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Laparoscopic Appendectomy: About a Prospective Monocentric Series of 251 Cases

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Abstract

Thanks to numerous studies comparing laparoscopic appendectomy and open appendectomy, laparoscopic appendectomy has become the gold standard in young women. However, its role in the management of acute appendicitis in men remains controversial.

The aim of our study was to assess the feasibility, reproducibility, technical difficulties, and identify the advantages and disadvantages of laparoscopic appendectomy.

Materials and Methods: Prospective monocentric descriptive feasibility study. We included all adult patients over 15 years of age, operated on for acute appendicitis over 36 months (February 2019-February 2022).

Results: A total of 251 patients were operated on for acute appendicitis. The mean age of our patients was 34 years ± 14 years (range 15 - 82 years). Male predominance in (57.37%). Intraoperatively, the phlegmonous form was the most frequent (148 patients = 58.97%). The appendix was often located in the internal latero-caecal position (120 patients = 47.81%). The mean operating time was 37.06 ± 15.76 minutes (range 21 to 97 minutes). Only one conversion was recorded (0.4%). The rate of postoperative complications was (3.58%), including 03 (1.19%) deep collections of the right iliac fossa. Pain assessed on the visual analog scale (VAS) was often of low intensity (176 patients = 70.12%).

Conclusion: In addition to the well-known advantages of laparoscopic approach, our results have shown the feasibility and safety of laparoscopic appendectomy.

Keywords: Acute Appendicitis ; Conversion; Deep Collections; Emergency Laparoscopy

Abbreviations: RIF: Right Iliac Fossa; VAS: Visual Analog Scale ; BMI: Body Mass Index.

Introduction

Open appendectomy has always been the «Gold Standard» reference for the treatment of acute appendicitis [1,2]. However, in recent years, laparoscopic appendectomy has proven to be as safe as laparotomy [1]. In addition to the well-known advantages of laparoscopy, laparoscopic appendectomy brings other specific benefits to the management of this pathology.

Indeed, the clinical polymorphism of appendicitis, and the multiplicity of differential diagnoses, especially in women, make laparoscopy both a diagnostic and therapeutic tool [3]. This approach helps reduce the rate of negative appendectomies and the rate of undetermined diagnoses [4,5].

Finally, the analysis of quality of life after appendectomy would favor the laparoscopic approach, with notably better aesthetic results [6].

Although French recommendations published in 2006 did not favor laparoscopic appendectomy [6], it has now become the «gold standard» for premenopausal women, and two other patient groups appear to significantly benefit from the laparoscopic approach: elderly patients and obese individuals [7-10].

In pregnant women, laparoscopic surgery was initially contraindicated. Currently, this approach is an excellent option for experienced teams [11-13].

Our objective was to evaluate the feasibility, reproducibility, and technical difficulties, while identifying the advantages and disadvantages of laparoscopic appendectomy.

Materials and Methods

Prospective monocentric cross-sectional and descriptive feasibility study. Laparoscopy was used to operate on 251 patients with simple acute appendicitis over 36 months (February 2019-February 2022).

All surgical procedures were performed by the same operator.

Inclusion Criteria

All adult patients (15 years and older) presenting with simple acute appendicitis.

Exclusion Criteria

Subjects classified as ASA (IV), and children under 15 years of age.

Surgical Technique

- All patients underwent surgery under general anesthesia.
- Three (03) trocars were used: 01 10 mm umbilical trocar for the optic, one 10 mm operating trocar placed at the right hypochondrium, and one 05 mm trocar at the left iliac fossa.
- Dissection of the appendix, in case of adhesions, was always performed using monopolar electrocautery.
- Ligature of the appendicular base was intracorporeally performed in all cases, either by a Miller's knot or by a simple non-locking knot.
- Ligature of the appendiceal mesentery was accomplished with clips.
- Appendiceal section was always performed with cold scissors.
- We systematically performed cauterization of the appendiceal stump using monopolar electrocautery.
- Operative specimens were always extracted in an endo-bag.

