SAS Journal of Surgery
Abbreviated Key Title: SAS J Surg
ISSN 2454-5104
Journal homepage: https://www.saspublishers.com

OPEN ACCESS

Surgery

Diagnostic Laparoscopy: An Effective Tool in the Evaluation and Management of Chronic Abdominal Pain

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DOI: https://doi.org/10.36347/sasjs.2024.v10i09.008 | **Received:** 28.07.2024 | **Accepted:** 03.09.2024 | **Published:** 10.09.2024

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Abstract **Original Research Article**

Background: Chronic abdominal pain (CAP) is the fourth most frequent chronic pain syndrome presenting at different levels of health care systems and a leading reason for gastroenterology referrals. This is defined as recurrent abdominal pain that worsens the patient's quality of life and causes significant physical morbidity and psychological distress over a period of more than three months. The prevalence is 22-25%, and women are impacted more often than men. Often, CAP is diagnosed as unexplained chronic abdominal pain (UCAP) when a definitive diagnosis is not made. Diagnostic laparoscopy is a helpful minimally invasive procedure for diagnosis and occasionally for definitive management in all of these situations. ***Aim of the study:*** The study aims to use diagnostic laparoscopy for all cases of chronic abdominal pain (CAP) without a definite cause. ***Methods:*** Sixty individuals with chronic abdominal pain participated in this prospective observational study, which ran from January 2022 to December 2023 at the Satkhira Medical College Hospital in Bangladesh. With their informed written consent, participants were chosen according to stringent selection criteria. Numerous data on demographics, preoperative pain characteristics, intraoperative findings, and postoperative pain relief status were included in this ethically approved study. SPSS software was used to analyze the data, and statistical tests were used to report the results and determine significance at a 95% confidence interval. ***Result:*** The study involved 60 patients, predominantly aged 21-30 years, with a mean age of 37.14 years. Females represented 58.33% of the participants. Pain was reported by all patients, with vomiting (41.67%) and fever (33.33%) being less common symptoms. Most patients experienced pain for 13-18 months before surgery. Among the revealed diagnoses, three important causes were appendicitis (35%), adhesions (23.33%), and Koch's abdomen (21.67%). Treatments were tailored according to underlying etiology, such as appendectomy for appendicitis, anti-tubercular treatment for Koch's abdomen etc. Postoperative pain relief improved significantly over three months, with VAS scores decreasing from 6.42 to 4.16 (P=0.028). ***Conclusion:*** The study demonstrates the usefulness of diagnostic laparoscopy in determining the underlying causes of persistent abdominal pain. In addition, it has less morbidity, better aesthetic outcomes, and simultaneous therapeutic interventions.

Keywords: Diagnostic Laparoscopy, Evaluation, Management and Chronic Abdominal Pain.

INTRODUCTION

As the fourth most common chronic pain syndrome in the general population, chronic abdominal pain (CAP) is now a major reason for referrals to gastroenterologists [1,2]. Recurrent abdominal pain lasting longer than three months is known as CAP. Managing CAP is difficult for both patients and doctors since it frequently causes severe physical morbidity and psychological disability [1]. According to Viswanath *et al.*, (2023) [3], the prevalence rate of CAP worldwide ranges from 22% to 25%, with women being affected more frequently than men (24% versus 17%). This illness often necessitates multiple laparotomies and poses a significant clinical challenge [4]. Remarkably, following a comprehensive diagnostic evaluation, over 40% of patients with CAP do not provide a specific etiological diagnosis; this condition is known as unexplained chronic abdominal pain (UCAP). Significant depressive symptoms and a lower quality of life are linked to UCAP [5-7]. CAP can result from a number of organic and functional illnesses. Common functional causes include motility disorders, functional dyspepsia, and irritable bowel syndrome; common

