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LAPAROSCOPIC *VERSUS* CONVENTIONAL APPENDECTOMY: OUR EXPERIENCE AND REVIEW OF THE LITERATURE

Franco Michael Lombardo,[1] Marta Zanghì,[2] Umberto Falzone,[1] Salvatore Zummo,[1] Giuseppe Di Buono,[3] Giuseppe Amato,[3] Antonino Agrusa,[3] Guido Zanghì[4]

[1]Department of Medical, Surgical Sciences and Advanced Technologies "G.F. Ingrassia", University of Catania; [2]Department of Biomedical and Biotechnological Sciences, Human Anatomy and Histology Section, School of Medicine, University of Catania; [3]Department of Surgical, Oncological and Stomological Disciplines, School of Medicine, University of Palermo; [4]Multidisciplinary Research Center for the study of Biotechnological and Mechanical Prosthetic Materials used in the Treatment of wall defects, Catania, Italy

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ABSTRACT

Acute appendicitis is one of the most common surgical emergencies, treated either by laparoscopic appendectomy (LA) or conventional open appendectomy (OA). This retrospective study analyzed 132 patients who underwent surgery at the Policlinico G. Rodolico in Catania (Italy) between 2020 and 2023, comparing the two approaches in terms of operative time, complications, and length of hospital stay. The results show that the laparoscopic technique, performed in 62.12% of cases, offers advantages such as shorter operative time, reduced postoperative pain, and shorter hospitalization. However, it presents a higher risk of intra-abdominal abscesses compared with the open technique. LA thus proves to be a beneficial choice, particularly in cases of uncertain diagnosis.

Introduction

Acute appendicitis is one of the most frequent conditions presenting to the emergency department and, in some cases, requires surgical treatment.

According to data from the literature, approximately 0.2% of the population develops acute appendicitis each year, and one in seven individuals will experience it during their lifetime.

In Italy, data indicate that about 55,000 to 60,000 appendectomies are performed annually. In most cases, the condition affects male children and adolescents, with a higher incidence between the ages of 15 and 20.[1]

In this condition, early diagnosis and appropriate management – either medical or surgical – are essential to prevent complications. Surgical treatment includes two main approaches: the open technique and the laparoscopic technique. The development of the latter has enabled the introduction of minimally invasive surgery, which over time has become the gold standard, particularly due to its ability to allow a comprehensive exploration of the abdominal cavity, especially in female patients.

However, according to some authors, its use remains controversial in complicated cases. This study aims to compare two surgical techniques to evaluate the effectiveness of the laparoscopic approach relative to the open technique, with the goal of improving patient safety and outcomes.

Materials and Methods

From January 2020 to January 2023, a total of 132 patients were enrolled in this retrospective observational study conducted in our General Surgery Unit at the Policlinico G. Rodolico in Catania (Italy). Inclusion criteria encompassed all patients admitted through the emergency department exhibiting clinical and/or radiological indications of acute appendicitis.

The choice between the two surgical approaches, laparoscopic or open, depended on the surgeon's personal experience. Multiple data points were collected for each patient, encompassing both their personal and clinical history, as well as technical information related to the surgical procedure.

Collected data included demographic information, past and present med-

* *Corresponding author:* Guido Zanghì, *gzanghi@unict.it*
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ical history, physical examination findings, and laboratory and radiological investigations. Surgical data included the type of procedure performed, operative time, incidence of conversion, intraoperative and postoperative complications, and length of hospital stay.

We also considered the intravenous analgesic therapy administered and its duration. All patients were adequately informed and signed written informed consent prior to the procedure.

The laparoscopic technique, briefly described, was performed using a Veress needle for pneumoperitoneum induction, an 11/12 mm supra- or infra-umbilical optical trocar, an 11 mm trocar in the left iliac fossa, and a 5 mm trocar in the right iliac fossa. After isolating the appendix from the mesoappendix and coagulating the appendicular artery with an ultrasonic dissector, the appendix was resected after placing three endoloops (two at the base) and extracted using an endobag. In our experience, the use of a linear stapler with a white cartridge was reserved exclusively for cases of gangrenous acute appendicitis.

The open technique was performed through a McBurney incision. The classical method was adopted, consisting of ligation and sectioning of the mesoappendix, followed by sectioning of the appendix between two Vicryl® ties and inversion of the stump using a traditional purse-string suture.

A peritoneal drain was routinely placed in all operated cases.

