RESEARCH PAPER

Seeing Beyond Imaging: Diagnostic Laparoscopy In Undiagnosed Chronic Abdominal Pain

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Received: *20th Feb, 2026;* ***Revised:*** *4th Mar, 2026;* ***Accepted:*** *25th Mar, 2026;* ***Available Online:*** *10th Apr, 2026*

Abstract

Background: Chronic abdominal pain remains a diagnostic challenge despite advances in imaging modalities. Diagnostic laparoscopy offers direct visualization of intra-abdominal structures with simultaneous therapeutic capability.

Objective: To evaluate the diagnostic yield and therapeutic benefit of laparoscopy in patients with chronic abdominal pain of uncertain etiology.

Methods: A retrospective study was conducted over a period of 6 months involving 20 patients with undiagnosed chronic abdominal pain (≥12 weeks) who underwent diagnostic laparoscopy. Medical records were reviewed for demographic data, clinical presentation, laparoscopic findings, therapeutic interventions, and histopathological correlation.

Results: Diagnostic laparoscopy established a definitive diagnosis in 85% (17/20) of patients. The most common findings were intestinal adhesions (30%), followed by chronic appendicitis (20%), and abdominal tuberculosis (15%). Therapeutic interventions were performed in 75% of patients. Histopathological examination confirmed the intraoperative diagnosis in all cases where tissue was obtained. No major complications were recorded, and the mean hospital stay was 2.3 days.

Conclusion: Diagnostic laparoscopy is a safe and effective modality for establishing diagnosis and providing therapeutic intervention in patients with chronic abdominal pain undiagnosed by conventional investigations.

Keywords: Chronic Abdominal Pain, Diagnostic Laparoscopy, Adhesions, Chronic Appendicitis, Abdominal Tuberculosis, Minimally Invasive Surgery.

How To Cite This Article: Ravuri Jyothi Sri Vnl, Ramprasath E, Prabakar A, Pradeep Kumar M, Menaka C. Seeing Beyond Imaging: Diagnostic Laparoscopy In Undiagnosed Chronic Abdominal Pain. Int J Drug Deliv Technol. 2026;16(26s):615-622. Doi: 10.25258/ijddt.16.26s.66

INTRODUCTION

Chronic abdominal pain, defined as intermittent or continuous abdominal discomfort persisting for more than 12 weeks, represents one of the most challenging clinical conditions encountered by surgeons and gastroenterologists worldwide [1,2]. This condition significantly impacts patients physically, psychologically, and socially, contributing substantially to healthcare utilization and economic burden [3]. Globally, chronic abdominal pain affects approximately 10-15% of the population, with considerable variation across geographical regions [4]. In India, it is recognized

as the fourth most frequent chronic pain syndrome and accounts for nearly 13% of surgical admissions, underscoring its clinical significance in the subcontinent [5,6].

The etiology of chronic abdominal pain is remarkably diverse, encompassing both organic and functional disorders [7]. Organic causes include intestinal adhesions, biliary pathology, appendicular disease, abdominal tuberculosis, hernias, and gynecological conditions in females [8,9]. Functional disorders such as irritable bowel syndrome, functional dyspepsia, and various motility abnormalities constitute another significant proportion of cases [10]. The biopsychosocial model of chronic pain further complicates the diagnostic landscape, as psychological factors including anxiety, depression, and somatization disorders frequently coexist with or mimic organic pathology [11].

Despite remarkable advancements in diagnostic modalities, including biochemical tests, serological investigations, ultrasonography, computed tomography, and magnetic resonance imaging, up to 40% of patients remain without a definitive diagnosis even after comprehensive evaluation [12,13]. These conventional methods often provide only indirect evidence and may fail to identify subtle, atypical, or early-stage intra-abdominal pathology [14]. Furthermore, imaging modalities have inherent limitations in detecting conditions such as low-grade adhesions, early peritoneal tuberculosis, or chronic appendicitis, which may present with minimal structural changes [15,16].

