with increased morbidity and mortality compared to simple appendicitis [6]. Diagnosis of AA is based on functional signs, physical examination, results of biological tests and imaging. Despite the results of some studies showing the efficacy of antibiotic therapy alone in the treatment of simple acute appendicitis, laparoscopic or open appendectomy remains the approach of choice. The absence of data on this pathology, which is so frequent in our working context, motivates us to carry out this study in order to highlight the epidemiological, diagnostic, therapeutic and outcomes aspects of acute appendicitis at the Ziguinchor Peace Hospital.

### Materials and Methods

This was a retrospective, cross-sectional, descriptive, monocentric study lasting 2 years from January 2022 to December 2023. The study involved all records of patients who underwent appendectomy for acute appendicitis in the general surgery department of the Ziguinchor Peace

Hospital. Incomplete files were not included. Our study variables were qualitative (gender, elements of diagnosis, approach, appendix position, operative evolution, morbidity, mortality) and quantitative (age, frequency, hospital stay, appendix diameter on imaging, diagnostic delay). Our data were collected on Excel 2016, processed then analyzed by EPI info version 7.1 software, and presented as text, percentages, mean and standard deviation.

**Results**

We collected 103 patients who underwent appendectomy for acute appendicitis. The frequency of appendectomies was 51.5 patients per year. The study included 71 men and 32 women (sex ratio M/F: 2.21). The mean age was 23.53 years, with extremes of 11 and 78 years. The predominant age group (45.63%, n=47) was [20 – 30]. The main comorbidities (N=8) were: 2 cases (1.94%) of haemorrhoidal disease and caesarean sections. The average consultation time was 4.53 days, with extremes of 1 day and 22 days (Table 1).

**Table 1:** Distribution according to time of consultation

Time of consultation (days)	Number	Percentage (%)
0 - <3	31	30.1
3 - <6	44	42.7
6 - <9	19	18.5
9 - <12	2	1.9
12 - <15	3	2.9
≥ 15	4	3.9
Total	103	100

Abdominal pain was present in all our patients. It was located in the right iliac fossa in 88.35% of the cases. Tenderness in the right iliac fossa was noted in 78.64%. Details of clinical signs are given in Table 2. Febril was noted in 61 patients (59.22%) and fever in 25 (24.27%).

**Table 2:** Distribution according to clinical signs

Signs	Numbers	Percentages (%)
Pain on RIF	103	100
Vomiting	62	60.19
Nausea	34	33.01
Diarrhea	14	13.59
Tenderness on RIF	81	78.64
Blumberg's sign	21	20.39

Blood counts in all our patients showed hyperleukocytosis in 53.31%. C-reactive protein was performed in 88 patients, and was positive in 87. Morphological examinations were performed in all our patients. These included 92 abdominal ultrasounds (sensitivity = 85.86%) and 11 abdominal CT scans (sensitivity = 63.63%). The mean anteroposterior appendicular diameter was 10.37 mm, with extremes of 5 mm and 16 mm. Details of appendix diameter are summarized in Table 3.

**Table 3:** Distribution according to diameter of appendix by imaging

Diameter of appendix (mm)	Number	Percentage (%)
0 - <6	2	1.94
6 - <12	67	65.05
12 - <18	34	33.01
Total	103	100

General anesthesia was used in 92.23% of cases, and antibiotic therapy in all our patients. The Mac Burney incision was performed in 58 cases (56.31%), and laparoscopy in 45 patients

(43.69%), including 3 conversions through below umbilical midline incision due to technical difficulties (Figure 1).



**Fig 1:** Laparoscopic intraoperative image showing a bulging appendix

Surgical exploration revealed simple acute appendicitis in 74 cases (71.84%), suppurative appendicitis in 8 cases (7.77%), and appendicular abscess in 21 cases (20.39%). Stercolith was found in 23 cases. The appendix was latero-caecal in 67.96%. Other appendix positions are detailed in Table 4.

**Table 4:** Positions of the appendix in peri operative

Position of the appendice	Number	Percentage (%)
Latero-caecale	70	67.96
Pelvic	6	5.83
Retro-caecale	14	13.59
Subserose	4	3.88
Sub hepatic	6	5.83
Meso cœliac	3	2.91
Total	103	100

Treatment consisted of appendectomy (figure 2) in all cases, combined with peritoneal lavage in the case of suppurative appendicitis, and pus collection, peritoneal lavage and drainage in the case of appendiceal abscesses.



**Fig 2:** image of appendectomy specimen

We noted two intra-operative incidents, one caecal perforation and one ileal perforation, mainly involving the laparoscopic approach. The overall mean operating time was 55.94 min, with extremes of 30 min and 120 min. Bacteriological examination of the pus in 18 cases revealed the presence of *Escherichia Coli* in 12 cases. Morbidity was 2.91%, with 1 case of residual abscess, 1 case of digestive fistula and 1 septic evisceration. The management of these complications was surgical review for the digestive fistula with ileostomy. Other complications were treated medically (antibiotics, local care). Mortality was nil. Patients had an average stay of 3.26 days, with extremes of 1 day and 21 days. Details of length of stay are given in Table 5. Anatomopathological examination of the surgical specimens in 47 patients (45.63%) was in favor of simple appendicitis with no histological signs of malignancy. The rest of the operative specimen results were not found.