Results

Of the 132 patients, 82 (62.12%) underwent laparoscopic appendectomy (LA) and 50 (37.88%) underwent open appendectomy (OA). The mean age of the study population was 29.98 years (range 11-76), with a median of 22 years. In the LA group, the mean age was 30.72 years (range 11-70), while in the OA group it was 28.84 years (range 14-76). Male patients accounted for 32 cases (39.02%) in the LA group and 38 cases (76%) in the OA group; female patients were 50 (60.98%) in the LA group and 12 (24%) in the OA group. Patients aged over 65 years were 6 in total: 4 in the LA group and 2 in the OA group. Sixteen patients presented comorbidities: 6 in the LA group and 10 in the OA group (Tables 1 and 2).

The mean operative time was 66.17 minutes (range 15-175 minutes), specifically 64.41 minutes in the LA group and 69.04 minutes in the OA group.

Histopathological analysis revealed 70 cases (53.03%) of catarrhal appendicitis, 46 cases (34.85%) of phlegmonous appendicitis, and 16 cases (12.12%) of gangrenous appendicitis. In the OA group, the incidence of catarrhal, phlegmonous, and gangrenous appendicitis was 32% (16 cases), 48% (24 cases), and 20% (10 cases), respectively. In the LA group, the incidence was 65.85% (54 cases), 26.83% (22 cases), and 7.32% (6 cases), respectively. In both groups, catarrhal appendicitis was the most frequent finding (Table 3).

The mean duration of postoperative analgesic therapy was 2.5 days (range 2-8); specifically, 2.3 days (range 2-6) in the laparoscopic group and 2.9 days (range 2-8) in the open group. Intraoperative complications occurred in 12 patients (9.1%), with 5 cases reported in the LA group. These complications included 3 cases of intra-abdominal abscess, one case requiring conversion to open surgery due to extensive adhesions and perforation of the appendix base with peritoneal contamination (0.75%), and one case complicated by a Meckel's diverticulum abscess, which was managed with laparoscopic diverticulectomy (0.75%). Among the 7 patients in the OA group, we observed 2 wound infections and one case of postoperative venous bleeding from the mesoappendix that required reoperation via laparoscopy.

No significant differences were found between the two groups in terms of postoperative complications, except for wound infections in the OA group and postoperative intra-abdominal abscesses in the LA group. The mean hospital stay was 4.5 days (range 2-10), with a mean of 4.2 days in the LA group and 5.1 days in the OA group (Table 3).

Discussion

LA is currently the most widely performed surgical technique in the treatment of acute appendicitis.

Several studies in the literature have documented not only better patient outcomes but also the possibility of complete peritoneal exploration, representing an important diagnostic opportunity, especially in cases of suspected or uncertain appendicitis.[2,3] It should be considered that several conditions can mimic acute appendicitis, and it is estimated that in about 50% of all cases, particularly in young women, the diagnosis is not certain at the time of surgery.[4]

The laparoscopic approach should be preferred to the open technique, especially in women, in pediatric and adolescent patients, in the elderly, and in all cases of uncertain acute abdomen.[4]

Based on our study data, the number of patients undergoing laparoscopy was higher than that of those treated with the open approach. Over the three-year period, laparoscopy represented 60% of all cases. Our study showed no significant age difference between the two groups and confirmed – consistent with data reported in the literature – the undeniable advantages of the laparoscopic approach even in elderly patients, without evidence of increased mortality or morbidity in this population.

Regarding operative time, we observed a shorter duration in the laparoscopic group (mean 64.61 minutes). However, most studies in the literature do not report a statistically significant difference between the two techniques. Other studies have highlighted that reduced operative time may be related to improved standardization of the technique and greater ease in adhesion lysis and abscess visualization.[5]

Several authors define complicated acute appendicitis as cases presenting gangrenous features, with or without abscess formation, peritonitis, base perforation, or suspected neoplastic pathology.[6-8]

A controversial issue concerns the use of the laparoscopic approach in complicated appendicitis. A meta-analysis published in 2004 by Guller *et al.* demonstrated that the laparoscopic technique offers greater advantages than the open approach in terms of postoperative complications and hospital stay, with-

Table 1. Demographic and clinical characteristics of patients.

Characteristics	LA	OA
Patients, n (%)	82 (62.12)	50 (37.88)
Male	32 (39.02)	38 (76)
Female	50 (60.98)	12 (24)
Mean age (range)	30.72 (11-70)	28.85 (14-76)
Old patients (>65 years)	4	2
Comorbidities	6	10

LA, laparoscopic appendectomy; OA, open appendectomy.

Table 2. Pre-operative and intra-operative findings.

Pre-operative and intra-operative data	LA, n (%)	OA, n (%)
Mean operative time	64.41	69.04
Catarrhal acute appendicitis	54 (65.85)	16 (32)
Phlegmonous appendicitis	22 (26.83)	24 (48)
Gangrenous appendicitis	6 (7.32)	10 (20)

LA, laparoscopic appendectomy; OA, open appendectomy.

Table 3. Post-operative outcomes and complications.