Diagnostic laparoscopy has emerged as a valuable minimally invasive tool offering direct visualization of intra-abdominal structures [17]. Since its introduction, the technique has revolutionized the approach to abdominal conditions by providing real-time assessment of the peritoneal cavity while simultaneously offering therapeutic capability [18]. The technique allows precise evaluation of the liver, gallbladder, stomach, intestines, appendix, and pelvic organs, enabling detection of pathologies that may be missed by non-invasive investigations [19]. Several studies have reported diagnostic yields ranging from 65% to 94% in patients with chronic abdominal pain of unknown origin [20,21].

The advantages of diagnostic laparoscopy extend beyond diagnosis. It reduces the need for exploratory laparotomy, offers shorter hospital stays, decreased postoperative morbidity, faster recovery, and improved cosmetic outcomes [22,23]. The technique has gained widespread acceptance in both elective and emergency settings due to its high diagnostic yield and cost-effectiveness [24]. However, evidence validating its specific role in undiagnosed chronic abdominal pain, particularly in the Indian population, remains relatively limited [25]. In view of the high prevalence of this condition and the diagnostic challenges posed, this study was undertaken to evaluate the role of diagnostic laparoscopy in identifying the underlying etiology of chronic abdominal pain and to assess the therapeutic interventions performed during laparoscopy.

MATERIALS AND METHODS

Study Design and Setting

This was a hospital-based retrospective study conducted in the Department of General Surgery at Chettinad Hospital and Research Institute over a period of 6 months. The study was approved by the Institutional Ethics Committee. Medical records of all patients who underwent diagnostic laparoscopy for chronic abdominal pain during the study period were reviewed and analyzed.

Study Population

A total of 20 patients who underwent diagnostic laparoscopy for chronic abdominal pain of uncertain etiology were included in the study. The inclusion criteria comprised adults aged 18 years and above who had experienced abdominal pain for at least twelve weeks and remained undiagnosed despite undergoing routine biochemical tests and radiological investigations including ultrasound, computed tomography scan, or magnetic resonance imaging [26]. Patients with a confirmed diagnosis for their abdominal pain prior to laparoscopy, those with incomplete medical records, pregnant women, or individuals deemed unfit for general anesthesia were excluded from the study.

Data Collection

Data were extracted from medical records using a structured proforma. Information collected included demographic characteristics such as age, sex, and relevant medical history. Detailed documentation of previous abdominal surgeries including cesarean section, hysterectomy, tubectomy, or other operative interventions was recorded. Clinical presentation including site of pain, duration of symptoms, associated symptoms such as fever, diarrhea, constipation, and urinary complaints were noted. Findings of preoperative investigations including complete blood count, liver and kidney function tests, and imaging studies were documented [27].

Surgical Technique

All patients underwent diagnostic laparoscopy under general anesthesia after obtaining informed consent. Port placement was performed using the open (Hasson) technique at the umbilicus, except in cases of previous abdominal scars where Palmer's point entry was utilized [28]. Additional ports were inserted as needed based on intraoperative findings. A systematic laparoscopic survey of the peritoneal cavity was performed using a 10mm, 30-degree laparoscope, beginning with the pelvis and extending through all quadrants of the abdomen. Structures visualized included the uterus and adnexa in females, the ileocecal region, appendix, colon, stomach, duodenum, gallbladder, liver, spleen, and small and large bowel, the latter examined by "walking" along its entire length using atraumatic graspers [29].

Therapeutic Interventions

Where indicated, therapeutic procedures were undertaken during the same sitting. These included adhesiolysis, appendectomy, peritoneal biopsy, lymph node biopsy, aspiration of peritoneal fluid, ovarian cystectomy, and other corrective surgeries based on intraoperative findings [30]. All tissue samples obtained were sent for histopathological examination to establish a definitive diagnosis. Patients diagnosed with abdominal tuberculosis were started on anti-tubercular therapy as per standard protocols [31].

Outcome Measures

The primary outcome measure was the diagnostic yield of laparoscopy, defined as the proportion of patients in whom a definitive diagnosis was established. Secondary outcome measures included the spectrum of laparoscopic findings, types of therapeutic interventions performed, correlation between intraoperative findings and histopathological diagnosis, operative time, hospital stay, and perioperative complications.

