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Analysis of 68 Cases of Periappendicular Abscess Treated by Laparoscopic Surgery in Stage I

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Abstract

Objective: To evaluate the efficacy and feasibility of laparoscopic surgery as a primary treatment for periappendiceal abscess. **Methods**: A retrospective analysis was conducted on 68 patients with periappendiceal abscess undergoing laparoscopic surgery in the primary stage. Intraoperative and postoperative outcomes were subjected to statistical analysis. **Results**: All 68 patients successfully underwent primary laparoscopic appendectomy. The mean operative time was 55.15 ± 12.3055.15 \pm 12.3055.15 ± 12.30 minutes, and the intraoperative blood loss averaged 15.35 ± 6.5215.35 \pm 6.5215.35 ± 6.52 ml. The time to first flatus was 21.5 ± 2.3021.5 \pm 2.3021.5 ± 2.30 hours, the time for white blood cell normalization was 5.50 ± 1.505.50 \pm 1.505.50 ± 1.50 days, and the postoperative hospital stay was 10.50 ± 2.3010.50 \pm 2.3010.50 ± 2.30 days. None of the cases required conversion to open surgery. Over a follow-up period ranging from 5 to 29 months (median: 16 months), no complications, including intra-abdominal abscess, stump leakage, stump inflammation, or adhesive bowel obstruction, were observed. **Conclusion**: Laparoscopic surgery in the primary stage for periappendiceal abscess is a safe and feasible treatment option.

Keywords

Periappendiceal Abscess, Laparoscopy, Primary Surgery

1. Introduction

Periappendiceal abscess is an acute abdominal condition caused by purulent appendicitis, gangrenous perforation, or liquefaction and is subsequently encapsulated

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by the greater omentum or intestinal loops. It represents a distinct stage in the progression of acute appendicitis [1]. Traditional management has primarily relied on conservative treatments, including anti-infection therapy and percutaneous drainage. However, these approaches are limited by issues such as recurrent abdominal pain, incomplete resolution of the inflammatory mass, and intra-abdominal adhesions [2] [3].

Emergency open surgery remains an alternative treatment, but it carries significant drawbacks, such as extensive surgical trauma, inadequate preoperative preparation, and malnutrition-related complications, including intestinal fistula, bleeding, adhesions, and impaired wound healing [4].

Recent advancements in laparoscopic minimally invasive techniques and surgical instruments have created new opportunities for the treatment of periappendiceal abscess, demonstrating notable advantages. However, consensus on the feasibility of primary-stage treatment for periappendiceal abscess remains lacking [5]. Many patients and their families still prefer conservative management, and the applicability of laparoscopic techniques in resource-constrained primary healthcare settings warrants further investigation [6].

Against this backdrop, this study retrospectively analyzes the clinical data of 68 patients with periappendiceal abscess who underwent primary laparoscopic surgery in the Department of General Surgery, Yulong County People's Hospital, Lijiang City, between January 2022 and December 2023. The aim is to explore and verify the efficacy and safety of laparoscopic minimally invasive techniques in the primary treatment of periappendiceal abscess, providing a scientific basis for clinical practice and promoting equitable healthcare development in grassroots institutions.

2. Materials and Methods

2.1. General Data

A total of 68 patients were included in this study, comprising 40 males and 28 females. Of these, 8 patients were under 14 years of age, 10 were aged 14 - 60 years, and 50 were over 60 years. All patients underwent laparoscopic surgery using the traditional three-port method.

Inclusion criteria:

1) Acute abdominal pain with a disease duration of ≤14 days;

2) Symptoms such as abdominal pain and fever;

3) Detection of a right lower abdominal mass on physical examination or confirmation of periappendiceal abscess via CT, ultrasound, or other imaging modalities;

4) Athological diagnosis of purulent or gangrenous appendicitis post-surgery.

Exclusion criteria:

1) Severe abdominal distension due to complete intestinal obstruction;

2) Diffuse peritonitis or septic shock;

3) Severe cardiac, pulmonary, hepatic, or renal dysfunction precluding laparo-

scopic surgery.

