

# Role of Diagnostic Laparoscopy in Chronic Abdominal Pain with Uncertain Diagnosis: A 1-year Cross-sectional Study

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## ABSTRACT

**Aim:** Diagnosis of chronic abdominal pain is a significant clinical challenge. Laparoscopy, a minimally invasive technique, could potentially be diagnostic as well as therapeutic in patients with chronic undiagnosed abdominal pain. This study was aimed to evaluate the role of laparoscopy as an investigative modality in the diagnosis and management of patients with chronic abdominal pain.

**Materials and methods:** Demographics, clinical data, and medical and surgical history of the patients (55 patients) with chronic abdominal pain were noted. Details of pain such as, severity of pain based on visual analog scale (VAS) score, duration of pain, site of pain, and nature of pain were recorded. Routine along with radiological investigations were also performed. After preoperative investigations, the patients were subjected to diagnostic laparoscopy, either by open or closed technique under general anesthesia. Postoperative assessment of pain was done using VAS score.

**Results:** Most of the patients (65.45%) had a duration of pain between 8 weeks and 12 weeks and mean duration of pain was  $10.80 \pm 2.78$  weeks. Fever was present in 41.82% of the patients. A history of lower segment cesarean section was observed in 5.45% patients. The most common surgical procedure performed was adhesiolysis (30.91%) followed by appendectomy (29.09%). Postoperative pain relief was statistically significant ( $p < 0.001$ ).

**Conclusion:** Laparoscopy offers an effective diagnostic modality and excellent pain relief in the management of patients with chronic abdominal pain. Furthermore, adhesions and inflamed appendix are important causes of chronic abdominal pain. However, studies with a large sample size are required to validate the findings.

**Clinical significance:** Laparoscopy is an investigative modality in the diagnosis and management of patients with chronic abdominal pain.

**Keywords:** Adhesiolysis, Appendectomy, Chronic abdominal pain, Diagnostic laparoscopy.

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## INTRODUCTION

Chronic abdominal pain is an intermittent or continuous pain persisting for more than 12 weeks.<sup>1</sup> It is the most common clinical presentation that affects the patients both physically and psychologically. In India, it is the 4th frequent chronic pain syndrome in the general population that represents about 13% of all surgical admissions.<sup>2</sup> Numerous etiologies ranging from organic to functional cause chronic abdominal pain. The most common organic disorders include intestinal adhesions, biliary causes, and appendicular causes, while functional disorders include irritable bowel disease, functional dyspepsia, and various motility disorders.<sup>3</sup> In spite of strong diagnostic workups, 40% of the patients with chronic abdominal pain did not have specific diagnosis at the end.<sup>4</sup> Many patients remain undiagnosed even after excluding the common disorders by meticulous investigations, and pose a significant diagnostic challenge to the physician.<sup>5</sup>

Biochemical, serological, and imaging techniques such as ultrasound sonography (USG), computed tomography (CT), and magnetic resonance imaging (MRI) only provide indirect evidence of underlying disorder; therefore, many of the cases remain inconclusive. Thus, it is a major challenge for the surgeon to diagnose accurately and decide an appropriate treatment modality.<sup>6</sup> The advent of diagnostic laparoscopy added a new tool in the diagnosis and treatment of chronic abdominal pain. It is a minimally invasive procedure and plays a significant role in the present era to diagnose chronic undiagnosed abdominal pain. It allows the direct visualization of the peritoneal cavity without the need of open exploratory laparotomy.<sup>4</sup> Many factors (including high

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diagnostic yield, its applicability and therapeutic management in both elective and emergency setups, reduced hospital stay, low morbidity, and expenditure) have made this treatment modality most popular.<sup>7</sup>

Although diagnostic laparoscopy is becoming acceptable in surgical practice, its role in ascertaining the diagnosis of nonspecific abdominal pain needs to be validated by an evidence base.<sup>8</sup> Studies that establish the definite role of diagnostic laparoscopy in patients with chronic abdominal pain are limited.<sup>8–11</sup> Hence, considering the burden of chronic abdominal pain and the advantages offered by laparoscopy, the present study was undertaken to identify the etiology of chronic abdominal pain. It was also aimed to assess the outcome in terms of pain relief in such patients on follow-up, after elective diagnostic laparoscopy.

## MATERIALS AND METHODS

### Study Design

The present one-year hospital-based cross-sectional study was conducted from January 2016 to December 2016 at the Department of General Surgery. An approval was obtained from the Institutional Ethical review board, prior to the commencement of the study. A total of 55 patients with undiagnosed chronic abdominal pain were included in the study. The patients fulfilling selection criteria were informed in detail especially, the procedure of diagnostic laparoscopy and a written informed consent was obtained.

