

Laparoscopic Appendectomies at Brazzaville University Hospital

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How to cite this paper: Note Madzele, M.E.J., Elion Ossibi, P., Bhodeho Medy Monwongui, Massamba Miabaou, D., Tsouassa Wa Ngono, G.B., Avala, P.P., Niengo Otsouta, G., Motoula Latou, N.H., Nzaka Moukala, C., Alima Koya, C.D.B. and Otiobanda, G.F. (2024) Laparoscopic Appendectomies at Brazzaville University Hospital. *Surgical Science*, 15, 183-194.

<https://doi.org/10.4236/ss.2024.154018>

Received: March 6, 2024

Accepted: April 13, 2024

Published: April 16, 2024

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Abstract

Introduction: Acute appendicitis represents an urgent surgical condition, requiring the removal of the vermiform appendix. Laparoscopy is the standard surgical approach. This study aimed to outline the epidemiological, clinical, therapeutic, and outcome characteristics of patients undergoing laparoscopic surgery for acute appendicitis. **Patients and Methods:** A descriptive, retrospective analysis was carried out in the Emergency and Digestive Surgery departments of the University Hospital Center of Brazzaville, spanning two years from January 1, 2021, to December 31, 2022. The study included all patients who underwent laparoscopic surgery for non-complicated acute appendicitis. **Results:** The study included 12 cases of non-complicated acute appendicitis treated with urgent laparoscopy. The mean age of the patients was 37 ± 8.9 years, with a sex ratio of 0.7. The predominant symptom leading to consultation was pain in the right iliac fossa, with an average time to consultation of 6.4 ± 5.7 hours. Patient histories included diabetes in one case, obesity in two cases, and one case of prior abdominoplasty. During surgery, a phlegmonous appendix was observed in nine patients. The average duration of hospital stay was 3.6 ± 1.3 days, with all patients experiencing uncomplicated recoveries. **Conclusion:** The practice of emergency laparoscopic appendectomy is still relatively infrequent in our setting and presents an ongoing challenge.

Keywords

Acute Appendicitis, Appendectomy, Laparoscopy, Emergency

1. Introduction

Acute appendicitis (AA) represents a surgical emergency marked by the sudden inflammation of the vermiform appendix [1]. The standard treatment involves the surgical removal of the appendix, either through open surgery or via laparoscopy, with the latter being currently recognized as the preferred method for managing AA [2]. Indeed, the laparoscopic approach to appendicular pathology was initially designed to decrease the morbidity of appendectomy and the frequency of diagnostic errors. Added to this were the quality of aesthetic and rapid healing, the short hospital stay and the early resumption of activities [3] [4]. In sub-Saharan Africa, where this procedure is infrequent due to the obstacles associated with the medical environment and fewer resources, several studies nevertheless describe this surgical approach for the treatment of AA. These include the series of cases reported by Kéli in Côte d'Ivoire, Ndong in Senegal, James in Niger, Lawani in Benin, and Moussa in Chad [5] [6] [7] [8] [9]. In Congo, the activity of laparoscopic surgery in digestive surgery began in 2009 with the fairly regular practice of cholecystectomy for vesicular stones [10]. With regard to AA in its uncomplicated form, which accounts for 21.1% of abdominal surgical emergencies admitted to the University Hospital of Brazzaville, a recent study reports its surgical treatment [11]. It was reported that of all patients operated in this setting, a small proportion had undergone a laparoscopic approach. As of now, there has been no local study focused solely on the laparoscopic surgical treatment of AA. Therefore, our study aimed to outline the epidemiological, diagnostic, therapeutic, and outcome-related characteristics of patients who were admitted to the Emergency and Digestive Surgery service at the CHU of Brazzaville for AA and treated surgically through laparoscopy.

2. Patients and Methods

This study was a retrospective analysis carried out in the surgical unit of the Emergency Department and in the Digestive Surgery Department of the Brazzaville University Hospital.

