Journal of Clinical and Medical Images

Research Article ISSN 2640-9615 |Volume 5

Role of Diagnostic Laparoscopy in Management of Chronic Abdominal Pain of Nonspecific Origin Presenting at a Tertiary Care Hospital

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Received: 19 Aug 2021
Accepted: 02 Sep 2021
Published: 08 Sep 2021

Citation:

Singh V, Role of Diagnostic Laparoscopy in Management of Chronic Abdominal Pain of Nonspecific Origin Presenting at a Tertiary Care Hospital. J Clin Med Img. 2021; V5(16): 1-14

Keywords:

Diagnostic; Laparoscopic, Pain

1. Abstract

1.1. Aim: Chronic abdominal pain of unknown origin represents a significant challenge in surgical practice. Diagnostic laparoscopy is a minimally invasive surgical procedure that allows the visual examination of the intra-abdominal organs in order to detect pathology. It has diagnostic as well as therapeutic use, avoiding unnecessary laparotomy in cases of diagnostic uncertainty and providing a wide range of possible interventions for the underlying cause, if needed, at the same time.

1.2. Material and Methods: The present study was conducted on total of 50 patients, who fulfilled the inclusion and exclusion criteria. This study was done over a period of one year and comprised of patients with nonspecific abdominal pain where other clinical symptoms and investigations were inconclusive, and were willing for diagnostic laparoscopy.

1.3. Results: In our prospective study, 50 patients with pain abdomen lasting for a period of more than three months were subjected to diagnostic laparoscopy. The maximum numbers of patients were in the age group of 31- 40 years with Mean age of patients being 34.21 years. Male to female ratio was 1: 1.5. The most common finding at laparoscopy in our study was chronic fibrotic appendicitis (34%), followed by adhesions and bands causing chronic short bowel obstruction in 22% of cases. 14% of patients had tubercles or strictures of tubercular origin. In our study 36% of patients underwent appendectomy, 20% had laparoscopic adhesiolysis. No obvious pathology could be found in 8% (n=4) of the patients. Average duration of surgery in our study was 67.14 minutes with the average duration of hospital stay being 4.5 days. There was no mortality in our study.

1.4. Conclusion: Chronic abdominal pain is a common problem and even after extensive non-invasive work up of such patients, the exact cause of pain abdomen is seldom known. Diagnostic laparoscopy makes it possible for the surgeon to directly visualize the contents of the abdominal cavity better than any other investigative modality. Laparoscopy established the diagnosis in 86% of our patients. This study confirmed that in this difficult patient group, laparoscopy could safely identify abnormal findings and can improve the outcome in a majority of the cases.

2. Introduction

Chronic abdominal pain of unknown origin represents a significant challenge in surgical practice. Often, despite meticulous routine examinations and a battery of investigations, such patients remain undiagnosed, not revealing the cause of pain. The delay in arriving at an accurate diagnosis before treatment may inadvertently lead to a progress in the underlying disease and thus some patients are commonly subjected to treatment on the empirical lines [1]. A 2009 report in “Scientific American” indicated that 10–20% of the US and European populations experienced chronic pain; 59% of these individuals were women. Nearly 20% of adults with chronic pain indicated that they have visited an alternative medicine therapist. Many of them undergo exploratory laparotomy; some are put on anti-tubercular treatment, while females often end up taking

anti-androgens [2].

In many patients who present with chronic abdominal pain, blood tests, serological tests and even the modern imaging techniques fail to confirm any diagnosis. These investigations are often inconclusive as they only provide an indirect evidence of the underlying disease [3]. Besides the rural inaccessibility, the cost of these investigations adds to the financial burden of the patients, which becomes a crucial reason for their non-compliance [4].

Therefore, conclusive diagnosis in such patients is usually arrived upon by direct visualisation of abdominal cavity, obtaining tissue or ascitic fluid for histological confirmation, by means of an invasive intervention in the form of exploratory laparotomy or the recently evolving diagnostic laparoscopy [5, 6].

Needless to say, exploratory laparotomy continues to be favourable amongst a large number of surgeons owing to its ability to provide a direct visualisation of the abdominal viscera enabling a more thorough examination besides providing access for active intervention by means of surgery [7]. However, the continuous growth of Minimally Invasive Surgery has ushered in an era of surgical practices with reduced morbidity and mortality, thereby increasing the acceptance of diagnostic laparoscopy amongst general surgeons [4].

Diagnostic laparoscopy is fast becoming the investigation of choice in cases of chronic pain abdomen, owing to the increased use and familiarity of laparoscopic surgery and the need to reduce the incidence of negative laparotomies [8]. The word 'laparoscopy' has its origins in the Greek language, 'Lapara': 'flank' and 'Skopein': 'to see', thus literally meaning 'to see inside the part of the body from ribs to the groin'[9].

Jacobeus is believed to have performed the first laparoscopic procedure in humans in an ascitic patient for the early diagnosis of malignant lesions in 1910, perfecting the technique employed earlier by Kelling to perform the first 'peritonioscopy' in a dog in 1901 [10].

In 1949, Ruddock, considered to be the pioneer of laparoscopy, presented statistical data from 1,500 cases from a total of 2,500 cases of peritoneoscopy [11].

Prof Dr Med Erich Mühe, from Germany performed the first laparoscopic cholecystectomy [12].

Diagnostic laparoscopy has diagnostic as well as therapeutic use, avoiding unnecessary laparotomy in cases of diagnostic uncertainty and providing a wide range of possible interventions for the underlying cause, if needed, at the same time.

Diagnostic laparoscopy, in addition to giving a definitive diagnosis, reduces postoperative morbidity and hospital stay, hence is cost effective with same result as compared to open surgery.

2.1. Aims and Objectives

The purpose of this study was to determine the efficacy of diagnostic laparoscopy in the diagnosis and management of patients with chronic abdominal pain.

- To make a definitive diagnosis in cases of chronic non-specific pain abdomen.
- To assess the extent of the disease.
- To confirm the clinical and radiological findings in doubtful cases.
- To give effective relief to the patient wherever possible.

3. Material and Methods

The present study comprised of patients with nonspecific abdominal pain where other clinical symptoms and investigations were not conclusive, admitted in the Department of surgery at Government Medical College & Hospital Jammu, over a period of one year from November 2018 to October 2019, willing for diagnostic laparoscopy.

The study was done prospectively and all the patients' personal and demographic data, history regarding the site and aetiology of pain, as well as all the investigations previously performed on the patients were noted.

