

Diagnostic And Therapeutic Laparoscopy in Acute And Subacute Abdominal Conditions: A Prospective Observational Study From A Tertiary Care Centre in North India

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Abstract

Background: Diagnostic laparoscopy provides direct visualization of the peritoneal cavity and can combine diagnostic clarification with definitive minimally invasive treatment. Its role is particularly relevant when clinical assessment and imaging are inconclusive or when unexpected pathology is encountered.

Methods: This prospective observational study included 47 consecutive haemodynamically stable adults undergoing diagnostic laparoscopy for acute or subacute abdominal conditions at Subharti Medical College between November 2024 and March 2026. Demographic characteristics, indications, intraoperative findings, therapeutic procedures, conversion to open surgery, and postoperative outcomes were prospectively recorded.

Results: The mean age was 39.8 ± 3.9 years; 28 patients (59.6%) were female and 19 (40.4%) were male. Biliary pathology was the predominant indication (31/47, 65.9%), followed by appendicitis (8/47, 17.0%) and abdominal wall hernias (5/47, 10.6%). Laparoscopy identified clinically relevant unexpected findings, including biliary and vascular anatomical variations, portal cavernoma, empyema, occult gallbladder carcinoma, abdominal tuberculosis, inflammatory adhesions, bowel injury, and sealed appendicular perforation. Most patients underwent definitive laparoscopic treatment; three (6.4%) required conversion to open surgery.

Conclusion: In appropriately selected haemodynamically stable patients, diagnostic laparoscopy is a useful diagnostic and therapeutic strategy for acute and subacute abdominal conditions. It permits direct assessment, facilitates same-setting treatment, and supports timely conversion when anatomy or disease severity makes minimally invasive completion unsafe.

Keywords: Diagnostic Laparoscopy; Therapeutic Laparoscopy; Acute Abdomen; Subacute Intestinal Obstruction; Minimally Invasive Surgery; Conversion To Laparotomy.

Introduction

Acute and subacute abdominal conditions remain common surgical presentations in which rapid and accurate diagnosis is essential. Ultrasonography and cross-sectional imaging have substantially improved preoperative evaluation; however, subtle peritoneal disease, early inflammatory changes, bowel compromise, occult injury, and complex biliary anatomy may remain uncertain before operation (1–4).

Diagnostic laparoscopy has consequently evolved from a purely diagnostic procedure into a platform for both diagnosis and treatment. Direct inspection of the abdominal cavity can establish or refine the diagnosis, identify unexpected pathology, guide targeted biopsy, and allow definitive minimally invasive intervention during the same anaesthetic episode (5–11).

An equally important function of laparoscopy is operative decision-making. Recognition of dense adhesions, difficult anatomy, advanced malignancy, bowel injury, or other technically hazardous findings may prompt conversion to open surgery. Timely conversion should be regarded as a safety decision rather than procedural failure (12,13).

The present study evaluated the clinical role of diagnostic and therapeutic laparoscopy in adults presenting with acute and subacute abdominal conditions at a tertiary care teaching hospital. The objectives were to describe the indications and intraoperative findings, assess the therapeutic procedures completed laparoscopically, document unexpected pathology, and identify circumstances requiring conversion to open surgery.

Materials and Methods

Study design and setting

A prospective observational study was conducted in the Department of General Surgery, Subharti Medical College, India, from November 2024 to March 2026. Institutional Ethics Committee approval was obtained before study commencement, and written informed consent was obtained from all participants.

Study population

Forty-seven consecutive patients who fulfilled the eligibility criteria and underwent diagnostic laparoscopy during the study period were included.

Inclusion criteria

Adults aged ≥ 18 years; acute or subacute abdominal pain requiring operative evaluation; haemodynamic stability; inconclusive clinical or radiological evaluation, or a planned laparoscopic procedure with both diagnostic and therapeutic intent; and written informed consent.