The research spanned a period of two years, from the 1st of January, 2021, to the 31st of December, 2022. We included adult patients admitted for uncomplicated AA and operated laparoscopically. As indicated in the medical records, these patients had symptoms that had been evolving for no more than 24 hours; they were in good general condition; On physical examination, there was no mass in the right iliac fossa and no signs of peritoneal irritation.

The study examined epidemiological, diagnostic, therapeutic, and outcome-related variables.

The surgical procedures were conducted on patients under general anesthesia, who had been pre-administered antibiotic therapy consisting of amoxicillin and clavulanic acid. Patients were positioned in a supine position, with the left arm resting alongside the body. A urethral catheter was inserted prior to surgery. Extensive debridement and antiseptic application were performed from the mam-

mary line to the mid-thighs, including the pubis and laterally to the edge of the operating table. The surgical drapes were broadly arranged to allow for a potential conversion to laparotomy if the operative conditions necessitated it, and to facilitate possible declivitous blade drainage.

The laparoscopy tower was positioned to the right of the patients, directly opposite the surgeon and their assistant, who were positioned to the left of the patients, with the assistant standing to the right of the surgeon.

The establishment of the pneumoperitoneum was performed using the open laparoscopy method, through a roughly 2 cm skin incision located just below the navel, facilitating the insertion of a 10 mm trocar devoid of its stylet. A purse-string suture on the aponeurosis around the trocar was executed using a Vicryl 4.1 slow-absorbing suture material to prevent gas leakage during the surgery. CO₂ insufflation was conducted at a maximum pressure of 15 mmHg. A 10 mm, 0° scope was inserted through the trocar, enabling the videoscopic-guided placement of two additional 5 mm trocars with their stylets, one in the left iliac fossa and the other above the pubic area, with careful avoidance of the epigastric vessels and bladder. These trocars were utilized by the surgeon. The assistant managed the camera with his right hand. To enhance exposure and ease exploration, an extra 5 mm trocar could be inserted into the right hypochondrium, designated for an atraumatic forceps held by the assistant. Additionally, the operating table could be rolled to the left and tilted into the Trendelenburg position for better surgical access.

The initial examination aimed to identify any potential bleeding at the sites where the trocars were inserted. To expose the appendix, an atraumatic clamp was inserted through the suprapubic trocar to hold the tip of the appendix. Another atraumatic clamp was used to grab the appendix near its base, stretching the mesentery. The mesoappendix was cut using either a coagulating hook or bipolar forceps (**Figure 1(A)** and **Figure 1(B)**). The subsequent step involved tying off the base of the appendix with a slow-dissolving Vicryl 2.0 thread. The knots were tied outside the body and then tightened inside the abdomen using a knot pusher (**Figure 2**). Alternatively, the base of the appendix could be tied off directly using two needle-holder forceps. A second, precautionary tie could be placed above the first. The appendix was cut less than a centimeter from the base tie. The cut appendix, held at its base, was immediately placed into a glove finger secured with a suture thread (serving as an endobag). The stump of the appendix was cleaned with a swab soaked in polyvidone iodine and then cauterized with a coagulating hook. The following step involved removing the appendix through the optical trocar opening. After ensuring there was no bleeding and possibly performing a minor peritoneal cleaning with saline, the trocars were removed, the area was deflated, and the aponeurosis at the optical trocar site was closed. The skin at all entry points was stitched with an intradermal running suture using a dissolvable Vicryl 3.0 thread or with simple stitches using the same thread. Small dressings were applied over each trocar entry stitch. The urinary catheter was removed at the end of the surgery or once the patients were fully awake.