Statistical Analysis

Data were analyzed using SPSS version 26.0. Continuous variables were expressed as mean ± standard deviation (SD), and categorical variables as frequencies and percentages. Descriptive statistics were used to summarize the demographic characteristics, clinical presentations, laparoscopic findings, and outcomes.

RESULTS

Demographic and Clinical Characteristics

A total of 20 patients were included in the study, comprising 12 females (60%) and 8 males (40%). The mean age was 36.85 ± 11.42 years (range: 19-56 years). The majority of patients belonged to the 31-40 years age group (35%). The mean duration of symptoms prior to presentation was 16.2 ± 9.4 weeks (range: 12-42 weeks). Eight patients (40%) had a history of previous abdominal surgery, including cesarean section (n=4), appendectomy (n=2), hysterectomy (n=1), and cholecystectomy (n=1). The demographic characteristics are summarized in Table 1.

Table 1: Demographic and Clinical Characteristics of Study Population (n=20)

Parameter	n (%)	Mean ± SD
Age (years)	-	36.85 ± 11.42
18-30	6 (30.0)	-
31-40	7 (35.0)	-
41-50	5 (25.0)	-
>50	2 (10.0)	-
Gender		
Female	12 (60.0)	-
Male	8 (40.0)	-
Duration of symptoms (weeks)	-	16.2 ± 9.4
Previous abdominal surgery	8 (40.0)	-

SD: Standard Deviation

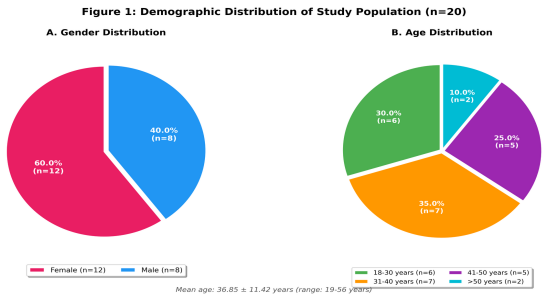

Figure 1: Demographic distribution of study population showing gender and age distribution

Clinical Presentation

The most common site of pain was the right iliac fossa in 8 patients (40%), followed by periumbilical region in 5 patients (25%), diffuse abdominal pain in 4 patients (20%), left iliac fossa in 2 patients (10%), and epigastric region in 1 patient (5%). Associated symptoms included constipation (45%), loss of appetite (40%),

nausea/vomiting (30%), low-grade fever (20%), and weight loss (15%). On clinical examination, localized tenderness was present in 14 patients (70%) and diffuse tenderness in 4 patients (20%), while 2 patients (10%) had no significant abdominal tenderness.

Laparoscopic Findings

Diagnostic laparoscopy was successfully performed in all 20 patients without any conversion to open surgery. The mean operative time was 58.6 ± 16.8 minutes (range: 30-95 minutes). Positive laparoscopic findings were observed in 17 patients (85%), while 3 patients (15%) had no identifiable pathology. The most common finding was intestinal adhesions, observed in 6 patients (30%), followed by chronic appendicitis in 4 patients (20%), abdominal tuberculosis in 3 patients (15%), mesenteric lymphadenopathy in 2 patients (10%), ovarian cyst in 1 patient (5%), and pelvic inflammatory disease in 1 patient (5%). The laparoscopic findings are detailed in Table 2.

Table 2: Laparoscopic Findings and Therapeutic Interventions (n=20)

Laparoscopic Finding	n (%)	HPE Confirmed	Intervention Performed
Intestinal adhesions	6 (30.0)	6	Adhesiolysis
Chronic appendicitis	4 (20.0)	4	Appendectomy
Abdominal tuberculosis	3 (15.0)	3	Biopsy + ATT
Mesenteric lymphadenopathy	2 (10.0)	2	Lymph node biopsy
Ovarian cyst	1 (5.0)	1	Ovarian cystectomy
Pelvic inflammatory disease	1 (5.0)	1	Adhesiolysis + Biopsy
No abnormality detected	3 (15.0)	-	None
Total	**20 (100)**	**17**	**-**