After admission, the patients were subjected to a detailed physical examination and all the routine investigations. This study included only the patients in whom no definite diagnosis could be made even after performing a battery of investigations including all the relevant radiological investigations.

There were no criteria of exclusion with respect to age or sex of the patient and a diagnostic laparoscopy was performed on patients across all age groups.

A total of 50 patients, who fulfilled the inclusion and exclusion criteria were included in this study.

Inclusion Criteria:

- Chronic abdominal pain in patients who had normal or inconclusive investigations
- Normal or inconclusive gynaecological examination.
- Ascites of unknown aetiology.
- Intra-abdominal lymphadenopathy of unknown aetiology.
- Surgical Jaundice.
- Sub-acute intestinal obstruction.
- Vague abdominal mass.
- Miscellaneous conditions.

Exclusion Criteria:

- Inability to tolerate pneumoperitoneum or general anaesthesia.
- Generalised peritonitis.
- Hemodynamic instability.

- Mechanical or paralytic ileus.
- Acute pain abdomen.
- Coagulopathy.
- Severe cardiopulmonary disease.
- Abdominal wall infection.
- Pregnancy.
- Massive Ascites.
- Patients undergoing some elective abdominal procedure in near future.

4. Observation

This study involving 50 patients was conducted in the Department of general surgery of our hospital from November 2018 to October 2019.This study was undertaken to evaluate the efficacy of diagnostic laparoscopy as an investigative modality in patients presenting with abdominal pain of duration more than 3 months. All 50 patients underwent Diagnostic Laparoscopy under General anesthesia after all the conventional investigations did not yield any proper diagnosis.

The peak incidence of chronic pain abdomen was in the third decade, 31-40 years (32%) followed by 21-30 years (24%). The youngest patient in our study was 12 years and the oldest patient being 82 years of age. The average age of presentation in this study was 34.21 years. The age wise distribution is given in (Table 1). The male to female ratio was 1:1.5 as shown in (Table 2). the duration of pain abdomen ranged from 3 to 9 months as shown in (Table 3).

Table 1: Age distribution of patients presenting with chronic pain abdomen

Age (In Years)	Number of Patients	Percentage (%)
<20	5	10
21-30	12	24
31-40	16	32
41-50	9	18
51-60	4	8
61-70	2	4
71-80	1	2
81-90	1	2
Total	50	100

Table 2: Sex Distribution of Patients Presenting With Chronic Pain Abdomen

Sex	No. of Cases	Percentage (%)
Male	20	c40
Female	30	60
Total	50	100

Table 3: Duration of pain in patients

Duration of Pain (Months)	Number of Patients	Percentage (%)
6-Mar	16	32
9-Jul	13	26
12-Oct	3	c6
13-15	4	8
16-18	6	12
19-21	4	8
22-24	3	6
>24	1	2