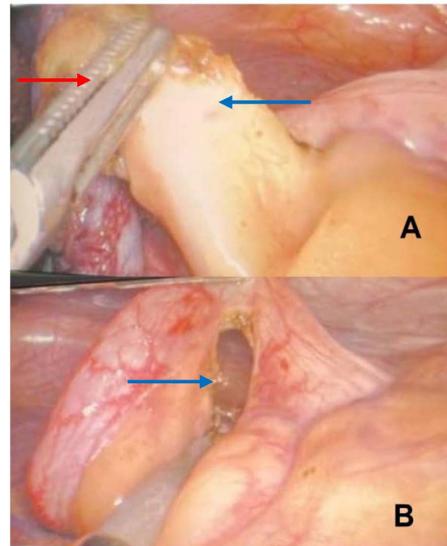


Figure 1. Images showing electrocoagulation of the meso appendix, 23-year-old patient. (A): Meso appendix (blue arrow); bipolar forceps (red arrow); (B): Meso appendix completely severed (blue arrow). Source: Brazzaville University Hospital Emergency and Digestive Surgery Departments.

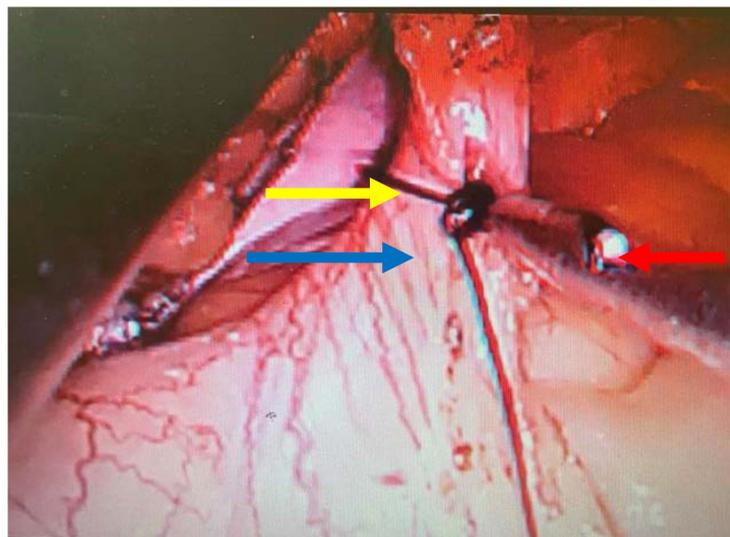


Figure 2. Image showing appendicular base ligation using a knot pusher. In a 31-year-old female patient. Appendicular base (blue arrow); appendicular base ligation with absorbable suture (yellow arrow); knot pusher (red arrow). Source: Brazzaville University Hospital Emergency and Digestive Surgery Departments.

Data were collected on the basis of admission records from the surgical unit of the Emergency Department and hospitalization records from the Digestive Surgery Department; as well as on the basis of patients' medical records. These should include at least one complete medical observation with information from post-operative follow-up for at least one month and an operative report. A pre-established investigation form was completed on a case-by-case basis. The analysis and processing of the data was done using Excel software version 2016.

3. Results

Throughout the duration of our study, we observed 12 patients who underwent laparoscopic surgery for non-complicated acute appendicitis (AA), accounting for 5% of all the appendectomies for non-complicated AA in this timeframe, these amounted to 231 cases. Our demographic breakdown included five males (42% of cases) and seven females (58% of cases) (**Figure 3**), with a *sex ratio* of 0.7 favoring females. The patients' average age was 37 ± 8.9 years, with a range from 23 to 54 years.

Table 1 shows the distribution of patients according to their professional activity.

Notable medical histories among these patients were diabetes in one individual and obesity in two individuals. Additionally, one patient had previously undergone abdominoplasty. The mean time to seek medical consultation was 6.4 ± 5.7 hours, with a range from 2 to 24 hours. Abdominal pain was the predominant symptom prompting consultation, present in all patients. This pain was localized to the right iliac fossa in nine (75%) patients and to the right pelvic area in three (25%) patients. Accompanying symptoms included fever, nausea, and/or vomiting in ten (83%) patients. Eleven (92%) patients maintained normal bowel movements. Overall, patients were in good health. Physical examinations revealed all patients had a coated tongue. Psoasitis was observed in one patient. Tenderness in the right iliac fossa, specifically at McBurney's point, was noted in four (33%) patients. The remaining patients exhibited pain upon deep palpation of the iliac fossa. Blumberg's sign was identified in eight (67%) patients and was associated with Rovsing's sign in five (42%) of these cases. A rectal exam highlighted right-sided pain in ten (83%) patients.