HPE: Histopathological Examination; ATT: Anti-Tubercular Therapy

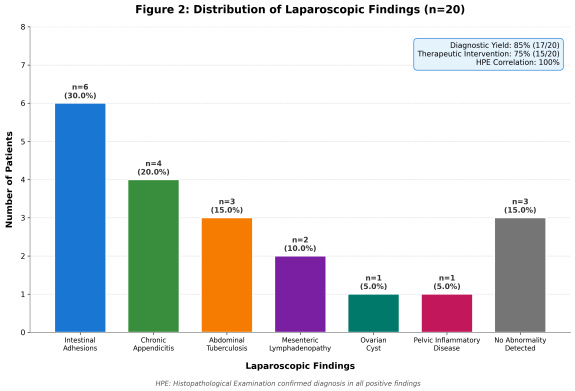

Figure 2: Distribution of laparoscopic findings showing diagnostic yield and therapeutic interventions

Therapeutic Interventions and Histopathological Correlation

Therapeutic interventions were performed in 15 patients (75%). The procedures included adhesiolysis (n=6), laparoscopic appendectomy (n=4), peritoneal/tissue biopsy (n=5), lymph node biopsy (n=2), and ovarian cystectomy (n=1). Some patients underwent multiple procedures during the same sitting. All histopathological examinations confirmed the intraoperative visual diagnosis, yielding a 100% correlation rate. Chronic non-specific appendicitis with lymphocytic infiltration and fibrosis was confirmed in all four appendectomy specimens. Peritoneal biopsies revealed caseating epithelioid granulomas with Langhans giant cells, consistent with tuberculosis, in 3 patients. The histopathological findings are summarized in Table 3.

Table 3: Histopathological Findings (n=17)

Histopathological Diagnosis	n (%)	Tissue Source
Fibrous adhesions with chronic inflammation	6 (35.3)	Adhesion bands
Chronic appendicitis	4 (23.5)	Appendix
Granulomatous inflammation (Tuberculosis)	3 (17.6)	Peritoneum/Omentum

Reactive lymphadenitis	2 (11.8)	Mesenteric lymph node
Serous cystadenoma	1 (5.9)	Ovary
Chronic salpingitis	1 (5.9)	Fallopian tube
Total	**17 (100)**	**-**

Operative Outcomes and Complications

No major intraoperative or postoperative complications were encountered. Minor complications included port-site infection in 1 patient (5%), which was managed conservatively with antibiotics and local wound care, and transient shoulder tip pain in 2 patients (10%), which resolved spontaneously within 48 hours. The mean hospital stay was 2.3 ± 0.9 days (range: 1-4 days). Eighteen patients (90%) were discharged within 3 days of surgery. No mortality was recorded during the study period. The operative outcomes are summarized in Table 4.

Table 4: Operative Outcomes (n=20)

Parameter	Value
Mean operative time (minutes)	58.6 ± 16.8 (range: 30-95)
Mean hospital stay (days)	2.3 ± 0.9 (range: 1-4)
Conversion to open surgery	0 (0%)
Major complications	0 (0%)
Minor complications	3 (15%)
- Port-site infection	1 (5%)
- Shoulder tip pain	2 (10%)
Mortality	0 (0%)

DISCUSSION

Chronic abdominal pain represents a significant diagnostic challenge, with a substantial proportion of patients remaining undiagnosed despite comprehensive evaluation with conventional investigations [32]. The present study evaluated the role of diagnostic laparoscopy in this challenging patient population and demonstrated a diagnostic yield of 85%, which is consistent with findings reported in the literature ranging from 65% to 94% [20,21]. Zhao et al. [20] in their comprehensive literature review of 23 studies reported that laparoscopy achieved a diagnosis in 65% to 94% of patients with chronic abdominal pain of unknown origin, supporting our findings.

The demographic profile of our study population showed female predominance (60%), which aligns with previous studies reporting higher incidence of chronic abdominal pain in females [33]. This gender disparity may be attributed to gynecological conditions contributing to chronic pelvic pain and the higher prevalence of functional gastrointestinal disorders in women. The mean age of 36.85 years in our study is comparable to findings by Husain et al. [26] and Bellad et al. [25], who reported similar age distributions in their studies on diagnostic laparoscopy for chronic abdominal pain.

