ORIGINAL ARTICLE

Role of Early Laparoscopy in Acute Nonspecific Abdominal Pain at Suez Canal University Hospitals

Ahmed M Ghanem[1], Goda M El-labban[2], Marwan S Mohamed[3], Ahmed H Hussein[4]

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Abstract

Introduction: Nonspecific acute abdominal pain (NSAP) is considered a serious problem in the surgical field. To assess this condition, many approaches have been used, such as observation and early laparoscopy.

Methods: This prospective interventional study was conducted at the tertiary care hospital in the Department of General Surgery and the Department of Emergency at Suez Canal University Hospital on 50 patients who presented with NSAP; the outcomes of early laparoscopy versus clinical observation were compared.

Results: The current study results revealed that the definitive diagnosis was achieved in 88% of cases in the laparoscopy group and 80% of cases in the conservative group. The laparoscopy could recognize a pathology in 22/25 cases. Therefore, our research presents a diagnostic yield of 88% which aligns with other studies that have shown comparable rates of high definitive diagnostic rates (between 86 and 100%).

Conclusion: Diagnostic laparoscopy (DL) is a safe and very effective minimally invasive therapeutic and diagnostic method, as it is used to identify and treat acute abdominal diseases. It minimizes morbidity, permits treatment and diagnosis in the same facility in most cases, shortens hospital stays, and reduces investigative costs.

Keywords: Abdominal pain, Acute abdomen, Laparoscopy, Nonspecific.

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Introduction

The surgical department often receives presentations of acute abdomen, which may occur in both primary care and secondary referral hospitals. Acute abdominal pain presents a challenge in terms of diagnosis.[1]

The acute abdomen is distinguished by the abrupt onset of abdominal symptoms that need the surgeon to make a rapid decision on whether to perform emergency surgery, provide conservative treatment, or examine the patient.[1]

Nonspecific acute abdominal pain (NSAP) is a serious problem in the surgical field and represents at least 13–40% of emergency surgical admissions for acute abdominal pain. To assess this condition, many approaches have been used, such as observation and early laparoscopy.[2]

Nonspecific acute abdominal pain is considered acute abdominal pain lasting for fewer than seven days without a definitive diagnosis instead of a baseline examination and diagnostic procedures.[3]

A variety of approaches have been used to evaluate these patients, such as observation, imaging techniques, and early laparoscopy. The watchful waiting option is also considered when the physician can balance the presently anticipated advantages of immediate therapy against the associated risks even if uncertainty exists. However, diagnostic laparoscopy (DL) is advised to prevent treatment postponement and the possible difficulties that may arise as a result.[4]

Diagnostic laparoscopy enables a surgeon to directly see aberrant abdominal contents that may be the source of pain but would not be detected otherwise, and it can exclude other sources of pain.[5]

Emergency situations in which laparoscopy is often performed include appendicitis, cholecystitis, and perforated peptic ulcer. Laparoscopy remains a contentious procedure when applied to perforated diverticulitis, small bowel obstruction, or abdominal trauma.[6]

Utilizing DL in this context is justified on the basis that it prevents treatment postponement, which may result in unfavorable patient outcomes, and laparotomy, which is linked with comparatively high rates of morbidity (5–22%). When a patient has a clear indication for surgical intervention, such as hemodynamic instability or perforated viscous (free air), DL should only be performed if the institution has the necessary facilities and equipment, and the surgeon has the necessary expertise.[7]

The clinical signs and symptoms of the majority of patients are often obscured by the various therapies administered by different physicians at different hospitals at different times and by varied radiological reports. Under these conditions, diagnostic laparoscopy by itself is sufficient to resolve the problem.[8]

Laparoscopy is the most efficacious method for connecting major surgical investigations with clinical assessment. It is a significant diagnostic tool because of its safety benefits, lower

[1–4]Department of General Surgery, Faculty of Medicine, Suez Canal University, Ismailia, Egypt

Corresponding Author: Marwan S Mohamed, Department of General Surgery, Faculty of Medicine, Suez Canal University, Ismailia, Egypt, Phone: +01004509806, e-mail: Egmaster0@yahoo.com

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morbidity, and mortality, decreased postoperative pain, and short hospital stay.[8]

Aim

To evaluate the role of early laparoscopy in NSAP.