organic causes include intestinal adhesions, biliary pathologies, and appendicular conditions [8–15]. Furthermore, visceral pain is frequently misdiagnosed as abdominal wall pain [16, 17]. When examining the abdomen to determine the cause of CAP, diagnostic laparoscopy is a useful procedure that can help prevent laparotomy [22]. In addition to enabling peritoneal cavity visualization, this minimally invasive procedure has revolutionized the management of numerous surgical diseases in the same setting [23, 24]. To determine the etiology and direct the necessary interventions, it is a safe and efficient diagnostic technique [27]. The most common finding is abdominal adhesions, especially in patients who have had previous abdominal surgeries [28]. Hepatobiliary problems, endometriosis, and appendicular pathology are other frequent findings that can all be treated with a laparoscopy [29]. The use of laparoscopy in CAP is still debatable, though. Some authors argue against its use in adhesiolysis because they believe it is not supported by evidence and, as a result, they do not advise CAP patients to undergo it as a treatment for adhesions [30, 31]. By providing a thorough view of the entire peritoneal cavity, laparoscopy makes it possible to perform targeted biopsies under direct vision. However, obtaining a high diagnostic yield through laparoscopy necessitates technical mastery, a thorough understanding of abdominal pathology, clinical acumen, and sound surgical knowledge [22, 32, 33]. The study intends to employ diagnostic laparoscopy in all cases of non-specific chronic abdominal pain (CAP). The objectives of the procedure are to confirm the pathological diagnosis by obtaining biopsies from any abnormal findings or lymph nodes, as well as to identify the underlying causes of CAP.

METHODOLOGY & MATERIALS

Study Design

This prospective observational study was conducted at Satkhira Medical College Hospital, Satkhira, Bangladesh, over a period of two years, from 1st January 2022 to 31st December 2023. Sixty participants suffering from chronic abdominal pain were carefully selected through purposive sampling, adhering strictly to predefined inclusion and exclusion criteria. Before their involvement, the study's objectives and procedures were communicated to all participants, and informed consent was obtained. Baseline demographic data were recorded for each patient, with stringent measures in place to ensure data confidentiality. The study protocol received ethical approval from the institutional ethical committee.

Selection Criteria

The inclusion criteria included patients between the ages of 18 and 65 who had visited the surgical outpatient department with chronic abdominal pain persisting for six months or more and had normal or ambiguous diagnostic results. The exclusion criteria encompassed patients with acute abdominal pain, cardiorespiratory disorders, sepsis of the abdominal wall, pregnancy, known abdominal cancers, individuals taking mental medication, and individuals with compromised immune systems.

Data Collection

Data included patient demographics, duration and site of abdominal pain, history of previous surgical interventions, comorbid conditions, and results from diagnostic investigations. The study also captured intraoperative findings, therapeutic or diagnostic interventions performed, correlations between intraoperative findings and histopathology reports, intraoperative and postoperative complications, and the degree of pain relief after this procedure. Standard baseline investigations such as blood and urine analyses, ECG, ultrasonography, and chest X-ray were done with additional tests like ESR, sugar profile and imaging studies such as erect abdominal X-ray, barium studies, esophagogastroduodenoscopy, colonoscopy, abdominal CT scans were performed as per individual requirement.

Intervention

General anesthesia was used for every surgery. The Veress needle was used to establish pneumoperitoneum. Two lateral 5mm ports and a 10mm umbilical camera port were placed, with the ports' locations changing based on the organs of interest and the existence of abdominal scars. A meticulous diagnostic laparoscopy was performed to thoroughly examine all of the abdominal viscera for pathology. The uterus, fallopian tubes, ovaries, peritoneal surfaces, appendix, terminal ileum, liver, gallbladder, stomach, and intestines all received special attention. Adhesions to the anterior abdominal wall or between bowel loops were observed. Based on the results of the intraoperative examination, a variety of surgical procedures were carried out, including adhesiolysis, appendectomies, and biopsies of suspicious lesions. Absorbable sutures were used to close all surgical ports.

Statistical Analysis

The data were methodically arranged into pertinent tables and graphs along with concise explanations in order to improve comprehension. On the Windows platform, SPSS software (version 26) was used to conduct statistical analyses. Categorical variables were shown as frequencies and percentages, and continuous variables were reported as mean ± standard deviation (SD). ANOVA, the Unpaired Student's t-test, and the Chi-Square test were among the statistical tests used. With a p-value of less than 0.05, statistical significance was evaluated at a 95% confidence interval.

RESULTS

Following the application of the inclusion criteria, sixty patients were included in the study. The distribution of study participants by age and gender is shown in Table 1. The majority of participants (36.67%) were between the ages of 21 and 30, and 26.67% were

between the ages of 31 and 40. With a standard deviation of 12.77 years, the participants' mean age was 37.14 years. In terms of gender distribution, 58.33% of the study population consisted of female subjects, while 41.67% of the subjects were male.