### Selection Criteria

Patients aged  $\geq 18$  years with a history of chronic abdominal pain from  $\geq 8$  weeks and undiagnosed despite biochemical and other radiological investigations such as USG/CT/MRI were included in the study. However, the patients diagnosed with chronic abdominal pain, discontinued follow-up, pregnant women, and those not fit for general anesthesia were exempted.

### Data Collection

Demographic data (including age and gender) were noted. Patients were interviewed for the medical and surgical history along with presenting complaints. Symptoms such as fever, diarrhea, constipation, burning, and micturition were recorded. The patients were subjected to clinical examination and details about severity of pain based on visual analog scale (VAS) score, duration of pain, site of pain, and nature of pain were noted. These findings were recorded on a predesigned and pretested proforma. Investigations including hemoglobin, total leucocyte counts, direct count, random blood sugar, platelet count, liver function test, urine routine and microscopy, serum creatinine, and radiological investigations such as USG, CT, and MRI were also performed.

### Intervention

After the evaluation of preoperative investigations and fitness for anesthesia, the selected patients were subjected to diagnostic laparoscopy, either by the open or closed technique by a single surgeon, under general anesthesia. Patients were kept nil by mouth for 12 hours prior to surgery. Initial port placement was done at umbilical point by open technique (Figs 1A and B). In cases with scars and previous history of surgery, initial port placement was done at Palmer's point, by open technique. Additional ports were inserted as required (Fig. 1C). The abdominal cavity was examined to the possible extent in each case. Interventions such as adhesiolysis, appendectomy, peritoneal biopsy, lymph node biopsy, or aspiration of any peritoneal fluid were carried out at the discretion of the operating surgeon. Starting from the pelvis, the uterus, ovary, uterine adnexa in females, rectum and sigmoid colon, ileocecal region, cecum, appendix, ascending colon, transverse colon, stomach, duodenum, gallbladder, liver, spleen, and descending colon were serially visualized and examined. The patient was then turned in reverse Trendelenburg position for examination of the upper abdomen. With the help of bowel grasping forceps, the whole length of small bowel could be walked over for direct visualization and examination. The final diagnosis was established based on the reports of biopsy examination. Following the procedure, patients received appropriate treatment based on the findings of the laparoscopy. The general anesthesia protocol remained same for all patients, and they were followed up for assessment of pain.

### Assessment of Pain

The pain was assessed using VAS score ranging from 0 to 10. VAS was explained to the patient during preoperative visit, considering zero as no pain and 10 as maximum pain points. The assessment of pain was done at enrolment and at postoperative followups, i.e., day 15, 30, 45, and 60.

### Statistical Analysis

The data obtained were coded and entered in Microsoft Excel spreadsheet. The categorical data were expressed as rates, ratios, and percentages. Continuous data were expressed as mean  $\pm$  standard deviation. The comparison of mean pain scores at different follow-ups was done using one-way ANOVA test.  $p \leq 0.05$  at 95% confidence interval was considered as statistically significant.

## RESULTS

The mean age of the patients was  $37.67 \pm 14.45$  years with striking female preponderance (64.45%; Table 1). Majority of the patients (38.18%) were in the age group of 18–30 years. Most of the patients were married (84.55%) and were graduates (54.55%). Fever was the clinical feature observed in most of the patients (41.82%). A history of lower segment cesarean section was observed in 5.45% patients. Tenderness over the lower abdomen was noted in 45.45% patients, while 43.6% patients had generalized tenderness (Table 1). The characteristics of the pain in the study population are given in Table 2. Most of the patients (65.45%) had a duration of pain between 8 and 12 weeks. The mean duration of pain observed in patients was  $10.80 \pm 2.78$  weeks. Most of the patients reported generalized (49.09%), intermediate (32.73%), and progressive type of pain (65.45%).

The clinical and biochemical profile of the study population is shown in Table 3. Blood urea levels ( $24.51 \pm 10.23$  mg/dL) of the patients with chronic abdominal pain was slightly high, while the remaining clinical and biochemical parameters were within the standard limits.