Exclusion criteria

Haemodynamic instability or septic shock; generalized peritonitis requiring immediate laparotomy; uncorrected coagulopathy; pregnancy; inability to tolerate general anaesthesia; or refusal to participate.

Preoperative evaluation

Patients underwent clinical assessment, routine laboratory investigations, ultrasonography, and contrast-enhanced computed tomography when clinically indicated. The preoperative diagnosis and intended operative strategy were documented.

Operative technique

All procedures were performed under general anaesthesia by experienced laparoscopic surgeons. Pneumoperitoneum was created by an open (Hasson) technique or Veress needle according to the clinical situation. Umbilical access was generally used, with Palmer's point selected when umbilical entry was considered unsafe. Systematic inspection included the liver, gallbladder, stomach, small bowel, appendix, colon, pelvis, omentum, mesentery, and peritoneum. Additional ports were placed as required. Definitive procedures included laparoscopic cholecystectomy, appendicectomy, TAPP hernia repair, common bile duct exploration, adhesiolysis, laparoscopic-assisted bowel resection, ileostomy reversal, and cystogastrostomy. Conversion was undertaken when safe laparoscopic completion was compromised by dense adhesions, difficult anatomy, bleeding, bowel injury, or suspected advanced malignancy.

Outcome measures

The principal outcomes were the diagnostic contribution of laparoscopy, successful completion of therapeutic laparoscopic procedures, unexpected intraoperative findings, conversion to open surgery and its indications, perioperative complications, length of hospital stay, and 30-day mortality.

Statistical analysis

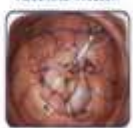
Continuous variables were summarized as mean $\pm$ standard deviation and categorical variables as frequencies and percentages. Because the study was primarily descriptive and involved heterogeneous diagnoses, results are presented principally using descriptive statistics.

Figure 1. Based on Tables 1 and 2, showing the diagnostic role, therapeutic applications, conversion criteria, and spectrum of procedures performed during diagnostic and therapeutic laparoscopy.

Table 1. Role of diagnostic and therapeutic laparoscopy and spectrum of laparoscopic surgical procedures.

A. ROLE OF DIAGNOSTIC AND THERAPEUTIC LAPAROSCOPY	
Aspect	Description
Diagnostic Laparoscopy	- To identify the cause of abdominal symptoms when non-invasive imaging is inconclusive or uncertain. - Direct visualization of abdominal cavity and detection of unexpected pathology.
Therapeutic Laparoscopy	- To provide definitive minimally invasive treatment in the same setting. - Wide spectrum of laparoscopic therapeutic procedures.
Key Features	- Minimally invasive - High diagnostic accuracy - Therapeutic feasibility - Reduced morbidity - Shorter hospital stay - Better cosmetic outcome
Conversion to Open Surgery	Indicated in cases of: - Dense adhesions - Advanced malignancy - Complex anatomy - Uncontrolled bleeding - Technically challenging situations
Benefits	- Treats underlying pathology - Avoids unnecessary laparotomy - Less postoperative pain - Shorter hospital stay - Faster recovery and return to activity
Improved Patient Outcomes	- Accurate diagnosis - Timely and appropriate treatment - Reduced complications - Individualized patient management

B. DIAGNOSTIC AND THERAPEUTIC LAPAROSCOPY – OVERVIEW	
DIAGNOSTIC LAPAROSCOPY Purpose To identify the cause of abdominal symptoms when non-invasive imaging is inconclusive or uncertain. Indications - Acute abdomen of unclear etiology - Subacute intestinal obstruction - Suspected intra-abdominal infection - Blunt/penetrating abdominal trauma - Occult malignancy - Unexplained abdominal pain Diagnostic Benefits - Direct visualization of abdominal cavity - Detection of unexpected pathology - Assessment of disease extent - Guidance for further management	THERAPEUTIC LAPAROSCOPY Purpose To provide definitive minimally invasive treatment in the same operative setting. Therapeutic Procedures - Cholecystectomy - Appendectomy - Adhesiolysis - Hernia repair - Drainage of collections/pseudocysts - Management of bleeding - Resection/anastomosis (selected cases) Benefits - Treats underlying pathology - Avoids unnecessary laparotomy - Less postoperative pain - Shorter hospital stay - Faster recovery and return to activity
Key Features - Minimally invasive - High diagnostic accuracy - Therapeutic feasibility - Reduced morbidity - Shorter hospital stay - Better cosmetic outcome Conversion to Open Surgery Indicated in cases of: - Dense adhesions - Advanced malignancy - Complex anatomy - Uncontrolled bleeding - Technically challenging situations Improved Patient Outcomes - Accurate diagnosis - Timely and appropriate treatment - Reduced complications - Individualized patient management	