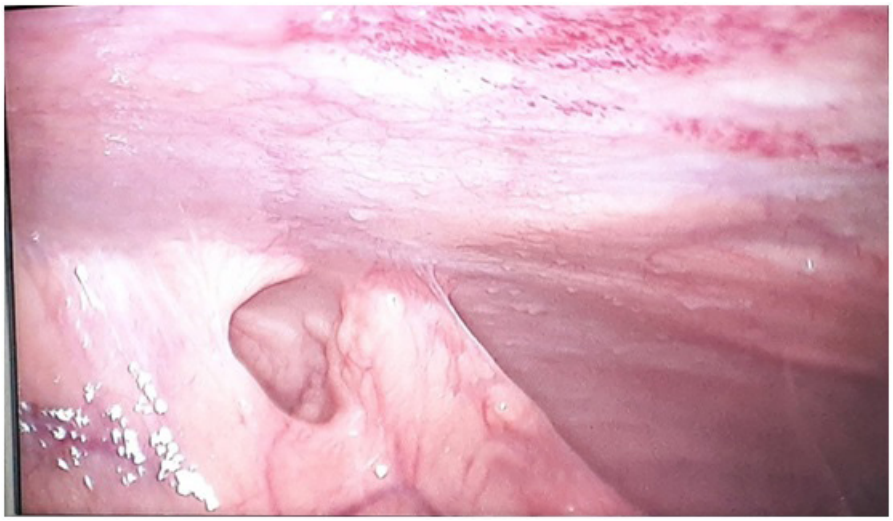

Figure 1: Adhesions with Peritoneal Tubercles

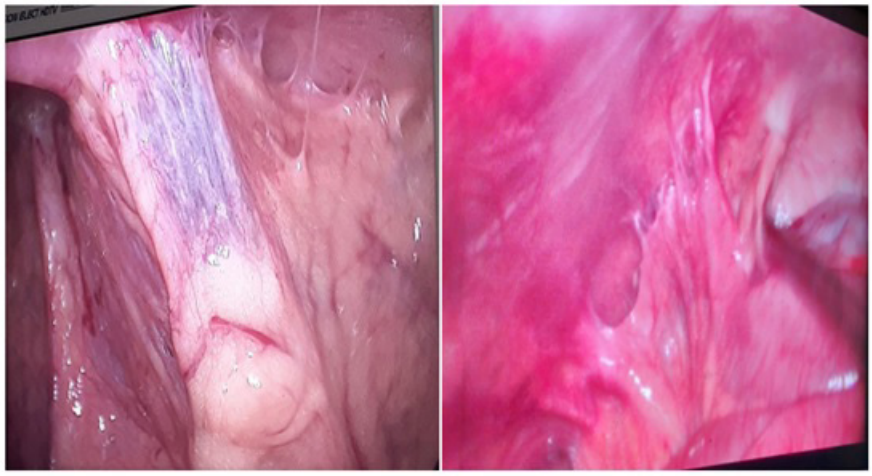

Figure 2: Post-Operative Adhesions

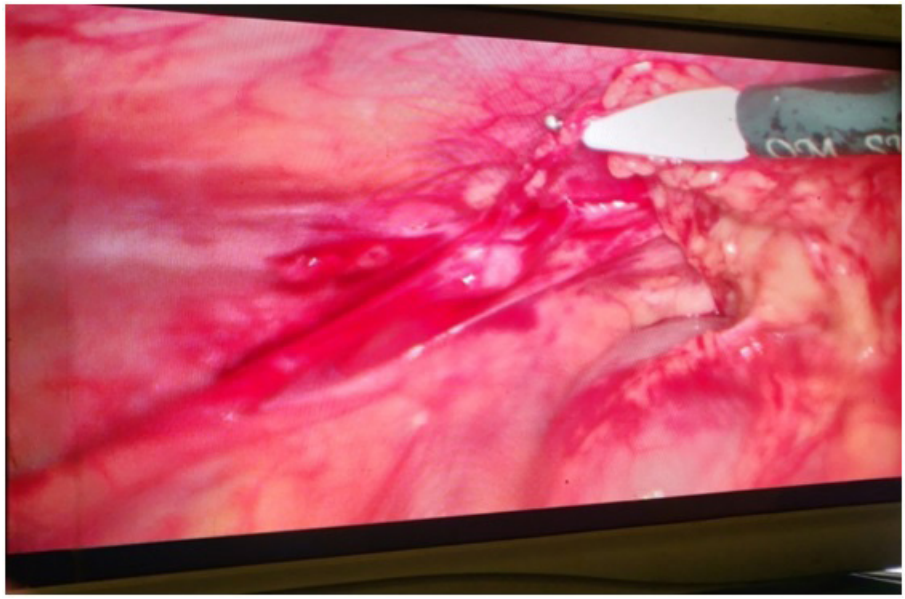

Figure 3: Adhesiolysis

The majority of the patients presented with periumbilical region pain (36%). It was followed closely by lower abdomen pain (32%), mostly in the right lower quadrant. This distribution is shown in (Table 4).

Around 8 (16%) of the patients in our study had undergone a previous surgery compared to 42 (84%) of them without any history of abdominal surgeries as shown in (Table 5).

There were a total of 14 (28%) patients who presented with tenderness in either of the abdominal quadrants, mostly in the right lower quadrant of abdomen. This is shown in (Table 6).

The most common finding was Chronic fibrotic appendicitis, present in 17 (34%) of the patients. This is depicted in (Table 7). The next most common finding at laparoscopy in our study was adhesions causing chronic pain 11 (22%). Most of the patients in this group were females and had a past history of abdominal surgery, appendectomy in 4 cases, hysterectomy in 2 cases, tubectomy in 1 and LSCS in 1 patient.

Seven patients showed features suggestive of tuberculosis with 4 (8%) of the patients showed the presence of tubercles suggestive of tubercular aetiology, biopsy and histopathology proved tuberculosis as the cause in 3 patients, and ATT was started post operatively. Diagnosis of tubercular strictures was made in 3 (6%) patients.

5 (10%) of the patients had lymphadenopathy, most common site being the mesenteric lymphadenopathy (8%). 1 (2%) patient had enlarged iliac lymph nodes. Biopsy was taken in all these cases.

We did laparoscopic cholecystectomy for 2 of our patients. HPE confirmed findings of chronic cholecystitis in both the patients.

5 (10%) patients were diagnosed with carcinoma per operatively. 2 patients had peritoneal deposits whose biopsy turned out to be metastatic Adeno-Carcinoma and 1 patient had metastatic deposits presenting as liver micro nodules.

Table 4: Location of pain

Region of Pain	Number of Patients	Percentage (%)
Upper Abdomen	6	12
Peri Umblical	18	36
Lower Abdomen	16	32
Diffuse Abdomen	10	20

Table 5: Patients with previous history of surgery

History of Surgery	Number of Cases	Percentage (%)
Present	8	16
Absent	42	84

Table 6: Clinical findings prior to diagnostic laparascopy

Clinical Finding	Number Of Patients	Percentage (%)
Tenderness	14	28
Vomiting	7	14
Abdominal Distension	7	14
Fever	6	12
Loss Of Weight/Appetite	4	8
Jaundice	3	6
Mass Abdomen	2	4
Hepatomegaly	2	4

Table 7: Findings after diagnostic laparascopy

Diagnosis	Number of Patients	Percentage (%)
Chronic/ Fibrotic Appendicitis	17	34
Adhesions/Bands	11	22
Tubercles/Strictures	7	14
Lymphadenopathy	5	10
Peritoneal Deposits	3	6
Ascites	3	6
Chronic Cholecystitis	2	4
Ovarian Cyst	1	2
Meckels Diverticulum	1	2
No Pathology	4	8