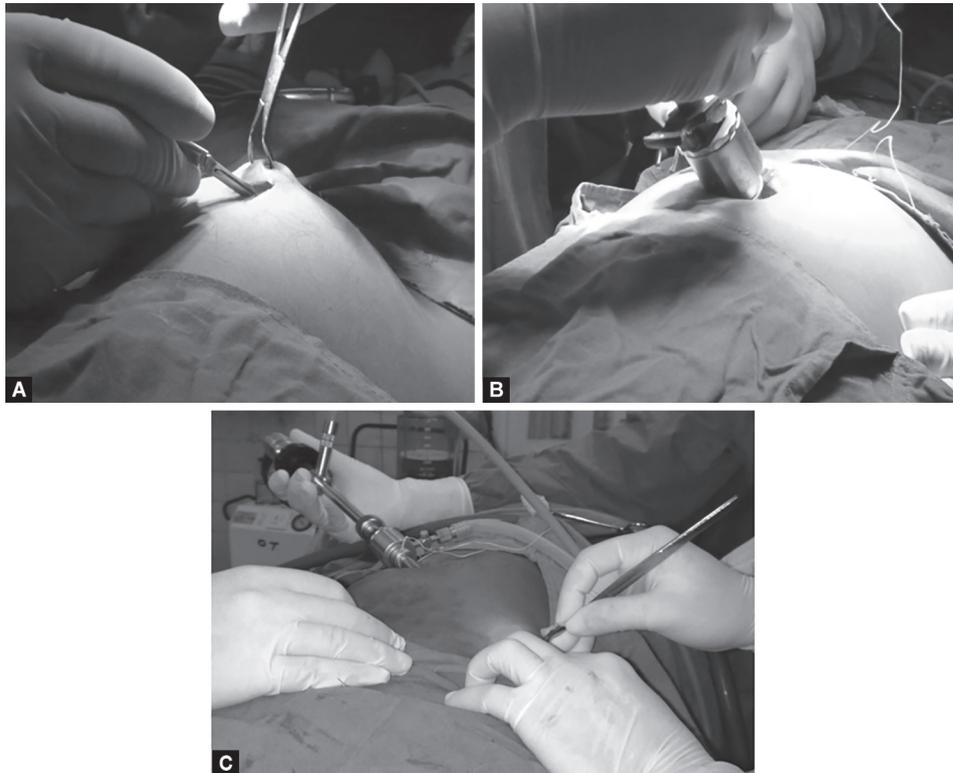
USG, CT, surgical findings, and the type of surgery performed in patients is summarized in Table 4. USG and CT findings were normal in 76.36% and 20% of the patients, respectively. The most common surgical finding was adhesions (30.91%) followed by an inflamed appendix (29.09%). The most common surgical procedure performed was adhesiolysis (30.91%) followed by appendectomy (29.09%).

Postoperative pain scores in the patients during the followup period is given in Table 5. On day 15, 47.27% patients had moderate pain and 14.55% patients had no pain. The pain was absent in 54.55%, 80%, and 89.09% patients on days 30, 40, and 60. The mean VAS score gradually reduced from  $3.05 \pm 1.88$  on day 15 to  $1.22 \pm 1.54$  on day 30,  $0.47 \pm 1.02$  on day 45, and  $0.25 \pm 0.78$  on day 60. This reduction was statistically significant ( $p < 0.001$ ).

## DISCUSSION

Chronic abdominal pain is a persistent problem that requires immediate investigation and management. Hence, the study aimed to evaluate the role of laparoscopy as an investigative modality in the diagnosis and management of patients with chronic abdominal pain.

Male-to-female ratio in this study was 1:1.89. This suggests that chronic abdominal pain is widely prevalent among females, which could be explained by the number of gynecological procedures



**Figs 1A to C:** Insertion of (A) Infraumbilical port; (B) Hasson's cannula; (C) Additional ports

**Table 1:** Demographic details including history of patients with chronic abdominal pain

Variables	n (%)
Sex	
Male	19 (34.55)
Female	36 (65.45)
Age (years)	
18–30	21 (38.18)
31–40	14 (25.45)
41–50	11 (20)
51–60	3 (5.45)
61–70	6 (10.91)
Marital status	
Single	8 (14.55)
Married	47 (85.45)
Education	
Studying	12 (21.82)
Primary	2 (3.64)
Secondary	10 (18.18)
Graduate	30 (54.55)
Postgraduate	1 (1.82)
Clinical presentation	
Fever	23 (41.82)
Diarrhea	2 (3.64)
Constipation	2 (3.64)
Burning micturition	1 (1.82)
Others	1 (1.82)

Contd...

Contd...

