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EVALUATION OF TREATMENT OUTCOMES OF ACUTE APPENDICITIS USING LAPAROSCOPIC SURGERY AT VINH TUONG DISTRICT MEDICAL CENTER

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ABSTRACT

Objective: To evaluate the treatment outcomes of acute appendicitis using laparoscopic surgery at Vinh Tuong District Medical Center.

Methods: A descriptive cross-sectional study was conducted on 66 patients diagnosed with acute appendicitis and treated with laparoscopic surgery. Data on epidemiological characteristics, clinical and paraclinical features, intraoperative findings, and postoperative outcomes were collected using a standardized medical record form and analyzed using medical statistical methods.

Results: The age group 31–60 years accounted for the highest proportion (53.0%), with females outnumbering males (42 vs. 24). Most patients were admitted within 24 hours of symptom onset (71.2%). Typical clinical manifestations included right lower quadrant pain (62.1%), continuous pain (90.9%), and nausea/vomiting (77.3%). Intraoperatively, purulent peritoneal fluid was observed in 75.8% of cases; the appendix was located in the right iliac fossa in 77.3%, with suppurative appendicitis accounting for 54.5% and perforation for 19.7%. The antegrade appendectomy technique was predominantly used (92.4%), and the appendiceal stump was mainly managed with clips (89.4%). The mean operative time was 91.41 ± 28.85 minutes, and the conversion rate to open surgery was 6%. Postoperatively, bowel motility most commonly returned on the second day (54.5%), with a low complication rate (9.1%) and no mortality. The length of hospital stay was mainly 5–7 days (68.2%). Early outcomes were favorable in 95.5% of cases, and favorable outcomes at 3 months were observed in 98.2%.

Conclusion: Laparoscopic appendectomy for acute appendicitis is a safe and effective method with low complication rates, rapid recovery, and is suitable for implementation at district-level healthcare facilities.

Keywords: acute appendicitis, laparoscopic surgery, treatment outcomes.

1. INTRODUCTION

Acute appendicitis is one of the most common gastrointestinal surgical emergencies worldwide, with incidence varying across regions. In developed countries such as the United States, it affects approximately 7% of the population, whereas in some Asian countries the rate tends to be lower, possibly due to the influence of a fiber-rich diet [1]. In Vietnam, acute appendicitis accounts for a high proportion of conditions requiring emergency abdominal surgery, reflecting a considerable burden on the healthcare system [2]. Although the disease generally has a favorable prognosis when diagnosed early and treated promptly, delayed diagnosis or inappropriate management may lead to severe complications such as residual abscess, systemic infection, peritonitis, and even death. Furthermore, late complications including intestinal adhesions, bowel obstruction, and abdominal wall hernia may adversely affect patients' long-term quality of life.

In current clinical practice, the diagnosis of acute appendicitis relies not only on clinical manifestations but also on modern paraclinical modalities such as ultrasonography, computed tomography, and magnetic resonance imaging. However, diagnosis remains challenging due to variable and atypical presentations in certain cases, which may result in misdiagnosis or unnecessary interventions. Appendectomy remains the standard treatment, and while classical surgical principles have been established since the late 19th century, the advent of laparoscopic surgery in the late 20th century has transformed management approaches. Laparoscopic appendectomy has become the preferred technique due to its advantages, including minimal invasiveness, reduced postoperative pain, faster recovery, lower risk of wound infection, and improved cosmetic outcomes. In Vietnam, this technique has been widely adopted and has demonstrated increasing effectiveness. At Vinh Tuong District Medical Center, laparoscopic surgery has been implemented since 2017 with initially positive results; however, no systematic study has yet evaluated its clinical characteristics and treatment outcomes at this institution. Therefore, the present study is conducted to provide scientific evidence aimed at improving the quality of diagnosis and treatment of acute appendicitis.

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2. SUBJECTS AND METHODS

2.1. Study subjects

Patients diagnosed with acute appendicitis and undergoing laparoscopic surgery at Vinh Tuong District Medical Center during the study period were included. Eligible participants were those with a confirmed diagnosis based on clinical symptoms, leukocyte count, and abdominal ultrasonography, who were suitable candidates for laparoscopic surgery and provided consent to participate in the study. Exclusion criteria included patients preoperatively diagnosed with appendiceal abscess, appendiceal phlegmon, or generalized peritonitis; patients initially diagnosed with conditions other than acute appendicitis but found intraoperatively to have appendicitis; and cases with incomplete medical records according to study requirements.

2.2. Time and setting

The study was conducted at Vinh Tuong District Medical Center from October 2019 to October 2020.

2.3. Study design

A descriptive cross-sectional study design was employed.

2.4. Sample size and sampling method

The total sample size consisted of 66 patients, using a convenience sampling method.