Pain is the most commonly reported symptom among the patient cohort, with other symptoms being less common. Figure 1 shows the distribution of patients according to their presenting symptoms. Of the patients, 41.67% reported vomiting, and 33.33% had a fever. Abdominal distension affected 16.67% of the patients, while bowel symptoms affected 11.67% of them.

The distribution of patients according to the time length of pain prior to a diagnostic laparoscopy is shown in Figure 2. The trend depicted in this figure highlights that the majority of patients had history of prolonged pain, which was chronic in nature. Four separate time periods were used to categorize the data: 3–12 months, 13–18 months, 19–36 months, and more than 36 months. Before the procedure, 38.33% of patients reported having pain for 13–18 months, and 28.33% reported having pain for more than 36 months. Less than half of the patients (18.33%) reported having pain for 19–36 months, and the least amount (15.00%) said they had pain for 3–12 months. Appendicitis was the most common condition (35.00%), followed by adhesions (23.33%) and Koch's abdomen (21.67%) in the laparoscopic findings shown in Table 2. 8.33% of patients had normal findings, and other causes included groin hernias (3.33%) and sub-acute intestinal obstructions (8.33%).

Appendectomy (35.00%) was the most frequently performed surgical procedure for appendicitis, followed by adhesiolysis (23.33%) for adhesions, band release (5.00%) for subacute intestinal obstruction, and transabdominal preperitoneal mesh hernioplasty (3.33%) for groin hernia. Antitubercular therapy was used to treat Koch's abdomen in 21.67% of cases. A significant decrease in VAS scores from 6.42±0.63 at baseline to 4.16±0.48 at three months (P=0.028) is demonstrated in Table 4, which compares post-operative pain relief over a three-month period.

Table 1: Study volunteers were distributed based on their age and gender

Variables	Frequency (N)	Percentage (%)
Age range (in years)		
≤20	4	6.67
21-30	22	36.67
31-40	16	26.67
41-50	9	15.00
51-60	4	6.67
61-65	5	8.33
Mean±SD	37.14±12.77	
Gender		
Male	25	41.67
Female	35	58.33