Variables	n (%)
History	
Previous LSCS	3 (5.45)
Hypertension	2 (3.64)
Hysterectomy	2 (3.64)
LSCS and tubectomy	2 (3.64)
Tubectomy	2 (3.64)
Laparoscopic adhesiolysis for intestinal obstruction	1 (1.82)
Open appendectomy	1 (1.82)
Right hemicolectomy	1 (1.82)
Tuberculosis	1 (1.82)
Not significant	40 (72.73)
Abdominal examination	
Lower abdominal tenderness	25 (45.45)
Generalized tenderness	24 (43.63)
Suprapubic tenderness	2 (3.64)
Upper abdominal tenderness	2 (3.64)
Umbilical tenderness	2 (3.64)

LSCS, lower segment cesarean section

they during pregnancy, such as cesarean sections, hysterectomy, and tubectomy. Similar sex-distribution pattern was observed in other studies in the literature.<sup>2,4,12</sup> One-third of the patients in the study were aged between 18 years and 30 years. This indicates that the occurrence of chronic abdominal pain is mostly in younger individuals.<sup>11,12</sup>

The physical examination in patients with chronic abdominal pain varies depending upon the location of pain and chronicity of

**Table 2:** Distribution of patients with chronic abdominal pain according to the characteristics of the pain

Characteristics	n (%)
Duration (weeks)	
8–12	36 (65.45)
13–16	18 (32.73)
>16	1 (1.82)
Site	
Generalized	27 (49.09)
Lower abdomen	22 (40.00)
Upper abdomen	3 (5.45)
Around umbilicus	3 (5.45)
Type of pain	
Moderate	1 (1.82)
Progressive	36 (65.45)
Intermediate	10 (18.18)
Dragging	5 (9.09)
Pricking	1 (1.82)
Severe	2 (3.64)
Severity	
Mild	1 (1.82)
Intermediate	18 (32.73)
Moderate	17 (30.91)
Severe	12 (21.82)
Progressive	7 (12.73)

**Table 3:** Clinical and biochemical profile of patients with chronic abdominal pain

Variables	Mean ± SD
Pain scores at enrollment (VAS score)	7.45 ± 0.74
Weight (kg)	62.65 ± 6.68
Pulse rate (per min)	76.39 ± 6.19
Systolic blood pressure (mm Hg)	121.45 ± 10.26
Diastolic blood pressure (mm Hg)	77.95 ± 8.33
Respiratory rate (per min)	17.80 ± 1.99
Temperature (°C)	97.71 ± 0.99
Hemoglobin (g%)	12.02 ± 1.76
TLC (mm <sup>3</sup> )	8803.89 ± 3859.00
Platelet count (lakh)	2.79 ± 0.82
RBS (mg/dL)	102.29 ± 15.82
Blood urea (mg/dL)	24.51 ± 10.23
Serum creatinine (mg/dL)	0.94 ± 0.24

VAS, visual analog scale; RBS, random blood sugar; TLC, total leukocyte count

**Table 4:** Distribution of patients with chronic abdominal pain according to USG, CT scan, surgical findings, and type of surgery

Variables	n (%)
USG findings	
Normal	42 (76.36)
Mild hepatosplenomegaly, free fluid	1 (1.82)
Mild splenomegaly, mild ascites, left minimal pleural effusion	1 (1.82)
Minimal bladder distended, no obvious collection in umbilical region	1 (1.82)
Minimal free fluid in pouch of Douglas	1 (1.82)
Not done	9 (16.36)
CT scan findings	
Normal	11 (20)
Not done	44 (80)
Surgical findings	
Adhesions	17 (30.91)
Inflamed appendix	16 (29.09)
Tubercular lymph node	6 (10.91)
Adhesions with inflamed appendix	5 (9.09)
Inflamed appendix with mobile cecum	3 (5.45)
Left-sided ovarian cyst	2 (3.64)
Liver abscess	1 (1.82)
Malrotation of gut	1 (1.82)
Omental adhere to right fimbrial end, high cecum, inflamed appendix	1 (1.82)
Right-sided ovarian cyst	1 (1.82)
Right-sided ovarian hemorrhagic cyst	1 (1.82)
Umbilicus sinus tract	1 (1.82)
Volvulus of the left hepatic flexure	1 (1.82)
Type of surgery	
Adhesiolysis	17 (30.91)
Appendectomy	16 (29.09)
Adhesiolysis with appendectomy	6 (10.91)
Lymph node biopsy	6 (10.91)
Ovarian cystectomy	4 (7.27)
Appendectomy with cecopexy	2 (3.64)
Excision of Ladd's band with ileotransverse colon anastomosis	1 (1.82)
Laparoscopic colopexy	1 (1.82)
Abscess drainage	1 (1.82)
Sinus tract excision	1 (1.82)