Intestinal adhesions emerged as the most common finding in our study (30%), corroborating the observations of multiple investigators [34,35]. The high prevalence of adhesions, particularly in patients with previous abdominal surgery (40% of our cohort), highlights the importance of detailed surgical history taking. Zhao et al. [20] reported adhesions as the most frequent finding in diagnostic laparoscopy for chronic abdominal pain, with prevalence rates ranging from 25% to 50%. The pathophysiology of adhesion-related pain involves mechanical stretching of peritoneal surfaces, neural entrapment, and visceral hypersensitivity [36]. In our study, all patients with adhesions underwent successful adhesiolysis, demonstrating the therapeutic utility of laparoscopy.

Chronic appendicitis was identified in 20% of our patients, reinforcing the concept that the appendix can be a source of recurrent or chronic abdominal pain even in the absence of classical imaging findings [37]. The histopathological confirmation of chronic inflammation with lymphocytic infiltration and fibrosis in all our appendectomy specimens validates the clinical utility of laparoscopic appendectomy in appropriately selected patients with chronic right lower quadrant pain. Kothadia et al. [38] described chronic appendicitis as an uncommon but important cause of chronic abdominal pain that is often overlooked due to its subtle presentation.

Abdominal tuberculosis was diagnosed in 15% of patients, which is significant given India's high tuberculosis burden [39]. This finding is consistent with studies from the Indian subcontinent reporting tuberculosis as a major cause of chronic abdominal pain

[40]. Laparoscopy offers distinct advantages in suspected abdominal tuberculosis by enabling direct visualization of characteristic peritoneal tubercles, ascites, and lymphadenopathy, while simultaneously allowing tissue acquisition for histopathological confirmation. The presence of caseating granulomas with Langhans giant cells in our peritoneal biopsies confirmed the diagnosis, allowing timely initiation of anti-tubercular therapy.

The therapeutic value of diagnostic laparoscopy was evident in our study, with 75% of patients undergoing definitive interventions during the same sitting. This "see-and-treat" approach represents a major advantage of laparoscopy, eliminating the need for a second surgical procedure in most cases [41]. The 100% correlation between intraoperative visual findings and histopathological diagnosis underscores the reliability of laparoscopic assessment when performed by experienced surgeons. Onders et al. [29] reported similar therapeutic rates in their study on laparoscopy for chronic abdominal pain, emphasizing the dual diagnostic and therapeutic utility of the procedure.

The safety profile of diagnostic laparoscopy in our study was excellent, with no major complications and only 15% minor complications. The port-site infection rate of 5% and absence of bowel injury, hemorrhage, or need for conversion to open surgery are consistent with the established safety record of diagnostic laparoscopy [42]. The mean hospital stay of 2.3 days supports the role of laparoscopy as a safe minimally invasive option in this patient population, offering significant advantages over exploratory laparotomy in terms of recovery time and morbidity.

The study has certain limitations that warrant acknowledgment. The retrospective design limits the ability to control for confounding variables and introduces potential selection bias. The relatively small sample size (n=20) limits the generalizability of findings. Additionally, the absence of long-term follow-up data precludes assessment of sustained symptom relief and recurrence rates. Future prospective studies with larger sample sizes and structured follow-up protocols would provide more robust evidence regarding the long-term outcomes of diagnostic laparoscopy in chronic abdominal pain.

CONCLUSION

Diagnostic laparoscopy is a safe and effective modality for establishing diagnosis in patients with chronic abdominal pain that remains undiagnosed despite conventional investigations. In our study, laparoscopy achieved a diagnostic yield of 85% and enabled therapeutic intervention in 75% of patients. The most common findings were intestinal adhesions, chronic appendicitis, and abdominal tuberculosis. The 100% histopathological correlation with intraoperative findings confirms the reliability of laparoscopic assessment. With minimal morbidity, short hospital stay, and excellent safety profile, diagnostic laparoscopy should be considered as an early diagnostic tool in patients with chronic abdominal pain of uncertain etiology, particularly when conventional investigations fail to establish a diagnosis.

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