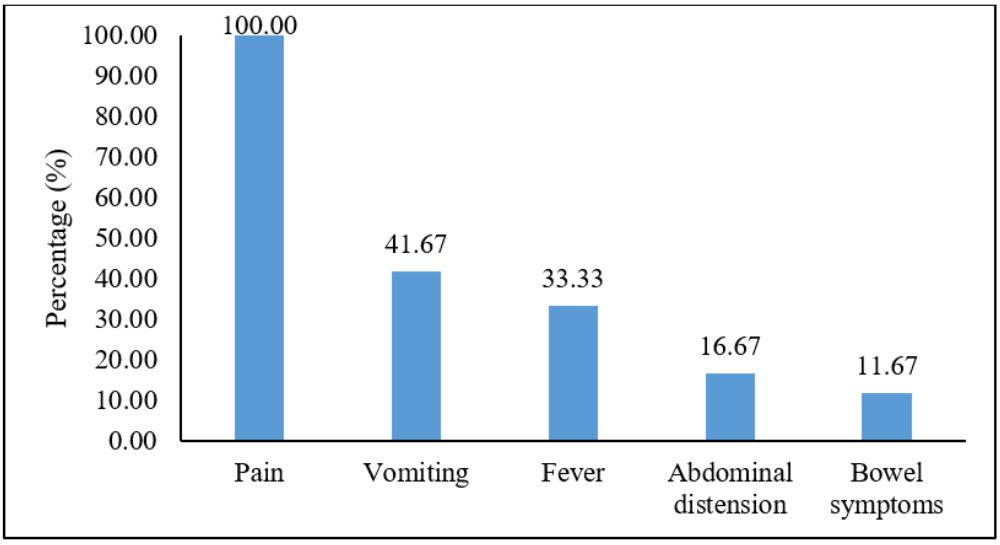

Figure 1: Distribution of patients according to symptoms

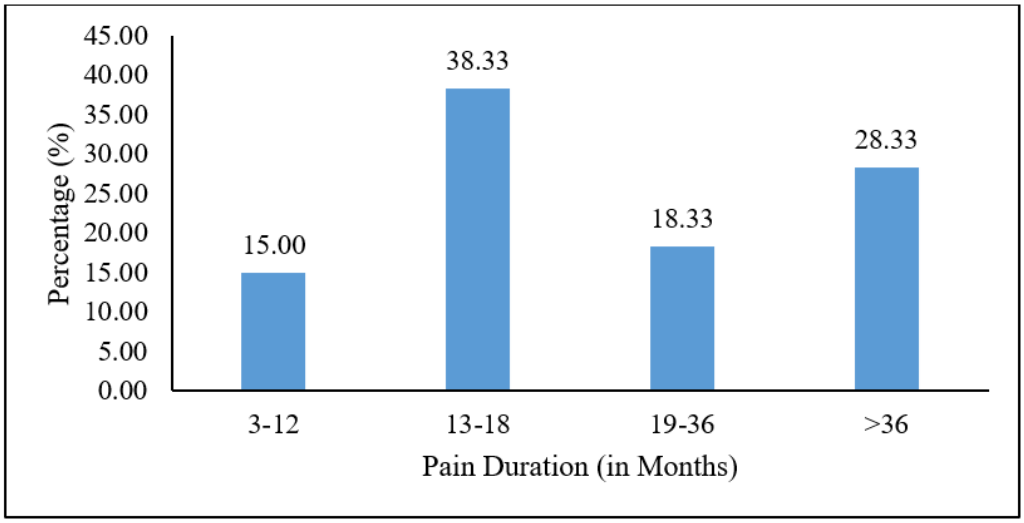

Figure 2: Patients were grouped based on how long they have experienced pain prior to a diagnostic laparoscopy

Table 2: Patient findings from laparoscopies

Laparoscopy findings	N	%
Appendicitis	21	35.00
Koch's abdomen	13	21.67
Adhesions	14	23.33
Sub-acute intestinal obstruction (SAIO)	5	8.33
Hernia	2	3.33
Normal	5	8.33

Table 3: Patients were divided up based on their treatments

Histopathology findings	Treatment	N	%
Appendicitis	Appendectomy	21	35.00
Koch's abdomen	Anti-tubercular treatment	13	21.67
Adhesions	Adhesiolysis	14	23.33
SAIO	Band release	3	5.00
	Adhesiolysis	2	3.33
Groin Hernia	Transabdominal preperitoneal (TAPP) mesh hernioplasty	2	3.33

Table 4: Comparing post-operative pain relief during monitoring of patients after the procedure

Variables	Present	1 Month	3 months	P-value
	Mean±SD			
VAS score	6.42±0.63	5.51±0.39	4.16±0.48	0.028

DISCUSSION

The majority of patients (36.67%) in the current study were within the age group of 21–30 years, followed by 26.67% in the age group of 31–40 years and 15.00% in the age group of 41–50 years. The patients' mean age was 37.14±12.77 years. Among this research group, 35 patients (58.33%) were female, while 25 (41.67%) were male. These findings align with previous studies by Baria (2013), Kumar *et al*., (2013), Parray *et al*., (2019), and Lingala (2018) [34-37]. Baria (2013) reported that the age of patients with chronic abdominal pain, as assessed via laparoscopy, ranged from 13 to 55 years, with females comprising 84% of the study population [34]. Kumar *et al*., (2013) observed a mean age of 34.42±2.56 years in patients undergoing laparoscopy for unexplained chronic abdominal pain, with females constituting over half of the cohort (62%) [35]. The patients in the prospective observational study by Parray *et al*., (2019) ranged in age from 15 to 80 years, with a mean age of 36.4 years. That study had a female predominance (49 females, 21 males), and it assessed the role of diagnostic laparoscopy in patients with acute and chronic abdominal conditions [36]. According to Lingala (2018), the third decade has the highest incidence of chronic abdominal pain, with a mean age of presentation of 34 years and a preponderance of 65% females [36].

This study found that pain accounted for 100% of all reported symptoms. Other symptoms that were reported were vomiting (41.67%), fever (33.33%), abdominal distension (16.67%), and bowel symptoms (11.67%). These results align with those of Parray *et al*., (2019), who reported that pain was the most frequently occurring presenting symptom in 88.6% of patients.

Other common complaints included altered bowel habits, dysuria, fever, and bleeding per rectum, and vomiting (44.3%), loss of appetite (42.9%), and distension (37.1%) [37].