USG, ultrasound sonography test; CT, computed tomography

the patient's symptoms.<sup>13</sup> Abdominal examination revealed lower abdomen (localized) and generalized tenderness as the most common symptoms. Generalized tenderness, when compared to localized, poses a greater diagnostic challenge to the surgeons.<sup>14</sup> The vitals and biochemical profile of the patients were quite normal. USG and CT scans conducted in patients did not result in the diagnosis of chronic abdominal pain, whereas laparoscopic findings reported most of the patients had adhesions and inflamed appendix. Adhesions restrict the mobility or distensibility of

abdominal organs, especially the bowel, and cause chronic abdominal pain.<sup>15</sup> Studies conducted by Salky et al.<sup>16</sup> and Sachin et al.<sup>17</sup> also reported abdominal adhesions as the frequent abdominal pathology. In contrast, study by Naniwadekar et al. reported abdominal Koch's as the most frequent cause of chronic abdominal pain, excluding gynecological cases.<sup>2</sup>

Adhesiolysis was the most common surgical procedure performed in the present study followed by appendectomy. Similarly, in a study by Sayed et al.,<sup>18</sup> 43.6% of the patients



**Table 5:** Distribution of patients with chronic abdominal pain according to the postoperative pain scores

VAS scores	Intervals, n (%)			
	15 days	30 days	45 days	60 days
No pain (0)	8 (14.55)	30 (54.55)	44 (80.00)	49 (89.09)
Mild (0–3)	20 (36.36)	18 (32.73)	9 (16.36)	5 (9.09)
Moderate (4–6)	26 (47.27)	7 (12.73)	2 (3.64)	1 (1.82)
Severe (>6)	1 (1.82)	0	0	0

VAS, visual analog scale

underwent adhesiolysis. In a study by Husain et al.,<sup>6</sup> patients with chronic abdominal pain had 19% and 17.3% cure rate with laparoscopic appendectomy and adhesiolysis, respectively, after a 6-month follow-up period. In a study by El-labban et al.,<sup>19</sup> laparoscopic adhesiolysis resulted in a positive outcome in more than 50% patients.

In this study, the overall pain relief was observed in 89.09% patients with chronic abdominal pain. A study by Kumar et al.<sup>4</sup> reported no pain or less pain in 86% of the patients after two months of laparoscopy. An excellent pain relief in the difficult patient group (i.e., patients with severe chronic pain with a duration of 10 weeks without relevant biological and radiological investigations) was observed in the present study. The mean VAS score also gradually reduced from day 15–60. At the end of the 60th day, only five patients reported mild pain and one patient had moderate pain. Patients with mild pain underwent cataplexy, appendectomy, lymph node biopsy, ovarian cystectomy, and sinus tract excision. however, the patient with moderate pain underwent excision of Ladd’s band with ileotransverse colon anastomosis.

Overall, laparoscopy is a safe, quick, and effective modality of investigation for chronic abdominal pain. The ability to pin point or exclude a major cause of abdominal pain, not only avoids further investigations but also plays a significant role in reducing the fear in the minds of the patients. Laparoscopy not only determines the diagnosis, but also has the advantage of therapeutic intervention, which can be performed at the same sitting in most cases, thus avoiding another hospitalization or another exploration of the abdomen. The study also confirms that diagnostic laparoscopy aids the surgeon in directly visualizing the contents of the abdominal cavity better than any other investigative modality. It is safe to identify abnormal findings without any biological and radiological background. This can also improve the outcome in majority of the patients in the difficult group by providing a hint for the confirmation of diagnosis. Despite all its benefits, the efficiency of laparoscopy is limited by the skill, training, and coordination of the surgeons.<sup>20</sup>

## CONCLUSION

Overall, laparoscopy offers a definitive diagnosis in patients presented with undiagnosed chronic abdominal pain and helps in the therapeutic intervention. Adhesions and inflamed appendix are the important causes of chronic abdominal pain. Relief of pain is obtained in many of these patients, which makes laparoscopy an excellent diagnostic modality in the management of chronic abdominal pain. However, this is a single-center study with a small sample size; hence, studies with a larger sample size are required to validate the current findings.

## CLINICAL SIGNIFICANCE

Laparoscopy is an investigative modality in the diagnosis and management of patients with chronic abdominal pain. Laparoscopy offers a definitive diagnosis in patients presented with undiagnosed chronic abdominal pain and helps in the therapeutic intervention.

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