Patients and Methods

This prospective interventional study was done between January 2020 and January 2022 in the Department of General Surgery and the Department of Emergency at the Suez Canal University; 50 patients with acute NSAP were studied and outcomes of early laparoscopy versus clinical observation were compared.

The sample was a random sample of both sex adult males and females, as appendicitis is the most prevalent cause of acute abdomen; we used the relative risk reduction of complications among patients presented with appendicitis. Based on that the prevalence of a relative risk reduction of complications in the clinical observation group, 31%; and a relative risk reduction of complications in the laparoscopy group, 69%, the sample size was 25 cases for each group after adding 10% dropout.[3,9,10]

Inclusion Criteria

Patients with NSAP aged above 18 years of both sexes, hemodynamically stable, have no signs of sepsis or septic shock, accepted coagulation profile, and fit for general anesthesia American Society of Anesthesiologist (ASA I–ASA II).

Exclusion Criteria

patients with hemodynamic instability, uncontrolled coagulopathy, multiple previous laparotomies, massive abdominal distension, or patient refusal of a laparoscopic procedure.

Preoperative Evaluation and Preparation

All patients who presented to the emergency department (ED) with acute abdominal pain during the study period underwent preoperative evaluation in the form of history taking, thorough physical examination, and laboratory and radiologic investigations. Patients were classified randomly into two groups: Group I—for whom early laparoscopy was done; Group II—who were put under clinical observation and follow-up.

Preoperative History Taking

A full history was obtained from all patients. The pain was analyzed in terms of onset, course, duration, location, character, quality, and severity. Other symptoms associated with abdominal pain (e.g., anorexia, nausea, and vomiting) were reported. Medical causes for acute abdominal pain (e.g., diabetic ketoacidosis) were excluded. Comorbidities (e.g., diabetes, hypertension, cardiac, hepatic, or renal pathology) were identified and managed, as necessary.

Preoperative Examination

Vital signs were recorded to exclude hemodynamic instability. Abdominal examination (including rectal and pelvic examination if necessary) was performed in all patients.

- Inspection: Critical diagnostic indicators included a careful examination of the abdominal shape, scars, visible masses, and abdominal movement during breathing.
- Palpation: For the diagnosis of abdominal guarding, epigastric pulsations, and tenderness. A rectal examination was performed to detect any obvious or concealed blood, pain, or mass (fecal impaction, prostate, tumor, or pelvic abscess). A pelvic examination is often performed on women who present with lower abdominal pain to exclude ectopic pregnancy, ovarian torsion, and pelvic inflammatory disease (PID).
- Percussion: For the diagnosis of large cysts, ascites, and abdominal masses.
- Auscultation: Initially, mechanical intestinal obstruction was characterized by hyperactive bowel sounds. Additionally, a renal and abdominal aortic bruit may be audible.

Investigations

- Laboratory investigations: Complete peripheral blood count, serum electrolytes, creatinine, liver function tests, and serum amylase levels in patients with right upper quadrant abdominal pain, blood glucose, urinalysis, and urine pregnancy test for all women of childbearing age.
- Imaging investigations: Plain abdominal X-ray and abdominal ultrasound: Abdominal computed tomography (CT) and for early laparoscopy group (group I): Preoperative preparation involved one or more of the following, as necessary: (A) Intravenous (IV) fluid resuscitation; (B) Correction of electrolyte or acid–base disturbances; (C) Antibiotics.

Operative Technique

Creation of pneumoperitoneum and port placement. Frequently, the access port was positioned in the supraumbilical or infraumbilical area, depending on the technique. Pneumoperitoneum was achieved by the "open method" in all cases. To generate the pneumoperitoneum using the open or Hasson approach, a little skin incision was made, and the rectus fascia was dissected to locate the peritoneum, which was then grasped with Allis clamps and opened with scissors. Confirmation of entry into the peritoneal cavity was accomplished either by digital palpation of the smooth intraabdominal tissues or vision of the omentum or small bowel. After port placement, a detailed examination of the peritoneal cavity was performed.