2.2. Surgical and Treatment Methods

2.2.1. Preoperative Preparation

Upon admission, all patients were administered broad-spectrum antibiotics targeting gram-negative and anaerobic bacteria. Patients with mild gastrointestinal symptoms received oral polyethylene glycol electrolyte solution for bowel preparation, while those with severe symptoms underwent a cleansing enema.

2.2.2. Surgical Procedure and Key Points

Under general anesthesia with endotracheal intubation, patients were positioned in a Trendelenburg position with a 15˚ - 30˚ left tilt. A small incision was made at the upper margin of the umbilicus to create the observation port. Two additional incisions were made: one at the opposite McBurney's point and another approximately 5 cm lateral to the right umbilicus for the auxiliary and main operating ports. Artificial pneumoperitoneum was created (12 - 15 mmHg for adults and 6 - 10 mmHg for children), followed by laparoscope insertion. A 10 mm trocar was placed in the main operating port, and a 5 mm trocar in the auxiliary port.

The abdominal cavity was examined laparoscopically to assess the extent of periappendiceal abscess. Surgical instruments were introduced and encapsulated and adhered tissues were bluntly dissected using suction or an electrocoagulation probe. The abscess was drained, and the mesoappendix was freed and divided using electrocautery. The appendicular artery was ligated, or in cases of poor tissue conditions, the mesoappendix was ligated as a bundle. The appendix base was clamped and ligated with sutures or closure clips approximately 0.5 cm from the root. The appendix was excised and retrieved in a specimen bag. The stump was disinfected with povidone-iodine, and the abdominal cavity was irrigated with saline, povidone-iodine, or metronidazole solution. Adhesions in the small intestine were resolved laparoscopically, and a drainage tube was placed in the pelvic floor or right iliac fossa to complete the procedure.

2.2.3. Postoperative Management

Postoperatively, patients were positioned semi-recumbently and administered broad-spectrum antibiotics targeting gram-negative bacteria. Antibiotics were modified according to postoperative susceptibility testing. Early ambulation was encouraged to promote bowel function recovery. Enteral nutrition was introduced after bowel function resumed. Patients were discharged after normalization of white blood cell count, C-reactive protein, and procalcitonin levels, along with normal findings on follow-up abdominal CT.

2.2.4. Primary Outcome Measures

1) **Intraoperative indicators**: intraoperative blood loss and operative time;

2) **Postoperative recovery indicators**: time to first flatus, time to white blood cell normalization, duration of drainage tube placement, and hospital stay;

3) **Postoperative complications**: incision infection, pelvic abscess, intestinal

obstruction, and stump leakage.

Statement

The study received approval from the Ethics Committee of Yulong County People's Hospital, and informed consent was obtained from all participants. The study complied with the ethical principles outlined in the Declaration of Helsinki.

3. Result

All 68 patients underwent successful laparoscopic surgery without iatrogenic or incidental injuries, conversion to open surgery, or mortality. Of these, 41 patients underwent simple ligation of the appendiceal stump; in 12 patients, the stump was sutured in a figure-eight pattern followed by purse-string embedding. Another 12 patients underwent continuous sutures combined with vertical mattress inverting sutures, with the appendiceal stump reinforced and covered using adjacent omental tissue. In 3 patients, the appendiceal base and surrounding cecal wall were resected using a laparoscopic linear stapler, with the stump covered by omental tissue.

Mean intraoperative blood loss was 15.35 ± 6.5215.35 \pm 6.5215.35 ± 6.52 mL, and mean operative time was 55.15 ± 12.3055.15 \pm 12.3055.15 ± 12.30 minutes. Postoperative parameters included mean time to anal flatus of 21.5 ± 2.3021.5 \pm 2.3021.5 ± 2.30 hours, white blood cell normalization at 5.50 ± 1.505.50 \pm 1.505.50 ± 1.50 days, drainage duration of 3.50 ± 1.503.50 \pm 1.503.50 ± 1.50 days, and hospital stay of 10.50 ± 2.3010.50 \pm 2.3010.50 ± 2.30 days (see Table 1). Follow-up duration ranged from 5 to 29 months, with a median of 16 months.