2.5. Study contents

The study comprehensively collected and analyzed epidemiological, clinical, and paraclinical characteristics of patients with acute appendicitis, including age, sex, duration of symptom onset, medical history, subjective and objective symptoms, as well as laboratory and imaging findings. In addition, intraoperative laparoscopic findings were recorded, including abdominal cavity status, appendix location and pathology, and surgical factors such as trocar placement, appendectomy technique, intra-abdominal management, and operative time. Postoperative outcomes were evaluated based on pain level, time to recovery of bowel motility, wound condition, antibiotic use, complications, and length of hospital stay.

2.6. Study procedures

Patients meeting the inclusion criteria were enrolled and their information was collected using a standardized case record form from admission to discharge. Preoperatively, patients underwent clinical examination, laboratory tests, and necessary imaging investigations. During laparoscopic surgery, all intraoperative findings and technical details were carefully documented. Postoperatively, patients were monitored for clinical progression, treatment course, and complications. Potential sources of bias were minimized by appropriate patient selection and ensuring complete and accurate data recording.

2.7. Data analysis

Data were collected through direct clinical assessment and review of medical records, including all relevant information on patient characteristics, surgical procedures, and treatment outcomes. The data were compiled, coded, and analyzed using appropriate medical statistical software to ensure accuracy and objectivity.

2.8. Ethical considerations

All patients and their relatives were fully informed about the study objectives, surgical procedures, as well as potential benefits and risks, and were included only after providing informed consent. All surgical procedures and data recording were conducted honestly and objectively. In difficult or high-risk cases, surgeons proactively converted to open surgery to ensure maximum patient safety.

3. RESULTS

During the study period, a total of 66 patients diagnosed with acute appendicitis and undergoing laparoscopic appendectomy were enrolled. The detailed results are presented as follows:

Table 1. General characteristics

Characteristics	Group	N	%
Age group	< 15	6	9.1
	15–30	13	19.7
	31–60	35	53.0
	> 60	12	18.2
Sex	Male	24	36.0
	Female	42	64.0
Time (hours)	< 24 hours	47	71.2
	24–48 hours	15	22.7
	> 48 hours	4	6.1
Comorbidities	Cardiovascular disease	2	3.0
	Urinary stones	4	6.1
	Diabetes mellitus	5	7.6
	Gastric disease	8	12.1
	Hypertension	5	7.6
	Gallstones	1	1.5
	Uterine fibroids	1	1.5
	None	40	60.6

Comment: The 31–60 age group accounted for the highest proportion (53.0%), followed by the 15–30 group (19.7%) and >60 group (18.2%), while the <15 group had the lowest proportion (9.1%). Females predominated over males (42 vs. 24). Most patients were admitted within 24 hours (71.2%), whereas late admission >48 hours was low (6.1%). The majority had no comorbidities (60.6%); among comorbid conditions, gastric diseases were most common (12.1%), followed by diabetes mellitus and hypertension (7.6%), while other conditions accounted for lower proportions.

Table 2. Clinical characteristics at admission

Characteristics	Group	N	%
Initial pain location	Epigastric (above umbilicus)	18	27.3
	Right iliac fossa	32	48.5
	Hypogastric (below umbilicus)	2	3.0
	Right flank	3	4.5
	Right upper quadrant	5	7.6
	Periumbilical	6	9.1

Characteristics	Group	N	%
Pain location at admission	Right iliac fossa	41	62.1
	Generalized abdomen	10	15.2
	Other locations	15	22.7
Pain character-istics	Continuous	60	90.9
	Intermittent	6	9.1
Gastrointestinal symptoms	Nausea/vomiting	51	77.3
	Constipation	3	4.5
	Diarrhea	11	16.7
	Normal bowel movement	52	78.8
Temperature	< 37.5°C	10	15.2
	≥ 37.5°C	56	84.8

Comment: Pain most commonly began in the right iliac fossa (48.5%) and epigastric region (27.3%), and later localized clearly to the right iliac fossa at admission (62.1%). Most patients experienced continuous pain (90.9%). The most common gastrointestinal symptom was nausea/vomiting (77.3%), while the majority still had normal bowel movements (78.8%). Most patients presented with fever ≥ 37.5°C (84.8%).

Table 3. Abdominal examination characteristics at admission

Characteristics	Group	N	%
Abdominal tenderness site	Epigastric (above umbilicus)	18	27.3
	Right iliac fossa	32	48.5
	Hypogastric (below umbilicus)	2	3.0
	Right flank	3	4.5
	Right upper quadrant	5	7.6
	Periumbilical	6	9.1
Abdominal guarding	None	3	4.5
	Right iliac fossa	50	75.8
	Other locations	13	19.7
Previous surgical scar	None	58	87.9
	Lower midline	5	7.6
	Upper and lower midline	1	1.5
	Suprapubic	2	3.0
Peritoneal irritation	Present	10	15.2
	Absent	56	84.8
Abdominal distension	Generalized distension	18	27.3
	No distension	48	72.7

Comment: Abdominal tenderness was most commonly located in the right iliac fossa (48.5%), consistent with the typical pain location. Abdominal guarding was predominantly found in the right iliac fossa (75.8%), while the absence of guarding was low (4.5%). Most patients had no previous surgical scars (87.9%). Signs of peritoneal irritation were present in 15.2% of cases. The majority of patients had no abdominal distension (72.7%).