C. SPECTRUM OF LAPAROSCOPIC SURGICAL PROCEDURES										
1. DIAGNOSTIC LAPAROSCOPY – COMMON INDICATIONS										
1. Acute Abdomen of Unclear Etiology  Exploration of entire peritoneal cavity to identify underlying pathology	2. Subacute Intestinal Obstruction  Identification of level and cause of obstruction (adhesions, bands, hernia, tumors, TB, etc.)	3. Suspected Intra-Abdominal Infection  Detection of abscess, collection, perforation or peritonitis source	4. Penetrating/Blunt Abdominal Trauma  Assessment of visceral injury and need for therapeutic intervention	5. Occult Malignancy / Peritoneal Disease  Detection of peritoneal carcinomatosis and staging with targeted biopsy	6. Others  Evaluation of abdominal pain, fever of unknown origin, portal cavernoma, abdominal tuberculosis, etc.					
2. THERAPEUTIC LAPAROSCOPIC SURGERY – COMMON PROCEDURES PERFORMED										
1. Laparoscopic Cholecystectomy  Removal of gallbladder for gallstones / cholecystitis	2. Laparoscopic Appendectomy  Removal of inflamed appendix	3. Adhesiolysis  Division of adhesions to relieve obstruction or pain	4. Laparoscopic Hernia Repair  TAPP / IPOM / TEP mesh repair for inguinal, ventral, umbilical hernias	5. Drainage of Collections / Pseudocyst  Drainage of abscess, localized collection or pancreatic pseudocyst	6. Laparoscopic Exploration & Lavage  Peritoneal lavage for peritonitis, bile spillage or contamination	7. Resection & Anastomosis  Segmental bowel resection with anastomosis in malignancy or malignancy	8. Omentectomy / Biopsy  Removal of spleen for trauma, hematologic or other diseases	9. Laparoscopic Cholelithostomy  CBD exploration, stone extraction and stenting	11. Gastrotomy / Feeding Jejunostomy  Feeding access in malignancy, neurological disorders or malnutrition	12. Others  Hemostatic, foreign body removal, peritoneal lavage, ligation of vessels, etc.

Results

A total of 47 consecutive patients underwent diagnostic laparoscopy. The mean age was 39.8 ± 3.9 years. There were 28 females (59.6%) and 19 males (40.4%).

Biliary disease was the dominant clinical category, accounting for 31 patients (65.9%). Acute appendicitis accounted for 8 patients (17.0%), abdominal wall hernias for 5 (10.6%), and pancreatic pseudocyst, penetrating abdominal trauma, and abdominal tuberculosis with inguinal hernia for one patient each (2.1%).(FIGURE4)

Diagnostic laparoscopy confirmed the suspected diagnosis in many patients but also disclosed findings that modified operative planning. These included aberrant biliary or vascular anatomy, portal cavernoma, gallbladder empyema, occult gallbladder carcinoma, inflammatory adhesions, abdominal tuberculosis, bowel injury, and sealed appendicular perforation.