During hospitalization, 9 patients developed adhesive or early inflammatory intestinal obstruction, which resolved with conservative treatment. No cases of intra-abdominal abscess, stump fistula, stump inflammation, or postoperative bleeding were observed during hospitalization or follow-up.

Table 1. Observational data of patients undergoing primary surgical treatment ($\overline{x} \pm s$).

Mean intraoperative blood loss	Mean operative time	Mean time to anal flatus	Mean white blood cell recovery time	Mean drainage duration	Mean hospital stay
(15.35 ± 6.52)mL	(55.15 ± 12.30)min	(21.5 ± 2.30)h	(5.50 ± 1.50)d	(3.50 ± 1.50)d	(10.50 ± 2.30)d

4. Discussion

This retrospective study analyzed clinical data from 68 patients with periappendiceal abscess who underwent primary laparoscopic surgery, evaluating the safety and efficacy of this minimally invasive approach for managing this specific acute abdominal condition. The findings demonstrated a high success rate with no conversions to open surgery and a low incidence of postoperative complications. Compared to traditional conservative treatment or staged surgery, primary laparoscopic surgery offers a minimally invasive approach with faster recovery, providing a novel perspective for clinical management.

The results highlighted the significant advantages of primary laparoscopic sur-

gery in terms of postoperative recovery. In this cohort, the mean operative time was 55.15 ± 12.3055.15 \pm 12.3055.15 ± 12.30 minutes, intraoperative blood loss was 15.35 ± 6.5215.35 \pm 6.5215.35 ± 6.52 mL, time to anal flatus was 21.5 ± 2.3021.5 \pm 2.3021.5 ± 2.30 hours, white blood cell normalization occurred within 5.50 ± 1.505.50 \pm 1.505.50 ± 1.50 days, and the mean hospital stay was 10.50 ± 2.3010.50 \pm 2.3010.50 ± 2.30 days. These outcomes surpass previously reported results for staged surgery or conservative treatment, underscoring the ability of minimally invasive surgery to reduce postoperative inflammatory responses and accelerate tissue repair. Additionally, no complications, such as intra-abdominal abscess, stump fistula, stump inflammation, or adhesive intestinal obstruction, were observed during follow-up, further validating the safety of this approach.

Technical considerations and procedural standards are critical to the efficacy of primary laparoscopic surgery. This study emphasized that during adhesiolysis, a combination of blunt and sharp dissection techniques is essential to avoid bowel and mesenteric injury, thereby reducing the risks of intestinal fistula and bleeding. For appendiceal stump management, methods such as subserosal dissection or laparoscopic linear stapling were selected based on lesion severity [7]. In cases of severe gangrene or liquefaction, multi-layered suturing and reinforcement with adjacent omental tissue were employed [8]. This individualized approach effectively prevented severe complications, such as stump fistula, highlighting the flexibility and precision of minimally invasive techniques.

Moreover, this study was conducted in a primary healthcare setting, demonstrating the feasibility of implementing primary laparoscopic surgery in resource-limited environments. All 68 patients underwent the conventional three-port laparoscopic technique, which requires relatively modest equipment but showcased the safety and maturity of the procedure. Standardized preoperative, intraoperative, and postoperative management significantly reduced medical resource utilization and financial burdens, strongly supporting the adoption of minimally invasive techniques in primary hospitals. This has important implications for enhancing the capacity of primary healthcare facilities to manage acute abdominal conditions and promoting equitable access to surgical care.

However, as a single-center retrospective analysis, this study is limited by its sample size and the absence of randomized controlled trials, which may affect the generalizability of the results [9] [10]. Future research should incorporate multi-center studies with larger sample sizes and extended follow-up periods to comprehensively evaluate the long-term efficacy and cost-effectiveness of primary laparoscopic surgery for periappendiceal abscess [11] [12].

5. Conclusion

Primary laparoscopic surgery for periappendiceal abscess is a safe, reliable, and effective treatment strategy. By adhering to standardized surgical techniques and individualized treatment protocols, this approach minimizes trauma, accelerates

recovery, and reduces complications. Its high feasibility and promotability in primary healthcare settings make it a scientifically sound and practical option for managing periappendiceal abscess.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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