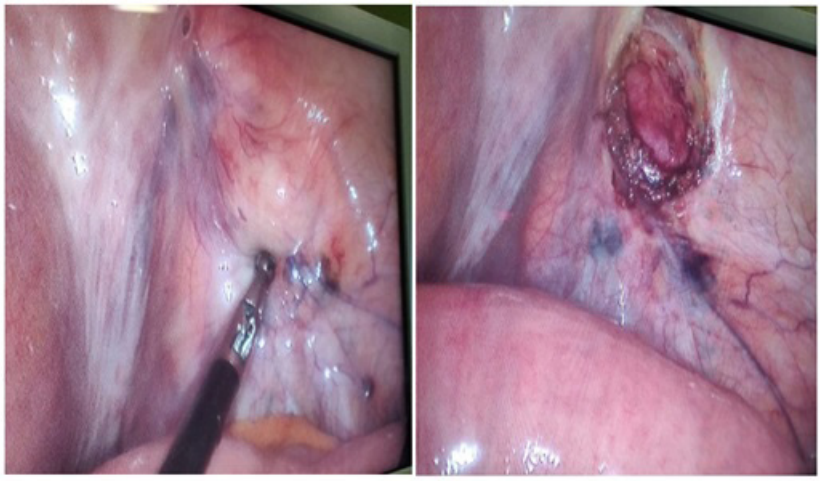

Figure 4: Enlarged Iliac Lymph Node with Biopsy Taken

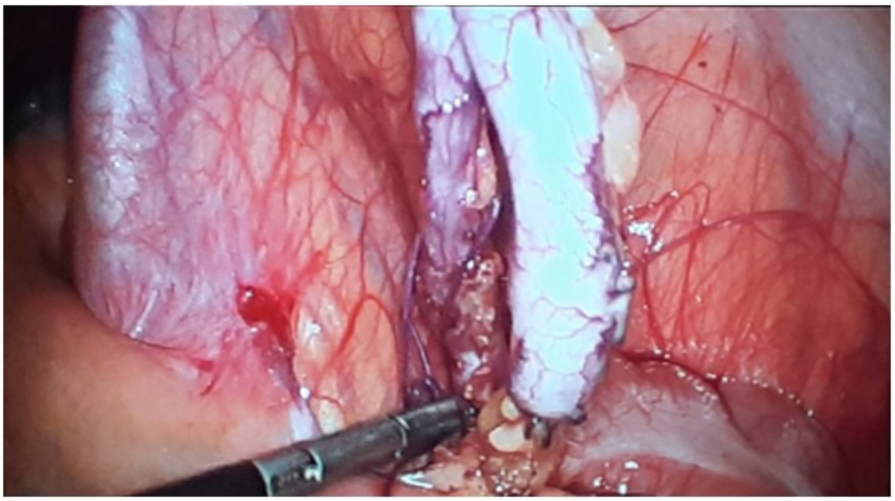

Figure 5: Chronic Fibrotic Appendicitis

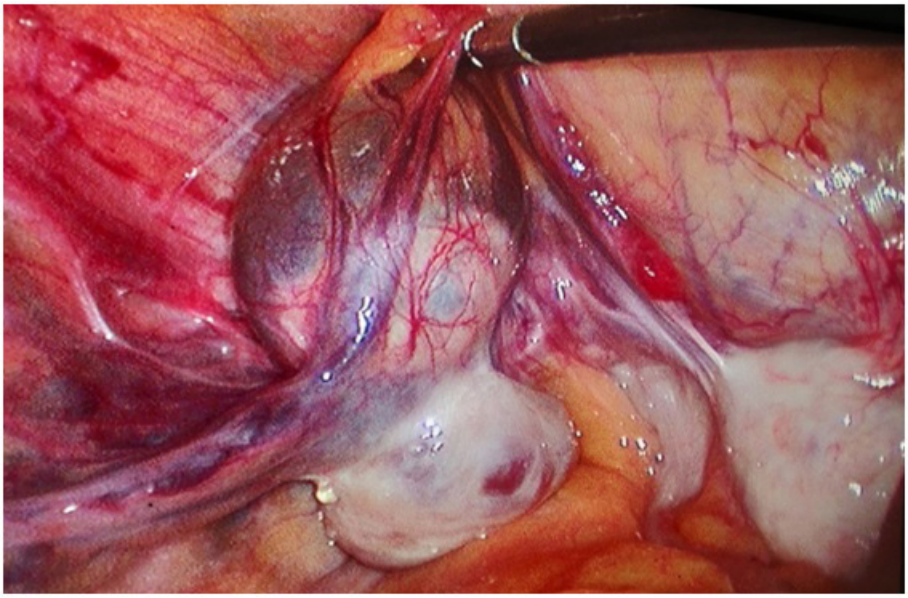

Figure 6: Post Hysterectomy Pelvic Adhesions with Concomitant Ovarian Cyst

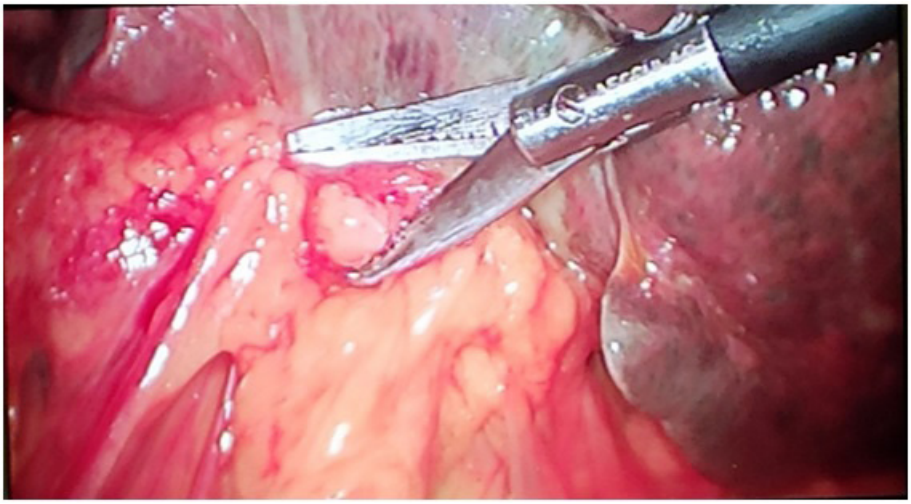

Figure 7: Chronic Cholecystitis with Adhesions

Meckel's Diverticulum was present in 1 (2%) patient who underwent extracorporeal wedge resection. No obvious organic cause was found in 4 (8%) patients, who still had a favourable outcome as they were spared a laparotomy as well as further investigations.

Overall, a diagnosis was made in 43 (86%) patients (Table 8), no organic cause was found in 4(8%) patients and histopathological evaluation returned inconclusive in 3(6%) patients.

Morbidity: 3(6%) patients developed surgical site infection which was managed conservatively by appropriate antibiotic cover and alternate day wound dressing. No mortality was encountered, during the hospital stay of patients, in our study group.

Postoperative hospital stay ranged from 3 to 11 days with a mean duration of stay of 4.5 days. The average length of the operative time was 67.14 minutes and 4 patients required conversion to an open procedure. All 4 cases were converted due to technical difficulties.

During the follow up period, all patients were re-evaluated for pain (Table no .9) The patients were reviewed at one month and two months post operatively. Subjective assessment of pain was done during the follow up and positive outcome (less pain or disappearance of pain) was noted and negative outcome (persistence of pain or worsening pain) was also noted. 5 patients were lost to follow up at the one-month time frame and 2 patients expired during follow up.

Table 8: Tissue diagnosis

Specimen	Number	Hpe Diagnosis	Number
Appendix	18	Chronic Fibrotic Appendicitis	16
		Inconclusive	2
Gall Bladder	2	Chronic Acalcular Cholecystitis	2
Tubercles	4	Tuberculosis	3
		Inconclusive	1
Mesenteric Lymph Nodes	4	Tuberculosis	3
		Inconclusive	1
Illiac Lymph Node	1	Metastatic Adenocarcinoma	1
Peritoneal Deposits	3	Carcinomatosis Peritoneii	2
		Lymphoma	1
Liver Nodules	2	Metastatic Adenocarcinoma	1
		Inconclusive	1
Omentum	2	Chronic Nonspecific Inflammation	2

Table 9: Pain relief during follow up

Duration (In Months)	Positive Outcome (%)	Negative Outcome (%)
1	77	23
2	71	29

Figure 8: Aspiration of Ascitic Fluid For Histo-Pathological And Biochemical Analysis