Table 2 provides a summary of patients' clinical signs.

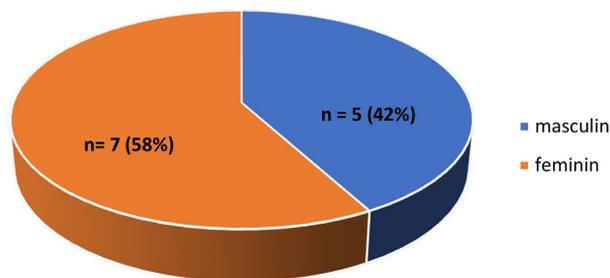


Figure 3. Distribution of patients by sex.

Table 1. Distribution of patients by profession.

Professions	Numbers	%
Doctor	2	16
Nurse	2	16
Civil servant	5	43
Student	3	25
TOTAL	12	100

Table 2. Distribution of patients according to clinical signs at admission.

Clinical signs		Staff	%
	Right iliac fossa pain	9	75
	Right pelvic pain	3	25
Functional Signs	Nausea	10	83.3
	Vomiting	10	83.3
	Bowel disorder	1	8.3
	Absence of fever	2	16.7
General signs	Fever	10	83.3
	Langue saburrhale	12	100
	Psoitis	1	8.3
	Right Iliac Fossa Defense	4	33.3
Physical signs	Pain on deep palpation of the right iliac fossa	8	66.7
	Blumberg's Sign	8	66.7
	Rovsing's Sign	5	41.7
	Right lateral pain on digital rectal examination	10	83.3

The laboratory findings indicated leukocytosis exceeding 10,000 elements/mm³ in eight (67%) of the patients, and a C-reactive protein (CRP) level above 24 mg in 11 (92%) of the patients. An abdominal ultrasound, performed on ten (83%) patients, confirmed the diagnosis of acute appendicitis by revealing an enlarged appendix, measuring more than 6 mm in diameter with wall thickness exceeding 3 mm. No peri-appendicular fluid was observed. Abdomino-pelvic CT scans were conducted on one patient, revealing a dilated appendix with thickened walls, which absorbed contrast, but without any peri-appendicular fluid. Pre-anesthetic evaluations by an anesthesiologist classified all patients as ASA 1. The mean time to surgical intervention was 10.4 ± 4.5 hours, with a range from 3 to 20 hours. All patients received pre-surgical antibiotic therapy, consisting of amoxicillin and clavulanic acid. In most cases (75%), three trocars were utilized. During surgery, the appendix appeared phlegmonous in 9 (75%) patients and catarrhal in 3 (25%) patients (**Figure 4**). The appendix was located in the right iliac area in 7 (58%) patients, in the pelvic area in 2 (18%), in the retrocecal area in 1 (8%), and in the mesocolic area in 1 (8%) patient. No drainage was performed for the right iliac fossa or the Douglas pouch. The average duration of the surgery was 105 ± 13.6 minutes, ranging from 92 to 140 minutes. There were no instances of converting to an open surgical approach in our series. The average length of hospital stay was 3.16 ± 1.3 days, with a range of 2 to 5 days. Postoperative recovery was uncomplicated for all patients, with a follow-up period of 30 days.