Results

A total of 251 patients underwent surgery for acute appendicitis. The mean age of our patients was 34 years ± 14 years (Range: 15 years - 82 years), with a male predominance in 57.37% (144 patients). Pregnant women accounted for 2.39% of our sample (06 pregnant women).

The body mass index (BMI) of our patients was above normal in 113 patients (45.02%). Overweight was observed in 30.68% of cases (77 patients), moderate obesity in 26 patients (10.35%), severe obesity in 06 patients (2.39%), and morbid obesity in 04 patients (1.59%).

Comorbidities were present in 56 patients (22.31%). Thus, 215 patients (85.66%) were classified as ASA I, 32 patients (12.75%) as ASA II, and 04 patients (1.59%) as ASA III.Previous abdominal surgery history was found in 12.75% of cases (32 patients).

Intraoperatively, the phlegmonous macroscopic form was the most frequent (148 patients = 58.97%). The gangrenous form was found in 38 patients (15.14%), the catarrhal form in 37 patients (14.74%), and the suppurative form in 28 patients (11.16%).

The location of the appendix was often retrocecal internal (120 patients = 47.81%). The retrocecal position was found in 93 patients (37.05%), the pelvic position in 37 patients (14.74%), and finally the meso-celiac position in 01 patient (0.4%). A stercolith was found in 136 patients (54.18%).

Laparoscopic exploration revealed associated pathologies in 05 patients (03 Meckel's diverticula, and 02 ovarian cysts), which were treated concomitantly.

The mean operative time was 37.06 ± 15.76 minutes (Range 21 to 97 minutes). The overall duration of anesthesia was 49.4 ± 15.19 minutes (Range 35 - 119 minutes). A single case of conversion (0.4%) was recorded.

On the first postoperative day, 35 patients (13.95%) had no pain, and 176 patients (70.12%) had mild pain intensity on the visual analog scale (VAS). Pain was of moderate intensity in 40 patients (15.94%).

«Perioperative and postoperative mortality was nil. The rate of postoperative complications was 3.59% (09 patients), including 06 (2.39%) surgical site infections and 03 (1.2%) deep collections in the right iliac fossa.

The duration of postoperative hospital stay was 21 hours ± 3.30 hours (Range 08 hours - 48 hours).

Discussion

The first laparoscopic appendectomy was performed in 1983 by SEMM [2,14]. Since then, numerous studies have compared laparoscopic appendectomy and open appendectomy. These studies have consistently demonstrated that laparoscopic appendectomy is as feasible, safe, and reproducible as open appendectomy [15]. Our results add to the findings of many studies confirming the feasibility of laparoscopic appendectomy.

Our results have shown that laparoscopic appendectomy is feasible regardless of the macroscopic appearance of the appendix and its anatomical position.The technique of laparoscopic appendectomy was similar in most studies, typically performed with 3 trocars [16,17]. In our study, 03 trocars were also sufficient in the majority of cases.

Various techniques are used for ligating the appendiceal base, including Roeder's knot, Miller's ligature, or a simple non-reinforced stitch. Occasionally, ligating the appendiceal base using a mechanical clamp [16]. This ligation is performed either intracorporeally or extracorporeally. In our series, we adhered to the principle that laparoscopy is only an approach and should not alter the technique. Thus, ligating the appendiceal base was always performed intracorporeally. Often by a Miller's ligature, and in rare cases, by a simple non-reinforced stitch.

The average operative time in our series of acute appendicitis was 37.06 ± 15.76 minutes (Range 21 to 97 minutes). Our operative time is nearly identical to that of the Lucchi series [18], which is 38.45 minutes. The operative time of the Quezada series [1] is 60.02 minutes, which is longer than ours (50.06 minutes), as it only included complicated appendicitis. Operative time varies among different studies, as shown in Table 01, due to the heterogeneity of samples from one series to another.