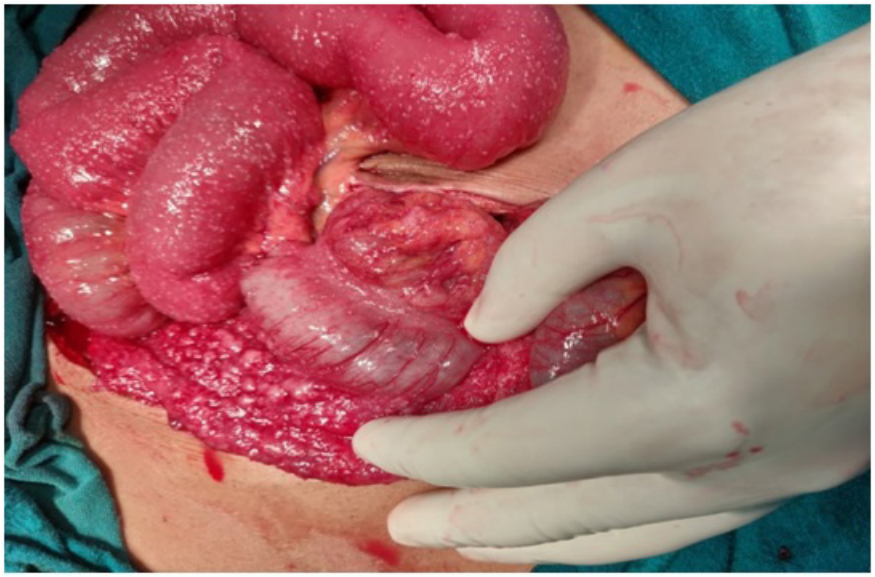

Figure 9: Omental Tubercles with Short Segment Bowel Stricture (Post Conversion To Open Surgery)

Figure 10: Extra-Corporeal Delivery Of Meckel's Diverticulum Followed By Wedge Resection

5. Discussion

In our study, maximum number of patients was in the age group of 31- 40 years of age accounting for 32% of cases. TABLE 10 depicts the Comparison of average age in each study. All these studies are consistent with our finding, that the maximum number of patients suffering from chronic abdominal pain belongs to the third decade of life.

There was female preponderance to chronic pain abdomen, with a male to female ratio of 1:1.5. El Labban GM and Hokkam EN (2010) also reported that the maximum number of patients with chronic pain abdomen were females, comprising of 60% of the total cases [12].

Similarly, Rathod A et al (2015) [4], Ahmed MM et al (2014) [15], Arya PK and Gaur KJBS (2014) [2] and Al Akeely MH (2006) [17] in their studies showed a female preponderance. Kumar S et al (2017) however, noted a majority of male patients in their study comprising of 50 patients, with a male is to female ratio of 1: 1.5.[18] Comparison of sex distribution of patients has been tabulated in table no 11

The most common location of pain in our study was in the periumbilical region, present in 18 (36%) patients, followed by pain in the lower abdomen in 16 (32%) patients, pain in upper abdomen in 6 (12%) patients and diffuse abdominal pain present in a total of 10 (20%) patients. 32 % of the patients in our study reported pain of 3-6 months duration and 26% gave history of pain lasting for a period of 7-9 months.

Chaphekar AP et al (2016) in their study reported generalised abdominal pain in a total of 53.3% patients, whereas 30% of the patients had pain in the lower abdomen and 13.3% had upper abdominal pain [14]. El Labban GM and Hokkam EN (2010) documented 30% of the patients having pain in the periumbilical region followed by right lower quadrant pain in 23.3% patients. Maximum number of patients had pain lasting for more than 9 months

duration [12]. Rathod A et al (2015) in their study on 67 patients, reported 34.3% patients having pain in the periumbilical region and 32.8% patients having pain in the right lower quadrant [4] Ahmed MM et al (2014) reported that 28.4% patients had pain in lower abdomen, 23.8% patients suffered from pain in right lower abdomen and 21.5% patients complained of central abdominal pain [15].

Diagnostic efficacy refers to the ability of diagnostic laparascopy to identify an organic cause for the pain or to provide tissue diagnosis. In our study comprising 50 patients, laparoscopy identified pathology in 43 patients (86%). The overall diagnostic rate is 99% for acute abdominal pain, 70% for chronic pain syndrome, 95% for focal liver disorders, 95% for abdominal masses, 95% for ascites and 80% for retro peritoneal diseases.

Akeely MH (2006) was able to find the diagnosis in 33 out of 35 patients (94%). Tuberculosis was present in 45.7% cases, carcinomatosis peritoneii in 28.5% and lymphoma in 8.57% cases [17]. Nar AS et al (2014) obtained tissue diagnosis in a total of 102 patients (85%). 56.6% of them were benign whereas 43.4% were malignant after histopathological examination [16]. Chaphekar AP et al (2016) were able to find a diagnosis in 26 out of 30 patients (86.6%) in their study [14]. Arya PK and Kaur KJBS (2004) were able to find an organic cause in 90% cases, whilst performing diagnostic laparascopy on a total of 49 patients [2]. El labban GM and Hokkam EN (2010) showed the diagnostic efficacy of diagnostic laparascopy to be 83.3%. [12] Varghese S et al (2017) were able to make a diagnosis in all the patients included in their study (100%). [19] Miller K et al (1996) were one of the earliest proponents of using diagnostic laparascopy in the management of chronic pain abdomen, by demonstrating a diagnostic efficacy in 89.8% cases [20].

This study also showed that diagnostic laparascopy was very effective in making a definite diagnosis (86%) in patients with chronic abdominal pain. This allows the treating surgeon to formulate a definitive plan in the management of such patients and to pursue therapeutic procedures to alleviate pain in all the possible cases. Comparison of Diagnostic Efficacy has been tabulated in (Table 12).

Diagnostic laparoscopy should, therefore, be used with increasing frequency when a tissue diagnosis is needed.

Table 10: Comparison of average age incidence

Study	YEAR	Average age (in years)
Nar AS *et al*	2014	55
Varghese S *et al*	2017	47.7
Al Akeely MH	2006	45
Raymond *et al*	2003	42
Sunesh Kumar	2017	41
Klingensmith *et al*	1996	39
Arya PKand Gaur KJBS	2004	37.5
El- Labban GM and Hokkam EN	2010	36
Pradeep Saxena	2016	35
R. G. Naniwadekar *et al*	2016	34.5
Chaphekar AP *et al*	2016	34
Anil Rathod *et al*	2015	33.5
Thanaponsathron *et al*	2005	27.5
Mir Mujtaba Ahmad *et al*	2014	26
Present study	2019	34.21

Table 11: Comparison of sex distribution of patients

STUDY	YEAR	TOTAL PATIENTS	MALE (%)	FEMALE (%)
Arya PK and Gaur KJBS	2004	49	32.66	67.34
Paajanen H *et al*	2005	72	16.67	83.33
Al Akeely MH	2006	35	31	69
El Labban GM Hokaam EN	2010	30	40	60
Ahmed MM *et al*	2014	88	33	67
Anil Rathod *et al*	2015	67	32.43	67.57
Pradeep Saxena	2016	142	41.55	58.45
Chaphekar AP *et al*	2016	30	43.33	56.67
Naniwadekar RG *et al*	2016	50	48	52
Kumar S *et al*	2017	50	60	40
PRESENT STUDY	2019	50	40	60