Placement of Additional Ports

Additional ports (5- or 10 mm) were placed under direct vision to prevent unintended injuries, to further explore any areas of interest, or to execute a therapeutic technique.

Perioperative Care

In diagnosed cases and negative cases, the procedure was done, intraoperative bleeding, conversion to open, bowel injury, postoperative wound infection, port site hernia, shoulder pain, postoperative hospital stay, postoperative complications (deep venous thrombosis, chest infection, and urinary tract infection).

Postoperative Care

Intravenous fluids, antibiotics, and analgesics. Drains were removed once the daily output was less than 50 cc. Patients were instructed to come for follow-up 2 weeks, 1 month after the operation. Stitches were removed 10–14 days postoperatively.

For the Clinical Observation Group (group II)

Patients who were randomized to this group were those who were hospitalized under active clinical observation. A comprehensive clinical examination was conducted twice daily. The baseline

Table 1: Age and gender among both groups

Variable	*Laparoscopic group N = 25*	*Conservative group N = 25*	*p-value*
Age[a]			
Mean ± SD	41 ± 12.01	36 ± 11.48	0.136
Range	18–55	19–56	
Gender			
Female[b]	14 (56)	16 (64)	0.773

[a]Data were expressed as mean ± SD; [b]Data were expressed as *n* (%)

Table 2: Final diagnosis of both groups

Variable	*Laparoscopic group N = 25*	*Conservative group N = 25*	*p-value*
Final diagnosis[b]			
Acute appendicitis	6 (24)	4 (16)	0.496
Acute cholecystitis	3 (12)	4 (16)	1.00
Adhesions	3 (12)	4 (16)	1.00
Diverticulitis	3 (12)	0 (0)	0.235
Perforated peptic ulcer	2 (8)	0 (0)	0.490
Ovarian cyst	2 (8)	8 (32)	0.074
PID	3 (12)	0 (0)	0.235
Undiagnosed	3 (12)	5 (20)	0.702

[b]Data were expressed as *n* (%). PID, pelvic inflammatory disease

blood tests were repeated 24 and 48 hours after admission, and supplementary hematologic and/or radiologic investigations were conducted in accordance with the patient's clinical progression. As soon as a clinical diagnosis could be established, the necessary surgical or medical intervention was initiated. Admission, close observation, IV fluids, antibiotics, analgesics, complete blood picture and other investigations as needed, erect chest and abdomen X-ray, pelviabdominal ultrasound, monitoring of (vital signs–pain–signs of peritonitis), hospital stays, surgery if done, operative time, intraoperative bleeding, bowel injury, postoperative wound infection, urinary tract infection, chest infection, and deep venous thrombosis.

Statistical Analysis

Statistical analysis was applied using Statistical Package for Social Sciences (SPSS), version 21.0. Correlations between various factors were assessed using Spearman and Pearson rank correlation; $p < 0.05$ is considered significant. All data were expressed as mean ± standard deviation (SD).

Results

Table 1 showed that age and gender were matched amongst both groups and female predominance in the conservative group.

Table 2 shows that acute appendicitis was the most common diagnosis following laparoscopic surgery 24%, whereas in the conservative group, ovarian cyst was the most common diagnosis 32%.

Table 3 demonstrates that laparoscopic surgery was carried out for group I and the procedures were completed in 25 patients (100) with a mean operative time of 37 minutes, intraoperative bleeding was reported in 4 patients which were significantly presented in this group with no need to convert to open surgery. In the conservative group II 13 out of 25 patients were subjected to laparoscopic surgery following conservative management for 48 hours in the surgery department with a mean operative time of 42 minutes.

