“ROLE OF DIAGNOSTIC LAPAROSCOPY IN CHRONIC ABDOMINAL PAIN WITH UNCERTAIN DIAGNOSIS - A ONE YEAR CROSS SECTIONAL STUDY AT KLES DR. PRABHAKAR KORE HOSPITAL AND MRC, BELAGAVI”

By

REG.NO. BH0115002

Dissertation

Submitted to the
KLE University, Belagavi, Karnataka

In Partial Fulfillment
of the requirements for the degree of

M. S.
in
GENERAL SURGERY

DEPARTMENT OF SURGERY,
JAWAHARLAL NEHRU MEDICAL COLLEGE,
BELAGAVI, KARNATAKA

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ENDORSEMENT BY THE HOD/PRINCIPAL/ HEAD OF THE INSTITUTION

This is to certify that the dissertation entitled **"ROLE OF DIAGNOSTIC LAPAROSCOPY IN CHRONIC ABDOMINAL PAIN WITH UNCERTAIN DIAGNOSIS - A ONE YEAR CROSS SECTIONAL STUDY AT KLES DR. PRABHAKAR KORE HOSPITAL AND MRC, BELAGAVI"** is a bonafide research work done by **CANDIDATE REG. NO. BH0115002**.

Dr. S. S. SHIMIKORE MS
Professor and Head,
Department of Surgery,
J. N. Medical College,
Nehru Nagar, Belagavi – 10

Date:
Place: Belagavi

Dr. N. S. MAHANTSHETTI MD
Principal,
J. N. Medical College,
Nehru Nagar, Belagavi – 10

Date:
Place: Belagavi

LIST OF ABBREVIATIONS USED

/Min	-	Per minute
^{0}C	-	Degree centigrade
ANOVA	-	Analysis of variance
BP	-	Blood pressure
BUN	-	Blood urea nitrogen
CAP	-	Chronic abdominal pain
CD	-	Crohn's disease
CPP	-	Chronic pelvic pain
CT	-	Computed tomography
cumm	-	Cubic millimeters
DOA	-	Date of admission
DOD	-	Date of delivery
DOS	-	Date of surgery
e.g.,	-	For example,
etc.	-	Et cetra
FAPS	-	Functional abdominal pain syndrome
GI	-	Gastrointestinal tract
gm%	-	gram percent
GORD	-	Gastro-oesophageal reflux disease
HB	-	Haemoglobin

i.e.,	-	That is,
IBD	-	Inflammatory bowel disease
IBS	-	Irritable bowel syndrome
Kg	-	Kilogram
LFT	-	Liver function test
LSCS	-	Lowe segment caesarean section
mg/dL	-	Milligram per deciliter
mm of Hg	-	Millimeters of mercury
mm	-	Millimeters
MRI	-	Magnetic resonance imaging
n	-	Total number
NBS	-	Narcotic bowel syndrome
NSAID	-	Nonsteroidal anti-inflammatory drugs
p	-	Probability
PID	-	Pelvic inflammatory disease
PR	-	Pulse rate
RBS	-	Random blood sugar
RR	-	Respiratory rate
TB	-	Tuberculosis
Temp	-	Temperature
TLC	-	Total leukocyte count

TREAT	-	Therapy Resource, Evaluation and Assessment Tool
TV	-	Television
UC	-	Ulcerative colitis
UCAP	-	Unexplained chronic abdominal pain
US	-	United States
USA	-	United States of America
USG	-	Ultrasound
VAS	-	Visual analog score

ABSTRACT

Background and objectives

Diagnostic laparoscopy, is a minimally invasive procedure that could potentially be diagnostic and also therapeutic for chronic undiagnosed abdominal pain. This study was aimed to evaluate the causes of chronic abdominal pain in undiagnosed patient on biochemical and radiological investigations and to study the outcome in terms of pain relief in such patients.

Methodology

This one year cross-sectional study was carried out in the Department of General Surgery, KLES Dr. Prabhakar Kore Hospital and Research Center, Belagavi. A total of 55 patients presenting with chronic abdominal pain (≥8 weeks) with uncertain diagnosis from January 2016 to December 2016 were studied.