Table 12: Comparison of Diagnostic Efficacy

STUDY	YEAR	TOTAL PATIENTS	DIAGNOSTIC EFFICACY (%)
Varghese S *et al*	2017	60	100
Pradeep Saxena	2016	142	95.77
Al Akeely MH	2006	35	94
Nar AS *et al*	2014	120	93.3
Arya PK Gaur KJBS	2004	49	90
Miller K *et al*	1996	59	89.8
Rathod A *et al*	2015	67	89.6
Sayed ZK *et al*	2015	55	89.1
Schrenk P *et al*	1994	92	87
Chaphekar AP	2016	30	86.6
Raymond *et al*	2003	70	85.7
Ahmed MM *et al*	2014	88	85.2
Sunesh Kumar	2017	50	85
El Labban GM Hokkam EN	2010	30	83.3
Naniwadekar RG *et al*	2016	50	82
Moussa and Mahfouz	2004	50	78.6
Salky BA *et al*	1998	265	76
PRESENT STUDY	2019	50	86

No abnormality was found in 4 patients (8%) who were just observed without any intervention. All the above-mentioned studies clearly show that a definite causative pathology was found in a majority of cases, and in only a few patients, the cause still eluded the prying eyes of the surgeon. Although, no abdominal cause for pain could be ascertained in these patients, these patients were nonetheless spared further investigations and invasive procedures like exploratory laparotomy. All of them received psychotherapy and were observed during follow-up.

Miller K et al (1996) reported finding no abnormality in 6 out of 59 (10.7%) cases [20]. Rathod A et al (2015) performed diagnostic laparoscopy on a total of 67 patients, and found no pathology in 7 (10.4%) patients [4]. Whereas, Naniwadekar RG et al (2016) [6] were not able to find an organic cause in as many as 18% cases, Varghese S et al (2017) had no (0%) normal findings in their study of 60 patients [19].

All these studies are consistent with our study proving that a definitive diagnosis can be achieved in a majority of cases. Table no 13 shows Comparison of Normal Study during Laparoscopy.

Schrenk P, et al (1994) in their study on 92 patients with chronic abdominal pain, reported appendicitis in a total of 32.2% cases [21]. Miller K, et al (1996) in their study involving 59 patients, found appendicitis as the leading cause in a total of 40.67% cases [20]. Arya PK and Gaur KJBS (2004) performed diagnostic laparoscopy on 49 patients and observed appendicitis as the leading cause in 26.5% cases [2]. Ali SAS, et al (2013) performed diagnostic laparoscopy on a total of 60 patients and the most common diagnosis was inflamed appendix in 18 (30%) patients [22]. Ahmad MM, et al (2014) in their study of 88 patients with chronic nonspecific abdominal pain showed that a total of 32.9% cases involved appendicular pathology [15]. Rathod A, et al (2015) in their study on 67 patients, found chronic appendicitis in 20.9% cases [4]. Karvande R, et al (2016) reported in a single centre prospective study done on 63 patients with chronic abdomen pain, the most common finding as chronic appendicular pathology, which was present in 56.1% patients [23]. Dhaigude BD, et al (2016) reported in their prospective study of 75 patients undergoing diagnostic laparoscopy for evaluation of chronic abdominal pain, the most common cause as chronic appendicitis. In this study 37 (49.33%) patients who underwent appendectomy for chronic abdominal pain had resolution of pain [24]. Varghese S et al (2017) in their study on 60 patients reported appendicitis as the second most common cause, present in 30% of cases [19]. Rao TU (2017) reported a descriptive study evaluating the role of diagnostic laparoscopy in 150 patients who had chronic abdominal pain showed peak prevalence of appendicitis, present in 80 (53.3%) cases [25]. Prasad S, et al (2017) also reported chronic appendicitis as the leading cause of chronic pain abdomen, present in a total of 15 out of 50 patients (30%) [26]. Sharma A, et al (2018) performed diagnostic laparascopy on 60 patients, presenting with chronic undiagnosed pain abdomen. Out of 60 patients, chronic appendicitis was present in 31(51.66%) patients [1] Chandak NU, et al (2019) performed diagnostic laparascopy on a total of 45 patients. On laparoscopic examination, maximum patients were found to have some appendicular pathology. 26 patients (57.8%) had elongated and inflamed appendix. 2 patients (4.4%) had appendicular lump and 1 patient (2.2%) had appendicular perforation [27].

All these studies are consistent with our finding that chronic fibrotic appendicitis is a major cause of chronic abdominal pain. Table no 14 shows comparison of major findings on diagnostic laparoscopy in different studies.

In our study of 50 patients, 8 patients had previous history of abdominal surgery. Although, in our study the proportion of patients with history of previous surgery was less than most of the earlier studies, it was consistent with the finding, that adhesions were the most common cause for chronic pain in all the patients having undergone surgery previously.

16% of the patients in our series were found to have intestinal adhesions secondary to a prior abdominal surgery, mostly appendectomy (in 4 patients). Some patients had a past history of hysterectomy (2), tubectomy (1), and one patient had a prior history of LSCS. Adhesions were present in a total of 22% (n=11) cases. 8 patients had previous history of surgery, 2 patients had adhesions present between an inflamed appendix with the surrounding bowel/parietal wall and 1 patient had adhesions present between Meckels Diverticulum and the anterior abdominal wall. Adhesiolysis was done as a therapeutic procedure.