**Table 5:** Distribution according to length of hospital stay

Length of hospital stay (days)	Number	Percentage (%)
1 - <4	64	62.14
4 - <7	34	33.01
7 - <10	4	3.88
19 - <22	1	0.97
Total	103	100

## Discussion

The limitations of our study are related to its retrospective and monocentric nature, as well as its relatively small sample size and duration, and the lack of data on pathological findings. Acute appendicitis is an abdominal surgical emergency and a frequent reason for emergency admission and intervention worldwide. Many authors agree on this frequency, which was 43.4%, 40.54% and 42.65% respectively in Morocco, Mali and Senegal [5, 7, 8]. In contrast, in other African countries, appendicitis came after acute peritonitis and acute intestinal obstruction [3, 9]. Appendicitis is a pathology of young adult male. This has been confirmed in our work and by several authors [7, 10-12]. However, a female predominance was reported in the study by Sartelli *et al.*, with a sex ratio of 0.8 [13]. Our mean consultation time was 4.53 days, with 39.8% of patients consulting within the first 48 hours after the onset of symptoms. These results are close to those reported in the literature [7, 13, 14]. The delay in diagnosis in our study could be explained by self-medication, the complex therapeutic pathway of the patient in Africa, and the low income in purchasing of our patients, with referral to traditional healers. Appendicitis is diagnosed clinically, with abdominal pain as the main symptom. The right iliac fossa is the classic site, as described by authors [7, 15]. According to the literature, the clinical presentation is marked by pain in the right iliac fossa (95%), vomiting (73%) and nausea (80%) [7, 12, 15, 16]. Fever was present in 25 cases (24.25%), consistent with the clinical picture of acute appendicitis, especially in its complicated form. This rise in temperature was found in the study by Engbang *et al.* in Cameroon (41.7%) and that by Sartelli *et al.* in Nigeria (24.7%) [11, 13]. In our study, we found a non-specific biological inflammatory syndrome with predominantly neutrophilic hyperleukocytosis in 53.31% of cases and elevated C-reactive protein (CRP) in 98.86% of cases. CRP and hyperleukocytosis are the key elements of the diagnosis, forming part of the MANTRELS score and testifying to inflammation, as shown by several authors [13, 15, 14]. With regards to imaging, we performed more abdominal ultrasound scans (N:92 cases) than abdominal CT scans, confirming the diagnosis of appendicitis in 85, 86% of cases. Ultrasound is the

examination of choice for diagnosis, if it can be performed urgently, but it is operator-dependent. According to the literature, its sensitivity and specificity range from 48 to 90% and 83 to 100% respectively [10, 15]. According to the recommendations for clinical practice of the French Society of Digestive Surgery and the Society of Abdominal and Digestive Imaging on the management of appendicitis in adults, published in 2021, positive likelihood ratios for ultrasound were high (values between 6 and 46), while visualization of the appendix was inconsistent, ranging from 35% to 53% [17]. Despite the still difficult access and high cost of CT in our context, this explains why it is the last option. It is still of interest in the case of an elderly patient, or in cases of diagnostic doubt on ultrasound, with a sensitivity and specificity of between 76% and 100% and between 83% and 100%, respectively, for the diagnosis of acute appendicitis [17]. Surgical treatment remains the gold standard in the management of appendicitis and its complications. The common denominator is appendectomy. Several approaches have been described in the literature: McBurney incision, laparoscopy, transvaginal laparoscopic (NOTES), median laparotomy. The most commonly used approach is the Mac Burney incision, in 56.31% of cases [7, 12]. The preferred choice of this route in the African literature may be linked to its elective, minimally invasive nature, but also to the unavailability of emergency laparoscopy and a lack of skills [7, 11, 13]. The development of laparoscopy in our region has made this technique available on-call. In our series, 43.69% of patients underwent laparoscopic appendectomy, and the results of the literature show a benefit by offering complete exploration of the abdominal cavity, rectification of the diagnosis, investigation of complications, peritoneal lavage, reduced postoperative morbidity and a short hospital stay with earlier resumption of activities [17, 18]. During laparoscopy, we observed two intraoperative complications (iatrogenic opening of the cecum and ileum), hence the need for companionship. The position of the appendix was predominantly latero-caecal in 67.96% of cases, as was Sogoba *et al.* in Mali, who found this position in 79.04% [7]. On the other hand, Engbang *et al.* in Cameroon found a dominant ileocecal position (71.6%) [11]. The low morbidity of 2.91% in our series was comparable with that of Sogoba in Mali (1.9%), but lower than that of Engbang *et al.* in Cameroon (19.9%) [7, 11]. This significant difference may be linked to the study's sample size.

## Conclusion

Acute appendicitis is the leading cause of acute surgical abdomen in Ziguinchor and in many other countries around the world. It affects young adults, but can occur at any age. Diagnosis is clinical, supported by biology and imaging. Laparoscopic appendectomy is the standard treatment, with peri-operative antibiotic therapy. The prognosis is good, provided diagnosis and management are carried out before complications set in.

**Conflict of interest:** None.

**Author's contribution:** they contributed to the final editing of this manuscript.

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