Results

Most of the patients (65.45%) were females, and the male to female ratio was 1:1.89. The most common age group was 18 to 30 years (38.18%) and the mean age was 37.67±14.45 years. Most of the patients (65.45%) had duration of pain between 8 to 12 weeks and mean duration of pain was 10.80±2.78 weeks. Fever was present in 41.82% of the patients. Most of the women reported history of previous LSCS (5.45%) and 3.64% of the patients had history of hypertension. The most common surgical finding was adhesions (30.91%) followed by inflamed appendix (29.09%) and most common surgical procedure performed was adhesiolysis (30.91%) followed by appendicectomy (29.09%). The mean

VAS gradually reduced from 3.05±1.88 on Day 15 to 1.22±1.54 on Day 30, 0.47±1.02 on Day 45 and 0.25±0.78 on Day 60 This reduction was statistically significant ($p<0.001$).

Conclusion and interpretation

Adhesions and inflamed appendix are important causes of chronic abdominal pain. Furthermore Elective diagnostic laparoscopy in selected patients, offers excellent pain relief and an effective diagnostic modality in the management of patients with chronic abdominal pain.

Key words

Diagnostic laparoscopy; Chronic abdominal pain; Adhesions;

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INTRODUCTION

Pain is derived from the Latin word “Poena,” which means penalty or punishment. Chronic abdominal pain (CAP) is a condition in which the patient complains of a long term persisting pain that lasts for several months (>6 months) with the irritation of pain.[1] It still remains one of the leading clinical seceniour presenting to surgeons.[2]

The prevalence of the unspecified chronic abdominal pain is suggested by the epidemiological data to be around 22.9 per 1,000 person-years. Abdominal pain is a common complaint with cross-sectional data suggesting that up to 25% of adult populations have abdominal pain once in their life time.[3-5] The prevalence is equal across different age groups, ethnicities, and geographic regions.[6]

Chronic abdominal pain has a variety of different causes which requires prompt treatment, but all of them do not require exploration. Chronic Abdominal Pain (CAP) is a common complaint of patients seeking a primary care physician, it is one of the leading reason for referral to a gastroenterologist and the 4th frequent chronic pain syndrome in the general population, it represent about 13% of all surgical admissions.[2,7]

Chronic abdominal pain can be caused by a numerous etiologies ranging from organic to functional. Organic causes can be anatomical, physiological, metabolical, or can arise from the abdominal wall musculature, fascia, or nerves. Reaching a definitive diagnosis and prompt management is usually delayed because invasive investigations are frequently required to come to a conclusive diagnosis.[6]

Up until not very long ago, the abdomen cavity was called the "Pandora's Box" by surgeons; it was capable, on being opened, of throwing the biggest surprises at even the most seasoned surgeons.[3,8]

Abdominal pathology which may involve the bowel, peritoneum, lymph node or solid viscera may be the eminent cause for chronic abdominal pain. These patients tend to present with non-specific clinical features and remain a diagnostic dilemma for very long time. Imaging studies, biochemical and serological tests provide only indirect evidence of the underlying disease and many times remain inconclusive.[9-11]

Thus diagnosis of underlying pathology in chronic abdominal pain then is largely dependent on direct imagining of abdominal cavity and obtaining tissue or ascitic fluid for histological confirmation by laparoscopy. Although diagnostic laparoscopy is fast becoming acceptable in surgical practice its role in ascertaining the diagnosis of nonspecific abdominal pain needs to be validated by evidence base.[11]

Any laparotomy, performed for even a planned procedure used to be defensively labeled an 'Exploratory Laparotomy'. The operating surgeon would then have to deal with any problem that revealed itself. This, of course compromised on preoperative planning for procedures.[12,13]

However, in the last few decades there have been tremendous advances in imaging techniques, including ultrasound (US), computed tomography (CT) scan, magnetic resonance imaging (MRI); and Endoscopy. The need for an "exploratory"

laparotomy is not necessary, since the pathology can, in most cases be fully visualized in advance.[14]