Table 13: Comparison of Normal Study during Laparascopy

STUDY	NORMAL STUDY (%)
Naniwadekar RG *et al*	18
Labban GM and Hokkam EN	16.7
Schrenk P *et al*	16.24
Kumar S	15
Ahmed MM *et al*	14.7
Onders RP *et al*	14.2
Chaphekar AP *et al*	13.3
Miller K *et al*	10.7
Rathod A	10.4
Arya PK and Gaur KJBS	10.28
Paajanen H *et al*	8.3
Nar AS *et al*	6.7
Al Akeely MH	5.7
Saxena P	4.3
Sayed ZK	2.1
Varghese S *et al*	0
PRESENT STUDY	8

Saxena P (2016) in their study on 142 patients reported adhesions as a cause of abdominal pain in 21% of cases [3]. Kumar S et al (2017) found adhesions in 22% of cases, in their study involving 50 patients [18]. Naniwadekar RG et al (2016) in their study involving 50 patients with chronic abdominal pain found adhesions in 23.3% cases [6]. Sayed ZK et al (2015) in their study on 55 patients with chronic pain abdomen showed the presence of adhesions in 38.2% of cases. 70% of these had history of previous surgery [28]. Schrenk P et al (1994) in their study on 92 patients with chronic pain abdomen, showed the presence of adhesions in 38.7% cases [21]. Lavonius M et al (1999) in their study of laparoscopy for chronic abdominal pain in 46 patients reported postoperative adhesions in 63% of cases. 77% of patients who had undergone adhesiolysis considered the result good or beneficial [29]. Klingensmith ME et al (1996) performed diagnostic laparoscopy in their study involving 34 patients, 56% of them underwent adhesiolysis [30]. Ahmad MM et al (2014) in their study found adhesions in only 5.6% of the cases [15].

In our study of 50 patients, the most common cause was found to be chronic fibrotic appendicitis in 17 (34%) patients, followed by adhesions/bands in 22% patients, tubercles/strictures (14%), lymphadenopathy (10%), peritoneal deposits (6%), ascites (4%), chronic cholecystitis (4%), ovarian cyst (2%) and Meckel's diverticulosis (2%).

We performed therapeutic procedures such as appendectomy in 18 (36%) patients, adhesiolysis in 10 patients (20%), cholecystectomy in 2 (4%) patients. Lymph node biopsy was taken in 16 (32%) patients and ascitic fluid was aspirated for histopathological and biochemical analysis, in a total of 5 (10%) patients. No intervention was done in 4 (8%) patients.

Ahmad MM et al (2014) in their study reported the most common site of pain in lower abdomen (28.4%), mostly in the right lower abdomen (23%), followed by pain in the central abdomen (21.5%). This study comprised of 88 patients with chronic abdominal pain and demonstrated appendicular pathology as the leading cause (32.9%), followed by pelvic pathology (20.4%), tuberculosis (15.9%), mesenteric adenitis (4.5%), adhesions (5.6%), meckels diverticulum (1.1%) and lymphoma (1.1%) [15]. Saxena P (2016) in his study of 145 patients, diagnosed abdominal tuberculosis in 47 patients (32.4%), followed by adhesions/bands (21%), chronic appendicitis (14.78%), adenocarcinoma (2.8%) and strictures (2.11%) [3]. Appendectomy was performed in a total of 27 cases and laparascopic adhesiolysis/ band excision was done in 30 cases. Sayed ZK et al (2015) in their study on 55 patients reported adhesions in 21 patients (38.2%), followed by tuberculosis (21.8%) and chronic appendicitis (14.5%). This study entailed adhesiolysis in (43.6%) patients, appendectomy (14.5%), cholecystectomy (1.8%) and cyst aspiration (1.8%) [28]. Kumar S et al (2017) conducted a study on 50 patients and found adhesions causing chronic short bowel obstruction in 22% cases, followed by tuberculosis (19%), carcinoma (2%) and gall bladder pathology (1%).[18] Rathod A et al (2015) in their study on 67 patients, reported the most common cause of chronic abdominal pain was adhesions (43.3%), followed by chronic appendicitis (20.9%), tuberculosis (11.9%), endometriosis (4.5%), adenitis (3%), salpingitis (3%) and Meckel's diverticulum (3%) [4]. Naniwadekar RG (2016) conducted a study on 50 patients with chronic pain abdomen and reported abdominal tuberculosis as the most common finding (29.2%). Other findings included adhesions (23.3%), Meckel's diverticulosis (14.6%), appendicitis (9.7%) and retroperitoneal lymphadenopathy (7.3%). Biopsy was taken for tissue diagnosis in 20% of cases [6]. Varghese S et al (2017) in their study on 60 patients subjected to diagnostic laparoscopy, reported adhesions as the major cause of chronic abdominal pain (40%), followed by chronic appendicitis (30%), tuberculosis (13.33%) and gall bladder mass (6.66%). Adhesiolysis was done in 40% cases, appendectomy in a total of 30% and cholecystectomy in 1.66% cases [19]. El labban GM and Hokkam EN (2010) performed diagnostic laparoscopy on 30 pa-

tients and found adhesions in 19 (63.3%) patients, followed by chronic appendicitis (10%); hernia, gall bladder pathology and mesenteric lymphadenopathy in 3.3% cases each. In this study, they performed adhesiolysis in 19 patients (63.3%), appendectomy in 3 (10%), hernia repair in 1 (3.33%), cholecystectomy in 1 (3.33%) and lymph node biopsy in 1 (3.33%) patient [12]. Arya PK and Gaur KJBS (2004) in their study on 49 patients, reported abdominal tuberculosis in 14 (28.5%) patients, chronic appendicitis in 13 (26.5%) patients, adhesions in 4 (8.16%) patients, genitor-urinary tuberculosis in 5 (10.2%) patients, PID in 3 (6.12%) patients, endometriosis and uterine fibroid in 2 (4.08%) patients each and jejunal diverticulosis in 1 (2.04%) patient. Appendectomy was performed in 13 (33.3%) cases, peritoneal/ omental biopsy in 12 (24.49) cases, adhesiolysis in 4 (8.16%) cases and pelvic fluid study in 7 (14.28%) cases [2]. Chaphekar AP et al (2016) in their study on 30 patients, reported abdominal tuberculosis as the leading cause of chronic pain abdomen in 13 (43.3%) patients, adhesions and chronic appendicitis in 5 (16.66) patients each followed by PID, ovarian cyst and Meckel's diverticulosis in 1(3.33%) patient each. In this study, biopsy was taken in 13 (43.3%) cases, followed by adhesiolysis (16.6%), appendectomy (16.6%), pelvic fluid aspiration (6.6%) and resection of mackles diverticulum (3.3%) [14]. Nar AS et al (2014) performed a study on 120 patients and demonstrated disseminated carcinomatosis in 28 (23.3%) patients, tuberculosis in 23 (19.16%) patients, lymphoma in 17 (14.16%) patients, followed by benign liver cyst in 9 (7.5%), liver cirrhosis in 8 (6.66%), adhesions/band in 7 (5.83%), benign ovarian cyst in 5 (4.16%) and chronic appendicitis in 3 (2.5%) patients each [16]. Al Akeely MH (2006) in their study on 35 patients, showed benign pathology in 19 (54.3%) patients and malignant pathology in 14 (40%) patients. Tissue diagnosis confirmed tuberculosis in 16 (45.7%) patients, carcinomatosis peritonei in 10 (28.6%) patients, lymphoma in 3 (8.6%) patients, liver cirrhosis in 2 (5.7%) patients, hepatocellular carcinoma in 1 (2.9%) patient and Crohn's disease in 1 (2.9%) patient [17]. Table No 15 depicts comparison of Past History of Abdominal Surgeries