Table 4. Intraoperative characteristics of laparoscopic appendectomy

Characteristics	Group	N	%
Trocar position	Umbilicus + RIF + RUQ	63	95.5
	Umbilicus + RUQ + hypogastric	2	3.0
	Others	1	1.5
Intra-abdominal fluid	None	4	6.0
	Purulent fluid	50	75.8
	Clear fluid	12	18.2
Appendix location	Right iliac fossa	51	77.3
	Retrocecal	11	16.7
	Pelvic	3	4.5
	Between bowel loops	1	1.5
Appendix condition	Congested	17	25.8
	Suppurative	36	54.5
	Perforated	13	19.7
Perforation site	Tip	2	15.4
	Body	7	53.8
	Base	4	30.8
Appendiceal stump condition	Intact	59	89.4
	Fragile	7	10.6
Appendectomy technique	Antegrade	61	92.4
	Retrograde	5	7.6
	Ligation/clip of stump	59	89.4
	Suturing of stump	7	10.6
Peritoneal management	Irrigation + drainage	10	15.1
	Irrigation without drainage	0	0
	Swabbing + drainage	5	7.6
	Swabbing without drainage	51	77.3
Operative time (minutes)	≤ 60	9	13.6
	60 < t ≤ 120	50	75.8
	120 < t ≤ 180	7	10.6
Outcome	Success	62	94.0
	Conversion to open surgery	4	6.0

Comment: Most patients had trocar placement at the umbilicus, right iliac fossa, and right upper quadrant (95.5%). Intraoperatively, purulent fluid predominated

(75.8%). The appendix was mainly located in the right iliac fossa (77.3%), with suppurative appendicitis being the most common condition (54.5%), followed by congestion and perforation. Perforation most frequently occurred at the appendiceal body (53.8%). The appendiceal stump was intact in most cases (89.4%) and was primarily managed with ligation or clips (89.4%). The antegrade technique was predominantly used (92.4%). Peritoneal management mainly involved swabbing without drainage (77.3%). Most operative times ranged from 60–120 minutes (75.8%), with a mean of 91.41 ± 28.85 minutes. The success rate was high (94%), with a low conversion rate.

Table 5. Postoperative outcomes and treatment after laparoscopic appendectomy

Characteristics	Group	N	%
Time to return of bowel motility	First day	18	27.3
	Second day	36	54.5
	Third day	12	18.2
Duration of postoperative analgesic use (days)	3	9	13.6
	4	12	18.2
	5	45	68.2
Time to drain removal	2–4 days	11	73.3
	5–7 days	3	20.0
	> 7 days	1	6.7
Antibiotic regimen	Third-generation cephalosporin	47	71.2
	Third-generation cephalosporin + metronidazole	15	22.7
	Other antibiotics	4	6.1
Duration of postoperative antibiotic therapy	3–5 days	5	7.6
	5–7 days	45	68.2
	> 7 days	16	24.2
Length of postoperative hospital stay	3–5 days	5	7.6
	5–7 days	45	68.2
	> 7 days	16	24.2
Early postoperative complications	Trocar site infection (wound infection)	5	7.6
	Residual abscess	1	1.5
	Fluid collection	0	0
	Cecal fistula	0	0
	No complications	60	90.9
	Mortality	0	0
Early postoperative outcome	Good	63	95.5
	Moderate	2	3.0
	Poor	1	1.5
Outcome at 3 months	Good	55	98.2
	Moderate	1	1.8
	Poor	0	0

Comment: Bowel motility most commonly returned on the second postoperative day (54.5%), indicating early recovery of gastrointestinal function. The duration of postoperative analgesic use was predominantly 5 days (68.2%). Most patients had drains removed within 2–4 days (73.3%). The most commonly used antibiotics were third-generation cephalosporins (71.2%), with a typical treatment duration of 5–7 days (68.2%). The length of postoperative hospital stay was mainly 5–7 days (68.2%). The rate of early postoperative complications was low (9.1%), primarily consisting of wound infections. Early postoperative outcomes were mostly good (95.5%) and remained favorable at 3 months (98.2%).