	LA	OA
Post-operative data		
Mean duration of analgesic therapy, days (range)	2.3 (2-6)	2.9 (2-8)
Mean length of hospital stays, days	4.2	5.1
Post-operative complications		
Total (n)	5	7
Mortality	0	0
Reoperation	0	1
Wound infections	0	6
Intra-abdominal abscesses	3	0
Meckel's diverticulitis	1	0
Conversion to open surgery	1	0

LA, laparoscopic appendectomy; OA, open appendectomy.

out an increased risk of intra-abdominal abscesses.[9,10] Conversely, Li *et al.* reported a higher incidence of peritoneal abscesses and paralytic ileus after laparoscopic treatment.[11]

Regarding postoperative analgesia, our results showed a slight reduction in analgesic therapy duration among patients who underwent LA.

As for postoperative complications, in our experience, we observed a higher incidence of surgical site infections in patients treated with the open technique, in accordance with the literature.[12] Conversely, in the laparoscopic group, we recorded a higher rate of postoperative intra-abdominal abscesses. With regard to postoperative hospital stay, there was a difference between the two groups in favor of those treated with the laparoscopic technique (4.2 *vs.* 5.1 days after open surgery), a finding consistent with most studies in the literature, which also report reduced costs, greater patient comfort, and a faster return to daily activities.

Conclusions

Both LA and OA remain valid options for the management of acute appendicitis, each with its own advantages and limitations.

Our study highlights that the majority of surgical emergencies due to acute appendicitis were performed using the laparoscopic approach. In our experience, the laparoscopic technique is frequently employed regardless of the severity of the clinical presentation, and particularly in cases with uncertain diagnosis. LA offers shorter operative times, reduced postoperative pain, shorter hospital stays, lower incidence of early complications, greater patient satisfaction, and reduced healthcare costs. Conversely, OA appears to be associated with a lower incidence of postoperative intra-abdominal abscesses, probably because it allows more frequent peritoneal lavage.

Contributions: Franco Michael Lombardo, Marta Zanghì, Umberto Falzone, Salvatore Zummo, Guido Zanghì: conceptualization, data collection, data analysis, writing – original draft; Giuseppe Di Buono, Giuseppe Amato, Antonino Agrusa: collection of clinical data, literature review. All the authors read and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

Conflict of interest: the authors have no conflict of interest to declare.

Ethics approval and consent to participate: the study was conducted in accordance with the Declaration of Helsinki. Due to the retrospective nature of the study and the use of anonymized clinical data, formal ethical committee approval and informed consent were waived according to institutional policies.

Availability of data and materials: the datasets generated and analyzed during the study are available from the corresponding author on reasonable request.

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References

1. Bhangu A, Soreide K, Di Saverio S, et al. Acute appendicitis: modern understanding of pathogenesis, diagnosis, and management. Lancet 2015;386:1278-87.
2. Zanghì G, Zanghì A, Di Benedetto F. [Meckel's diverticulum complications]. Chirurgia Gastroenterologica 1993;27:91-5.
3. Shah K, Khiria L, Desai P, et al. Surgically inverting an incidentally detected Meckel's diverticulum - Wrong method. Int J Surg Case Rep 2015;6C:289-91.
4. Jaschinski T, Mosch CG, Eikermann M, et al. Laparoscopic versus open surgery for suspected appendicitis. Cochrane Database Syst Rev 2018;11:CD001546.
5. Markides G, Subar D, Riyad K. Laparoscopic versus open appendectomy in adults with complicated appendicitis: systematic review and meta-analysis. World J Surg 2010;34:2026-40.
6. Mariage M, Sabbagh C, Grelpois G, et al. Surgeon's Definition of Complicated Appendicitis: A Prospective Video Survey Study. Euroasian J Hepatogastroenterol 2019;9:1-4.
7. Menon NK. Primary adenocarcinoma of the appendix. Postgrad Med J 1980;56:448-50.
8. Zanghì GN, Brancato G, Crescimano R, et al. Carcinoide dell'appendice vermiforme: contributo clinico. Acta Chirurgica Mediterranea 1994;10:345-7.
9. Guller U, Hervey S, Purves H, et al. Laparoscopic versus open appendectomy: outcomes comparison based on a large administrative database. Ann Surg 2004;239:43-52.
10. Golash V. Rectus sheath abscess after laparoscopic appendicectomy. J Minim Access Surg 2007;3:64-5.
11. Li X, Zhang J, Sang L, et al. Laparoscopic versus conventional appendectomy- a meta-analysis of randomized controlled trials. BMC Gastroenterol 2010;10:129.
12. Gilmore OJ, Martin TD. Aetiology and prevention of wound infection in appendicectomy. Br J Surg 1974;61:281-7.