Table 14: Comparison of major findings on diagnostic laparascopy

STUDY	YEAR	CHRONIC APPENDICITIS (%)	ADHESIONS (%)	TUBERCULOSIS (%)
Schrenk P *et al*	1994	32.25	38.7	-
Miller K *et al*	1996	40.67	44	-
Onders RP *et al*	2003	7.14	55.7	-
Arya PK and Gaur KJBS	2004	26.5	8.2	38.7
El Labban GM and Hokkam EN	2010	10	63.3	3.3
Ali SAS et al	2013	30	10	26.6
Hussain M *et al*	2013	15.3	19	17.3
Nar AS *et al*	2014	3	8.4	19.16
Ahmed MM *et al*	2014	32.9	12.5	15.9
Sayed ZK *et al*	2015	14.5	38.2	21.84
Rathod A *et al*	2015	20.9	43.3	11.9
Chaphekar AP *et al*	2016	16.67	16.67	43.33
Naniwadekar RG	2016	9.7	33.8	29.2
Saxena P	2016	14.8	21	32.4
Dhaigude BD *et al*	2016	49.33	16	6.75
Karvande R *et al*	2016	56.1	21.2	19.7
Abdullah MT *et al*	2016	31.5	28.8	17.8
Varghese S *et al*	2017	30	40	13.33
Rao TU	2017	53.33	8	6.6
Prasad S *et al*	2017	30	11	22
Kumar S *et al*	2017	10	22	19
Sharma A *et al*	2018	51.6	20	6.66
Chandak NU *et al*	2019	57.8	11.7	6.7

Table 15: Comparison of Past History of Abdominal Surgeries

Study	No. of patients with Prior surgery (%)
El- Labban GM and Hokkam EN	56.6
Sayed ZK *et al*	54.5
Nar AS *et al*	33.3
Varghese S *et al*	31.6
Chaphekar AP *et al*	30
Kinnaresh Ashwin Kumar Baria	22
Present study	16

77% of the patients, in our study, reported a significant relief in their pain after 1 month of follow up, proving that diagnostic laparoscopy not only finds a definitive cause in most of the cases but also provides opportunities for therapeutic interventions in the same setting, which prove to be beneficial for patients suffering from chronic abdominal pain.

The average duration of the procedure in our study was 67.14 minutes. 4 patients underwent laparotomy whereas in 1 case, diagnostic laparoscopy was followed by extra-corporeal wedge resection of Meckel's diverticulum. No intervention was done in 5 cases. Post-operatively, the patients stayed hospitalised for duration of 3-11 days, with an average duration of 4.5 days.

Kumar S (2017) reported that the average duration of the procedure ranged from 20-90 minutes and the patients remained hospitalised from 1 to 3 days. Rathod A et al (2015) in their study on diagnostic laparoscopy reported the mean operating time of 49.73 minutes. Naniwadekar RG (2016) reported in their study, an average stay at the hospital of 4 days. 4 (8%) cases in this study were converted to open surgery. Varghese S et al (2017) had to convert 6 (10%) cases from laparascopy to open surgery due to technical difficulties. El Labban GM and Hokkam EN (2010) had no conversion to open surgery in their study. The average duration of the procedure was 58.7 minutes (30-120 minutes). Post operatively, patients stayed at the hospital from 2 to 9 days, with an average duration of 3.6 days. Arya PK and Gaur KJBS (2004) reported the average duration of the procedure around 30 minutes, with the patients remaining hospitalised from 1 to 4 days (average 2.5 days). Al Akeely MH (2006) in his study on 35 patients, reported mean operating time of 34 minutes. An additional 18 minutes were taken in the 2 cases which required conversion to open surgery. Miller K et al (1996) performed 66 laparoscopic treatments on 59 patients. All 66 attempted laparoscopic procedures were completed successfully. No conversion to laparotomy was necessary, and no postoperative complication occurred. Table no16 shows Comparison of Subjective Pain Relief after Diagnostic Laparoscopy.

Table 16: Comparison of Subjective Pain Relief after Diagnostic Laparoscopy

STUDY	PAIN RELIEF (%)
Miller K *et al*	89.8
Chaphekar AP *et al*	86.6
Zaffer KS	80.4
Moussa G *et al*	80.2
Labban GM and Hokkam EN	80
Paajanen H *et al*	79
Varghese S *et al*	72
Raymond *et al*	71.4
Onders RP *et al*	70
Lavonius M *et al*	60

All these studies are consistent with our study proving that diagnostic laparascopy is an effective and fast investigative modality, which allows the patient to resume daily activities at the earliest, with the least number of complications and almost negligible morbidity.

Therefore, diagnostic laparoscopy should be amongst the first line of management tools for patients with chronic abdominal pain.

6. Conclusion

Chronic abdominal pain is a common problem dealt not only by the general surgeon but by all practicing physicians. This study confirmed that in this difficult patient group, laparoscopy could safely identify abnormal findings and can improve the outcome in a majority of the cases. The most common finding at laparoscopy in our study was chronic fibrotic appendicitis (34%), followed by adhesions and bands causing chronic short bowel obstruction in 22% of cases. 14% of patients had tubercles or strictures of tubercular origin. In our study 36% of patients underwent appendectomy, 20% had laparoscopic adhesiolysis. No obvious pathology could be found in 8% (n=4) of the patients.

Average duration of surgery in our study was 67.14 minutes with the average duration of hospital stay being 4.5 days. There was no mortality in our study. Laparoscopy established the diagnosis in 86% of our patients. Therapeutic intervention done at the time of diagnosis relieved 71% of patients of their pain at the end of two months.

Laparoscopy has an effective diagnostic accuracy and therapeutic efficacy in the management of patients who present with chronic abdominal pain, especially in whom conventional methods of investigations have failed to elicit a cause for the pain or are unequivocal. Laparoscopy is safe, quick and effective modality of investigation for chronic abdominal pain. Laparoscopy prevents unnecessary laparotomy in a significant number of cases.

Diagnostic laparoscopy has a definitive role in the management of patients with chronic pain abdomen and should be an important investigative tool in the routine practice of all surgeons.

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