Therapeutic laparoscopy was completed in most patients. The most frequent procedures were laparoscopic cholecystectomy (24/47, 51.1%), laparoscopic appendicectomy (8/47, 17.0%), and laparoscopic TAPP hernia repair (5/47, 10.6%). Three patients (6.4%) required conversion to open surgery. (FIGURES5,6)

Table 1. Baseline diagnoses (N = 47)

Diagnosis	n	%
Cholelithiasis	24	51.1
Cholelithiasis with mild biliary pancreatitis	2	4.3
Cholelithiasis with choledocholithiasis	1	2.1
Cholelithiasis with empyema of gallbladder	2	4.3
Cholelithiasis with portal cavernoma	1	2.1
Carcinoma gallbladder	1	2.1
Acute appendicitis	4	8.5
Acute appendicitis with right ovarian cyst	2	4.3
Acute appendicitis with sealed perforation	2	4.3
Indirect inguinal hernia	2	4.3
Incarcerated inguinal hernia	1	2.1
Port-site ventral hernia	1	2.1
Abdominal tuberculosis with inguinal hernia	1	2.1
Intra-abdominal adhesions with inflammatory bowel disease	1	2.1
Pancreatic pseudocyst	1	2.1
Penetrating abdominal trauma with bowel injury	1	2.1

Table 2. Therapeutic procedures performed (N = 47)(FIGURE 7)

Procedure	n (%)
Laparoscopic cholecystectomy	24 (51.1)
Laparoscopic appendicectomy	8 (17.0)
Laparoscopic TAPP hernia repair	5 (10.6)
Laparoscopic CBD exploration with T-tube	1 (2.1)
Laparoscopic-assisted bowel resection and anastomosis	2 (4.3)
Laparoscopic cystogastrostomy	1 (2.1)
Ileostomy reversal	1 (2.1)
Conversion to open surgery	3 (6.4)
Other laparoscopic procedures	2 (4.3)

Discussion

This prospective series illustrates the practical value of laparoscopy across a heterogeneous group of acute and subacute abdominal presentations. Its principal advantage was not merely visualization, but the ability to move directly from diagnostic clarification to treatment when the operative findings were suitable. This is consistent with the established role of laparoscopy in selected abdominal emergencies (14–16).