4. DISCUSSION

4.1. Clinical characteristics

The subjective symptoms of acute appendicitis (AA) are diverse, depending on the anatomical position of the appendix and its neural innervation. Abdominal pain is the earliest symptom, typically starting in various locations such as the epigastric or periumbilical region and then gradually localizing to the right iliac fossa (RIF), which increases the risk of misdiagnosis in the early stage [3]. In this study, initial pain in the RIF accounted for 48.5%, and most patients experienced continuous pain (90.9%). At admission, pain was predominantly localized in the RIF (62.1%), consistent with the typical progression of the disease.

Gastrointestinal disturbances are common, with nausea and vomiting being the most frequent symptoms (77.3%), while most patients still had normal bowel movements (78.8%), and a small proportion presented with diarrhea. This indicates that gastrointestinal manifestations in AA are nonspecific and may be confused with other gastrointestinal conditions.

Regarding systemic symptoms, signs of infection may present at varying levels depending on disease progression and pre-hospital treatment. The proportion of afebrile patients was 15.2%, mainly due to prior medication use masking symptoms [3].

Typical physical signs include localized RIF tenderness, abdominal guarding, and peritoneal irritation. In this study, RIF tenderness accounted for 69.7% and RIF guarding for 75.8%, lower than in some previous studies, suggesting the possibility of delayed diagnosis in atypical cases. In patients with complications, the rates of abdominal distension (27.3%) and peritoneal irritation (15.2%) were lower than those reported in studies focusing on pure appendiceal peritonitis [4].

4.2. Intraoperative findings

Trocar placement was predominantly configured at the umbilicus, right upper quadrant, and RIF (95.5%), facilitating both visualization and manipulation. The choice of trocar position depends on the surgeon's preference and individual anatomical variations.

Intra-abdominal fluid was mainly purulent (75.8%), reflecting a relatively high proportion of patients presenting late or with complications. Proper peritoneal management requires thorough irrigation with

normal saline (0.9% NaCl) to reduce the risk of residual abscess formation.

The appendix was most commonly located in the RIF (77.3%), followed by retrocecal position (16.7%), consistent with previous anatomical studies [5], [6]. Intraoperatively, suppurative appendicitis was the most common condition (54.5%), followed by congestion (25.8%) and perforation (19.7%), with the perforation rate being higher than in some other studies.

Perforation most frequently occurred at the appendiceal body (53.8%), followed by the base (30.8%) and the tip (15.4%), consistent with previous reports [4]. These differences are related to the mechanism of luminal obstruction and the distribution of fecaliths.

Most appendiceal stumps were intact (89.4%), with only 10.6% being fragile, similar to previous reports [4]. A fragile stump increases surgical difficulty and often requires suturing instead of ligation or clipping. In this study, 89.4% of cases were managed with ligation or clips, while only 10.6% required suturing.

The antegrade appendectomy technique was predominantly used (92.4%), whereas the retrograde approach was reserved for anatomically challenging cases. The rate of abdominal drainage was 22.7%, lower than in studies on appendiceal peritonitis, indicating that drainage indications depend on the extent of intra-abdominal pathology [4].

The conversion rate to open surgery was 6.0%, mainly due to difficulty in exposing the appendix or associated lesions, comparable to international studies [7], [8]. The mean operative time was 91.41 ± 28.85 minutes, longer than in some studies, possibly due to a higher proportion of complicated cases [1], [4].

4.3. Postoperative management

After surgery, most patients required analgesics up to postoperative day 5 (68.2%), higher than in some studies, possibly related to the limited application of local analgesic strategies [4].

Bowel motility recovered relatively early, mainly within the first and second postoperative days (81.8%), consistent with domestic studies [1], [9].

All patients received postoperative antibiotics, predominantly third-generation cephalosporins (71.2%), with a common treatment duration of 5–7 days (68.2%). Some cases required prolonged therapy beyond 7 days due to more severe infection.

4.4. Postoperative outcomes

The rate of postoperative complications was low, mainly trocar site infection (7.6%) and residual abscess (1.5%), with no recorded mortality. These findings are consistent with previous domestic studies [1], [4].

The postoperative hospital stay was mostly 5–7 days, in line with the general trend of laparoscopic appendectomy [4], [9].

4.5. Outcomes of laparoscopic appendectomy

Early postoperative outcomes were highly favorable, with a good outcome rate of 95.5%, higher than in some previous studies [1], [4], [9]. At 3 months, the proportion of good outcomes remained high (98.2%), demonstrating the effectiveness and safety of laparoscopic surgery in the treatment of acute appendicitis.

5. CONCLUSION

Acute appendicitis primarily affects the working-age population and presents with relatively typical clinical features, including right iliac fossa pain and gastrointestinal disturbances. Laparoscopic surgery is an effective and safe treatment method, yielding good outcomes with a low complication rate; however, continued follow-up is necessary to evaluate long-term outcomes.

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