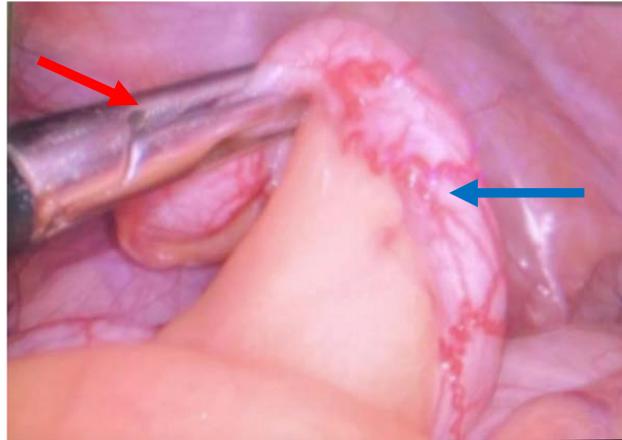


Figure 4. Intraoperative image showing a catarrhal appendix, 23-year-old patient. Blue arrow: body of appendix. Red arrow: atraumatic forceps grasping the appendix. Source: Brazzaville University Hospital Emergency and Digestive Surgery Departments.

4. Discussion

Acute appendicitis is a pathology of young adults, as we noted in our study. The average age of our patients was 37 years. Our result is comparable to those of several authors: James and colleagues in Niger [7], Keli and colleagues in Ivory Coast [5], Ndamba Engbang and colleagues in Cameroon [12], who found an average age of 35.28 years, 34.7 years, and 32 years, respectively. Although it is accepted that there is no parallel between sex and the pathology of acute appendicitis, many studies find a male predominance [13] [14] [15]. This was not the case in our series, which could be explained by the small sample size. Moreover, delayed consultation, self-medication leading to admission at the stage of complications of this pathology, could explain this female predominance. The diagnosis of acute appendicitis is clinical. In its classic form [2], it describes the picture of abdominal pain initially localized in the epigastric region and subsequently in the right iliac fossa. This pain is associated with fever or low-grade fever, nausea and/or vomiting, cessation of stool without cessation of gas. Physical examination reveals psotitis in the case of retrocecal acute appendicitis; guarding in the right iliac fossa, particularly at McBurney's point; a Blumberg sign and/or a Rovsing sign. A pain lateralized to the right on rectal examination may be noted. In our study, abdominal pain was the main symptom. It was found in all patients. Our result is similar to data in the literature [16] [17] [18] [19]. Biological examinations guide the diagnosis in atypical forms [2]. Indeed, the blood count shows a leukocytosis of more than 10,000 elements/mm³ and the CRP is greater than 24 mg/L. We found leukocytosis in 67% of patients and a CRP greater than 24 mg/L in 92% of patients. Jabahgi in France [20] and Sanogo in Mali [21] report leukocytosis at 29.1% and 26%, respectively. Morphological examinations such as abdominopelvic CT scan and abdominal ultrasound are also of considerable help for the diagnosis of acute appendicitis, particularly in its atypical form [13] [17] [18] [19]. In our study, ten patients had an abdomino-

pelvic ultrasound and one patient had an abdominopelvic CT scan. Once the diagnosis of acute appendicitis is confirmed, surgical intervention must be quickly decided as it is a surgical emergency. The approach of choice is laparoscopy [2] [22] [23] [24] [25]. During our study period, out of 231 patients admitted to the emergency department for uncomplicated AA, only 12 patients underwent laparoscopic surgery. There are two reasons for this low rate of laparoscopic appendectomy. The first would be related to the patient. Indeed, the low socio-economic level of patients and self-medication generally lead to a delay in consultation, at the end of which the observation of a deterioration in general condition and complications would have motivated the practice of a classic surgical approach rather than laparoscopy. The second reason has to do with medical and paramedical resources as well as equipment. Indeed, in our context, few practitioners have the expert mastery of laparoscopic technology. This makes it difficult to obtain expert labour for emergency pathologies and particularly AA at the University Hospital of Brazzaville. In addition, the availability of a single laparoscopic column in our hospital limits its regular use for all user services, in emergency and regulated surgery. In Niger, Saïdou *et al.* report 8% of laparoscopic surgery performed in emergency, and this was related to the insufficient number of laparoscopic columns [26].