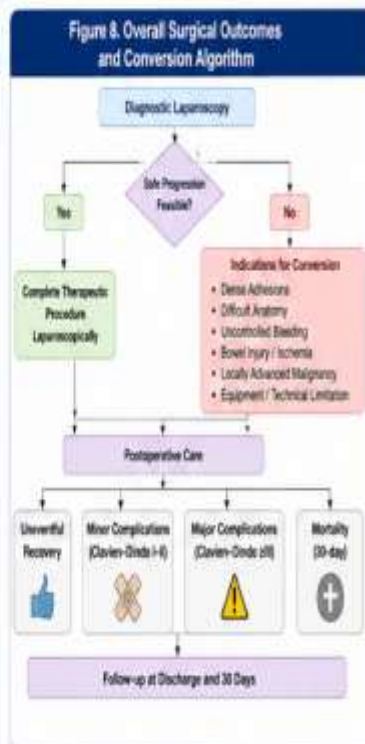
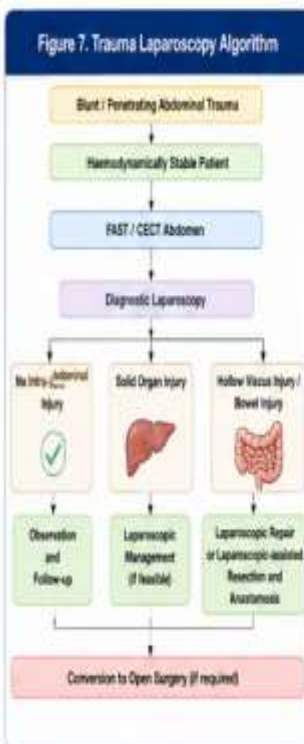
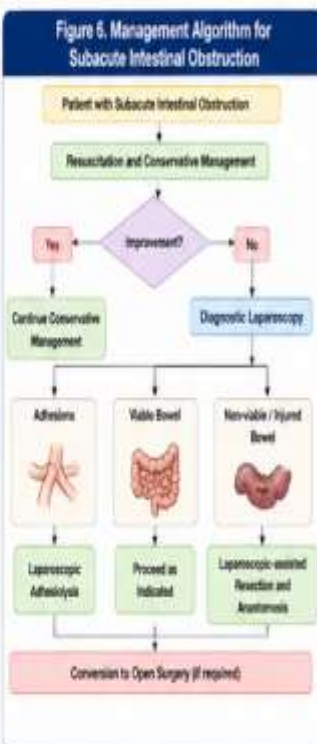
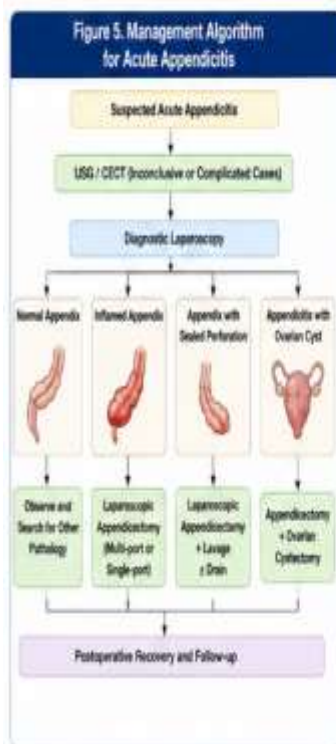
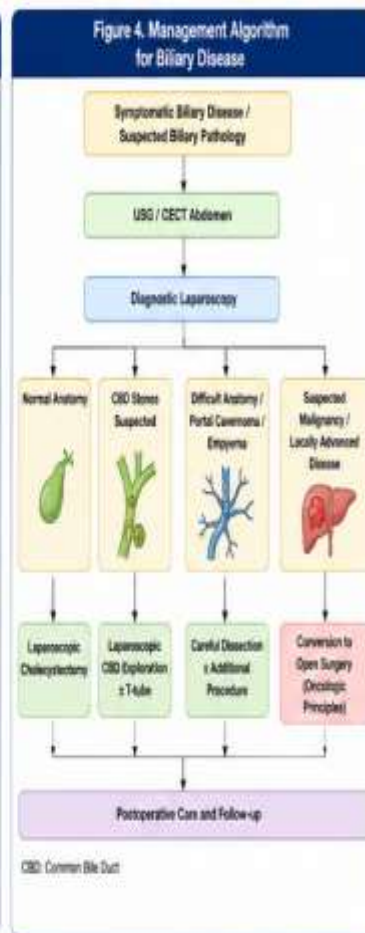
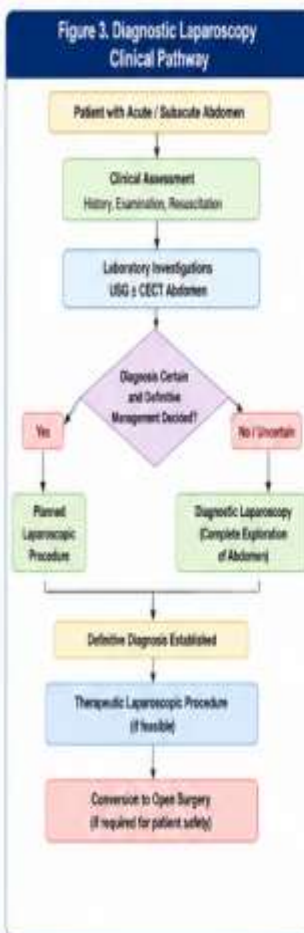
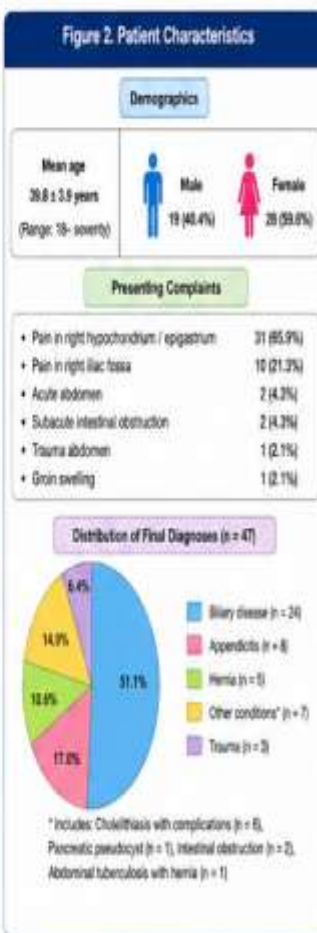
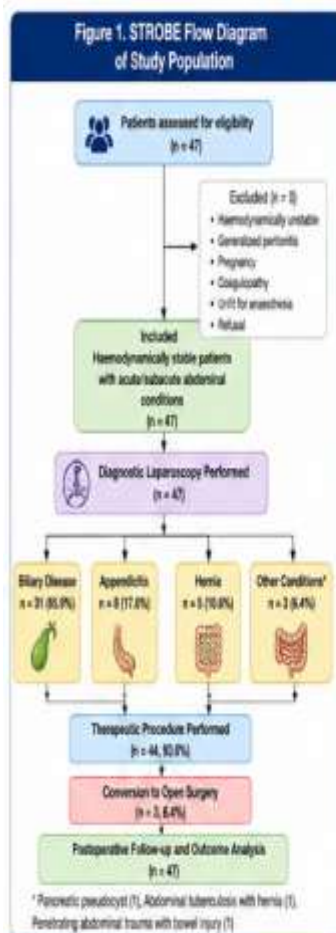
Biliary disease represented almost two-thirds of the cohort. In these patients, laparoscopy was useful for recognizing difficult or unexpected anatomy, including variations involving the cystic duct, cystic artery, and hepatic arterial system. It also identified portal cavernoma, empyema, choledocholithiasis, and suspected or occult gallbladder malignancy, all of which can substantially alter operative strategy (17–20).