Series	Sample Size	Mean Operative Time	Minimum Operative Time	Maximum Operative Time
Quezada F, et al. [1]	97	60.02 min	Not specified	Not specified
Bouillot JL, et al. [14]	448	53 min	Not specified	Not specified
Lucchi A, et al. [18]	259	38.45 min	Not specified	Not specified
Caruso C, et al. [19]	108	58 min	Not specified	Not specified
Boubekeur M, et al. [20]	140	64.68 min ± 26.63	20 min	165 min
Stavros K, et al. [21]	229	48.2 ± 31.2 min	Not specified	Not specified
Guanà R, et al. [22]	47	69.0 ± 13.8 min	Not specified	Not specified
Ukai T, et al. [23]	3273	57.3 min	Not specified	Not specified
Kumar S, et al. [24]	104	44.57 ± 6.68 min	Not specified	Not specified
Cox MR, et al. [25]	53	55 min	30 min	95 min
Biondi A, et al. [26]	283	54.9 ± 14.2 min	Not specified	Not specified
Our Series	251	37.06 ± 15.76 min	21 min	135 min

Table 1: Operative Times for Acute Appendicitis.

The reported conversion rates vary from one series to another, ranging from 0% to 27% for some series [27,28]. In our series of appendicitis, we recorded a single conversion (0.4%) during an intervention for appendiceal mass. This conversion, occurring early in the experience, was related to the inability to access the right iliac fossa (RIF) due to adhesions of the intestinal loops and omentum.

The main reasons for conversions during acute appendicitis reported in the literature are [27]: the learning curve, patient selection or non-selection. Indeed, the conversion rate is 10 times higher in patients with complicated acute appendicitis compared to simple appendicitis, bowel distension, hemodynamic instability, presence of intraperitoneal adhesions, extent of local inflammation, and

inadequate exposure of the right iliac fossa. For other series, obesity and comorbidities are conversion factors [1,16].

The main criticism of emergency laparoscopic approaches is the frequency of deep collections, particularly in the surgical treatment of acute appendicitis and generalized peritonitis. Studies have shown that the laparoscopic approach is associated with fewer wall abscesses than the McBurney incision [7,29]. However, it is responsible for twice as many deep abscesses as the McBurney incision [07,29-31]. For some authors, the rate of abscesses is identical between the laparoscopic and traditional approaches [32].

In a multicenter cohort study involving 6805 cases of acute appendicitis divided into two groups (one group of patients operated on through the traditional approach and another through laparoscopic approach), Jianguo Cao clearly demonstrated that the occurrence of deep abscesses is not systematically linked to the laparoscopic approach. Thus, the non-use of laparoscopic approaches for fear of deep abscesses is not justified [33].

Conclusion

Our study is in perfect agreement with the literature, confirming that laparoscopic appendectomy is a feasible and safe technique, both in women and men. In addition to the well-established advantages of laparoscopy, our study demonstrated that operative time is not prolonged during laparoscopic appendectomy, and its morbidity and mortality rates are low. The rate of deep collections, which is considered the main criticism of laparoscopic appendectomy according to the literature, is insignificant in our series.

In women, due to the multiplicity of differential diagnoses, professional societies recommend laparoscopic appendectomy as the gold standard. However, in men, laparoscopic appendectomy is not universally recognized as the gold standard, and according to professional societies, appendectomy can be performed both by laparotomy and laparoscopy. In our series, appendicitis was more common in young active men. Our observation among them, unlike laparotomy, laparoscopy avoids muscle damage, reduces hospitalization duration, and allows for a rapid return to socio-professional activities, not to mention the economic advantages resulting from cost reduction. Thus, our results suggest that laparoscopic appendectomy can aspire to be a gold standard even in young male patients.

Declarations

Ethics Approval

The data and files of patiénts presented in this manuscript are available at the Department of General Surgery of the University Hospital of Ain Taya.All patients consent to their inclusion in this work and the publication of the results.

Conflicts of Interest

The author declare that they have no conflicts of interest.

Author Contributions

All authors contributed to this work

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Availability of Data And Materials

The data (Patient records, information sheets for each patient) are available and entered in Excel and Word formats

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