In our study, nine patients (15.00%) reported abdominal pain lasting 3-12 months, 23 patients (38.33%) reported pain for 13-18 months, and 11 patients (18.33%) for 19-36 months, while 17 patients (28.33%) experienced pain for more than 36 months. These observations are consistent with those reported by Lingala (2018), Baria (2013), Kumar *et al*., (2013), and Onders *et al*., (2003) [27, 34, 35, 37]. Lingala (2018) noted that 52.38% of patients reported pain duration between 18 and 36 months [37]. Baria (2013) found the mean duration of pain to be seven months, ranging from three to eleven months [34]. Kumar *et al*., (2013) reported a mean pain duration of 9.5±2.4 months, with significant pain relief observed in most patients after two months of follow-up [35]. Onders *et al*., (2003) reported pain improvement in 74% of patients with chronic right lower abdominal pain [27]. The most common laparoscopic findings in this study were appendicitis (35.00%), adhesions (23.33%), Koch's abdomen (21.67%), sub-acute intestinal obstruction (SAIO) (8.33%), and groin hernia (3.33%), with 8.33% of patients having normal findings. These results are similar to the findings of Ahmad *et al*., (2014), Lingala (2018), Baria (2013), Kumar *et al*., (2013), and Parray *et al*., (2019) [34-38].

Ahmad *et al*., (2014) observed various laparoscopic findings, including inflamed appendix, appendicular faecoliths, enlarged mesenteric lymph nodes, and ovarian cysts, with a definitive diagnosis made in 85.2% of patients [38]. Lingala (2018) reported postoperative adhesions as the most common finding (51.1%), with a significant proportion of patients having a history of abdominal surgery, followed by recurrent appendicitis (11.9%) [37]. Baria (2013) found that 90% of patients received a definitive diagnosis through laparoscopy, with the most common findings being appendicular pathology (40.7%) and other conditions such as ovarian cysts and adhesions [34]. Kumar *et al*., (2013) reported that adhesions were the most common finding (30%), followed by pelvic inflammatory disease, abdominal tuberculosis, and chronic appendicitis [35]. In our study, 21 patients diagnosed with appendicitis underwent laparoscopic appendectomy. Laparoscopic biopsy was performed in 13 cases which were diagnosed as Koch's abdomen according to histopathological examination. Adhesiolysis was performed in patients with adhesions, and release of band was done for some cases of sub-acute intestinal obstruction. The patients with groin hernias were treated with transabdominal preperitoneal mesh hernioplasty.

The Visual Analog Scale (VAS) was used to assess postoperative pain relief. At the time of first presentation, the mean VAS score was 6.42±0.63. At one month (5.51±0.39) and three months (4.16±0.48) after surgery, this score significantly dropped, and the ANOVA test revealed a statistically significant improvement in VAS scores (p=0.028). These results are in line with those of Baria (2013), Ahmad *et al*., (2014), and Kumar *et al*., (2013) [34, 35, 38].

In general, laparoscopy is a quick, easy, and safe way to investigate CAP. This tool's ability to identify or to rule out a major cause of abdominal pain not only saves money on additional testing but also significantly lessens patients' anxiety. In addition to providing a diagnosis, laparoscopy offers the benefit of therapeutic intervention, which is typically carried out in one sitting, saving the patient from needing to return to the hospital or have their abdomen explored again. Additionally, the study demonstrates that, compared to all other investigative methods, diagnostic laparoscopy helps the surgeon directly visualize the contents of the abdominal cavity. Unusual findings can be safely identified even in the absence of biological or radiological context. By offering a clue for the confirmation of the diagnosis, this can also help the majority of patients in the challenging group to have better outcomes. Laparoscopy has many advantages, but its effectiveness is still largely dependent on the surgeons' coordination, skill, and training.

CONCLUSION AND RECOMMENDATIONS

All things considered, diagnostic laparoscopy yields a definitive diagnosis and helps with the therapeutic intervention for patients presenting with CAP. The three main causes of CAP are an inflammatory appendix, adhesions and Koch's abdomen. Most of the cases experience pain relief significantly during the postoperative period, which makes laparoscopy an effective diagnostic tool for treating persistent abdominal pain. Furthermore, this procedure offers safety, superior aesthetic outcomes and reduced morbidity. Nevertheless, additional research with a larger sample size is required to confirm the current findings because this is a single-center study with a limited sample size.

Funding: No funding sources

Conflict of interest: There is no conflict of interest

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