Appendicitis was the second most frequent indication. Laparoscopy provided the additional advantage of whole-abdominal and pelvic inspection, allowing recognition of associated ovarian pathology and sealed perforation in atypical presentations. This diagnostic breadth is particularly useful when gynaecological disease may mimic appendicitis (21–24).

The study also included patients with subacute intestinal obstruction and penetrating abdominal trauma. In selected haemodynamically stable patients, laparoscopy permitted identification of adhesive obstruction or bowel injury and, where feasible, laparoscopic-assisted bowel resection and anastomosis. These observations support a selective rather than indiscriminate role for minimally invasive exploration in emergency surgery (25–28).

Unexpected findings such as abdominal tuberculosis, inflammatory adhesions, and other intra-abdominal pathology further demonstrate the diagnostic advantage of direct peritoneal inspection and targeted biopsy (29–31). Conversion to open surgery was required in three patients (6.4%). Conversion should be interpreted in the context of patient safety, disease complexity, and oncological adequacy rather than as failure of laparoscopy (32,33).

The study has limitations. It was conducted at a single centre, included only 47 patients, and combined several distinct disease processes. The heterogeneity of indications limits disease-specific inference, and the available manuscript data do not provide sufficiently detailed long-term outcomes, quality-of-life measures, or cost-effectiveness analyses. Larger multicentre studies with standardized outcome definitions would strengthen the evidence base (34–37). (FIGURE 2 , 3,4 ,5 6,7 ,8)



Conclusion

Diagnostic laparoscopy is a useful diagnostic and therapeutic modality in appropriately selected haemodynamically stable patients with acute and subacute abdominal conditions. In this series, it facilitated direct identification of pathology, enabled definitive minimally invasive treatment in most patients, revealed unexpected findings that altered operative planning, and allowed timely conversion to open surgery when required for safety or oncological adequacy. The findings support selective integration of diagnostic laparoscopy into emergency and complex general surgical practice while recognizing the limitations of a small, heterogeneous, single-centre cohort.

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