Table 3: Operative data of both groups

Variable	*Laparoscopic group N = 25*	*Conservative group N = 13*	*p-value*
Operative time (minutes)[a]			
Mean ± SD	37.04 ± 5.76	42.31 ± 12.28	0.164
Range	29–47	34–60	
Intraoperative bleeding			
Yes[b]	4 (16)	0 (0)	0.001
Conversion to open			
Yes	0 (0)	4 (31)	0.001

[a]Data were expressed as mean ± SD; [b]Data were expressed as *n* (%)

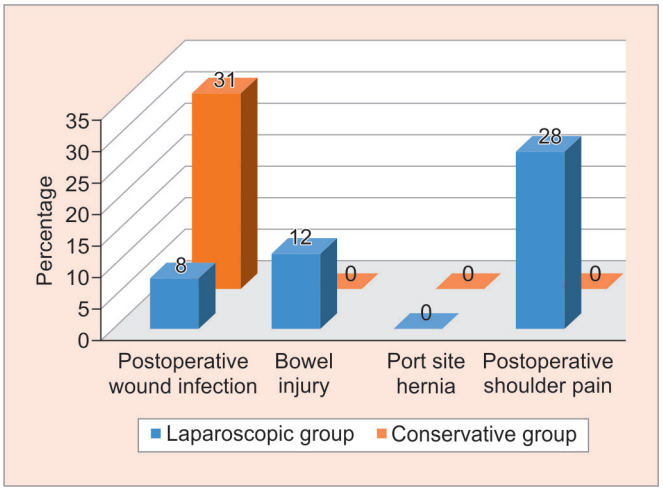

Fig.1: Postoperative complications of both groups

Table 4: Hospital stay of both groups

Variable	*Laparoscopic group N = 25*	*Conservative group N = 25*	*p-value*
Hospital stay (days)[a]			
Mean ± SD	2.96 ± 0.88	4.44 ± 1.29	<0.001
Range	2–5	3–6	

[a]Data were expressed as mean ± SD

Figure 1 illustrates that four patients in the conservative group who were subjected to surgery developed wound infection compared to two patients in the other group with a statistically significant difference, however, three patients in the laparoscopic group developed bowel injuries which was not occurred to any patient in the other group.

Table 4 shows that the mean hospital stay was significantly higher in the conservative group compared to the laparoscopic group.

In Table 5, patients were missed in the follow-up from the laparoscopic group where no missed patients in the other group with free of symptoms at this time among both groups, three patients were still missed in the follow-up from the laparoscopic

Table 5: Follow-up post operative for laparoscopic group and after admission for conservative group

Variable	*Laparoscopic group N = 22*	*Conservative group N = 25*	*p-value*
Follow-up 2 weeks			
Free	22 (100)	25 (100)	1.00
Follow-up 1 month			
Recurrence	3 (14)	0 (0)	0.198
Readmission	0 (0)	0 (0)	

group where no missed patients in the other group with free of symptoms at this time among both groups.

Discussion

Since the intraabdominal pathology of acute abdominal pain represents major conflict and may need urgent or immediate intervention evaluating the laparoscopy role in acute abdominal pain management was highlighted as a main point of interest.[11,12]

Consequently, this study was conducted and aimed to evaluate the role of early laparoscopy in NSAP.

In this research, 70 cases were assessed for eligibility. Of all eligible cases, 14 cases were excluded regarding the inclusion criteria and 6 cases refused to participate; 50 cases were included (25 in each group).

This research demonstrated that there was no significant difference between the studied groups regarding age and gender.

This research revealed that the definitive diagnosis was achieved in 88% of cases in the laparoscopy group and 80% of cases in the conservative group. Acute appendicitis was the commonest diagnosis following laparoscopic surgery 24%, whereas in the conservative group, ovarian cyst was the commonest diagnosis 32%.

Consequently, the laparoscopy could recognize a pathology in 22/25 cases. Therefore, our research presents a diagnostic yield of 88% which aligns with other studies that have shown comparable rates of high definitive diagnostic rates (between 86 and 100%).[13]

Morino et al.[14] revealed that diagnosis was achieved in 83.4% of the laparoscopy group and in 45.1% of the clinical observation group.