We used three trocars. Keli [5] and Koumaré [22] also used three trocars. Intraoperatively, the appendix was in the right iliac position in the vast majority of cases. This appendicular topography is the most common. Indeed, Jabahgi [20] and Sanogo [21] also find a predominance of this situation. Due to a delay in management, often the macroscopic appearance of the appendix exceeds the catarrhal stage. It can vary from the phlegmonous form to the perforated form [2]. In our series, the appendix was macroscopically phlegmonous in the majority of patients (75%). We performed the so-called “in” coelio-appendectomy or pure coelio-appendectomy. This is a technique with wider possibilities and which can be performed in all cases [25] [26] [27]. Koumaré [22] reported a high frequency of so-called “out” appendectomies in his study. Diop [28], for his part, reported a high frequency of so-called “mixed” appendectomies. We believe that the choice of technique depends on the surgeon’s skills, the position of the appendix, and the patient’s history.

The treatment of the meso appendix, in our study, was performed in the majority of cases using the coagulator hook and monopolar; and in a few cases with the help of the bipolar forceps. Several materials can be used for meso processing. This can be the bipolar clamp (ideally), the endo-clips, or the monopolar coagulator hook. In our context, often due to the recurrent non-functioning of the bipolar scalpel, we choose the coagulator hook. In addition, in an emergency context, we prefer not to opt for the use of endo-clips, the high cost of which would increase the cost of the surgical prescription at the expense of patients. In the same vein, Touré *et al.* in Senegal in 2009, used the bipolar scalpel for the treatment of the mesoappendix in order to save endo-clips [29].

Still from a technical point of view, ligation of the appendicular base was possible in our study with nodes made extracorporeal and tightened using a knot pusher. In our context, we do not have an endo-loop for the ligation of the appendicular base. This is also the case for the Senegalese team, which makes an equivalent of an endo-loop using spool thread [29].

Some laparoscopic surgery materials, such as the endobag, are often not available in sub-Saharan countries. To this, as in some regional teams, we substitute sterile thermowells in order to play the same role which consists of collecting the surgical specimen as soon as it is removed and avoiding contamination of the rest of the abdominal cavity and the abdominal wall during its extraction [29] [30] [31].

Furthermore, we did not have any cases of conversion to surgical approach, certainly due to the position of the appendix which generally allowed easy exposure; but also due to the selection of uncomplicated forms of acute appendicitis and the absence of perioperative complications. The conversion rates in randomized studies in the West vary between 0% and 20% [28]. The average hospital stay was 48 hours. Jabahgi and Nouille in France [20], Koumaré in Mali [22] reported respectively 57.6%, 27%, and 36.7% of patients who had a two-day hospital stay. Indeed, the benefit of laparoscopy on the duration of hospitalization is no longer to be demonstrated [2]. The same applies to postoperative outcomes, which are most often simple, particularly in terms of postoperative pain, surgical site infection, and patient rehabilitation. As reported in the literature, all these elements are improved [2] [16] [24] [27]. In all our patients, we noted simple postoperative outcomes, with a follow-up of 30 days. It should be noted that in our context, the laparoscopic appendectomy for AA, performed with the means available, could have the merit of reducing the hospitalization costs to be borne by patients; and to enable an early resumption of professional activities for the benefit of patients.

5. Conclusion

The practice of emergency laparoscopic appendectomy continues to be infrequent at our hospital, despite the widespread adoption of laparoscopic techniques for most surgical procedures, especially appendectomies. Given that the laparoscopic approach, considered the gold standard, yields superior outcomes in terms of cosmetic results and early patient rehabilitation, increasing its regular and frequent use presents a significant challenge in our setting.

Publication Consent

All patients, who were contacted retrospectively, consented to the use of their medical records for the purpose of publication.

Conflicts of Interest

The authors declare no conflicts of interest.

Author Contributions

All authors have made contributions to this article, and have read and approved its final manuscript.

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