The most common diagnoses in laparoscopy were appendicitis in 16 cases (30.1%), PID in 7 (13.2%), and no diagnosis in 11 (20.7%) while the most common diagnoses in observation were appendicitis in 3 cases (5.8%), PID in 8 (15.6%), and no diagnosis in 28 (54.9%).[14]

In one study done by Townsend et al.[15] laparoscopy was capable of achieving a definite diagnosis in 93–100% of patients and could perform a definitive therapy of the underlying condition in 44–73% of patients.

Agresta et al.[16] reported that a definitive diagnosis was achieved in 85.7% of patients and 90.6% of those patients were effectively managed with laparoscopy.

The current study results revealed that 13 out of 25 patients in conservative group were subjected to surgery following follow-up in the emergency room (ER), and the operative time was not different among both groups.

In agreement with our research, Sharaf et al.[12] reported that a definitive diagnosis was achieved in 99% of the instances. A total of 64% of the cases under investigation were effectively handled using laparoscopy. Conversely, the conversion rate to open surgery was 33%, which exceeded the rates documented in prior research.

Mehta et al.[17] also demonstrated that the conversion rate was 19%, with challenging procedures or inability to establish a definitive diagnosis serving as the causes for conversion, while Karamanakos et al.[18] revealed that the conversion rate was 2.2%.

Regarding postoperative complications, this research found that four patients in the conservative group who were subjected to surgery developed wound infection compared to two patients in the other group with significant differences.

In concordance with our research, Morino et al.[14] demonstrated that the average length of hospitalization was 3.7 days in laparoscopy and 4.7 days in observation which is significantly high in the observation group. This is consistent with Rubbia et al.[13] who reported that mean hospital stay was 3.36 days, and most cases were discharged on 1–3 postoperative days.

At follow-up postoperatively, the current study results revealed that three patients were missed in the follow-up within 1 month after admission from the laparoscopic group whereas no missed patients in the other group with free of symptoms at this time among both groups.

After 3 months of follow-up, 4 patients of the conservative group were missed during follow-up and 4 patients (19%) returned with abdominal symptoms which were managed conservatively; however, 5 patients (23%) in the laparoscopic group returned with abdominal symptoms which did not require any surgical intervention and referred to gastrointestinal tract (GIT) department for further management.

Morino et al.[14] revealed that 3 months after discharge, 20% of cases in laparoscopy and 52% in observation had recurrent abdominal pain with significant difference between them while after 12 months, 16% in laparoscopy and 25% in observation with no significant difference between them.

Rubbia et al.[13] followed up the patients at 10 days, 1 and 3 months postlaparoscopically and revealed that most cases exhibited enhancement in their condition in both groups with 2.3% of cases claiming that their problems persisted at 10 days, none thereafter.

The strength points of this study are that it is a prospective study design, its setting at a single tertiary care hospital, and the inclusion and evaluation of two different management routes. It provided that laparoscopy seems to be a promising, safe minimally invasive diagnostic and therapeutic procedure that is very effective in diagnosing and treating acute abdominal problems. Additionally, it may assist surgeons in selecting the most appropriate targeted incision for patients in whom laparoscopic therapy is not feasible for definitive treatment.

Limitations of the study include a very small sample size in comparison to prior research and the absence of a multicentric design, which introduces a substantial potential for publication bias. Also, the relatively short-term follow-up of patients postoperatively as Morino et al.[14] tracked outcomes for 12 months postoperatively, which may underestimate the incidence of recurrence of symptoms of abdominal pain.

Conclusion

Diagnostic laparoscopy is a safe and very effective minimally invasive therapeutic and diagnostic method, as it is used to identify and treat acute abdominal diseases. It minimizes morbidity, permits treatment and diagnosis in the same facility in most cases, shortens hospital stays, and reduces investigative costs.

Ethical Approval

Written consent was obtained from participants and they have the right to refuse without effect on their management.

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