Yet there are situations in which all the investigative modalities fail to come up with a diagnosis and the evaluation of chronic abdominal pain is one such area where diagnosis remain uncertain. Every surgeon is familiar with the persistent patient who keeps coming back for weeks, with a complaint of abdominal pain and all investigations carried out fail to come up with a diagnosis that will direct definitive treatment. Hence surgeon must then directly rely on visualization of the abdominal cavity with the eye, and haptic sensation, to come up with a diagnosis.[14] It has an abdominal incision which makes the patients less ambulatory due to pain, also it causes respiratory discomfort. It increases chances of wound infection, paralytic ileus. Diagnostic laparoscopy has become very much popular in present era as a solution to these problems.[11,14]

In the twentieth century, laparoscopy offers a simple, rapid, and safe method to evaluate and diagnose intra-abdominal diseases. Medical science is constantly thriving to peep into dark places of the body and to achieve such techniques that would bring perfection to diagnosis, since the days of Hippocrates. In making definite and reliable diagnosis of abdominal disorders over the past two decades, has firmly established it in the armamentarium of a general surgeon to perform this procedure safely lies the success of laparoscopy.[15,16] General surgeons are still reluctant to use this method of diagnosis as often as they can despite of all these. In the developing world, diagnostic and therapeutic laparoscopy has its most important application. Access to imaging devices like ultrasound, CT scan, magnetic resonance imaging (MRI) or Doppler is present in less than 20% of the population in the

developing world. In the minimally invasive exploration of selected patients with chronic abdominal disorders, whose diagnosis remains uncertain, despite exploring the requisite laboratory and imaging investigations like ultrasonography, CT scan, laparoscopy can be proved to be an important tool.[16,17] Chronic abdominal conditions are associated with poor quality of life and significant levels of depressive symptoms. About the prevalence, social burden, and suffering associated with chronic abdominal conditions, much is known. Laparoscopy is still an invasive procedure and is known to be noninvasive technology when diagnosis has reached such sophistication.[16,18] It must always follow careful clinical examination and its greatest value is in addition to other diagnostic aids.[16]

Overall, chronic abdominal pain is one of the commonest surgical presentation which leads to sufferings of the patients physically as well as psychologically. However, in many number of cases the cause of chronic abdominal pain remains undiagnosed despite of bio-chemical investigation and imaging techniques like USG, CT, MRI. In such cases diagnostic laparoscopy is of great value to achieve diagnosis.[19] However, studies are limited to establish the definite role of diagnostic laparoscopy in patients with chronic abdominal pain.[2,9-12,14,16,19] Hence considering the burden of chronic abdominal pain and the advantages offered by laparoscopy, the present study was undertaken to know the causes of chronic abdominal pain in undiagnosed patient on biochemical and radiological investigations at the same time to study outcome in terms of pain relief in such patients on follow up after elective diagnostic laparoscopy.

OBJECTIVES

The objectives of this study were;

Primary

- To know the causes of chronic abdominal pain in undiagnosed patient on biochemical and radiological investigations.

Secondary

- To study outcome in terms of pain relief in such patients on follow up after elective diagnostic laparoscopy.

REVIEW OF LITERATURE

Pain is derived from the Latin word “Poena” which means penalty or punishment.[1,2]

Abdominal pain represents one of the most important investigative challenges.

Abdominal pain is classified as acute or chronic based on an arbitrary cut-off of 12 weeks. Accurate understanding of medical history and a comprehensive physical examination is one of the important criteria to make a differential diagnosis of chronic abdominal pain. Nonetheless the cause remains unknown in 30% of cases.[20-22]

Chronic abdominal pain is defined as a condition in which the patient complains of a long term persisting constant pain that lasts for several months (>6 months) since the irritation of pain.[1]

Relevant anatomy

The abdomen is divided into nine quadrants as shown in the diagram below depending upon the lines and planes.

1. Epigastric
2. Right hypochondriac
3. Left hypochondriac
4. Umbilical
5. Right lumbar

6. Left lumbar
7. Hypogastric
8. Right iliac
9. Left iliac

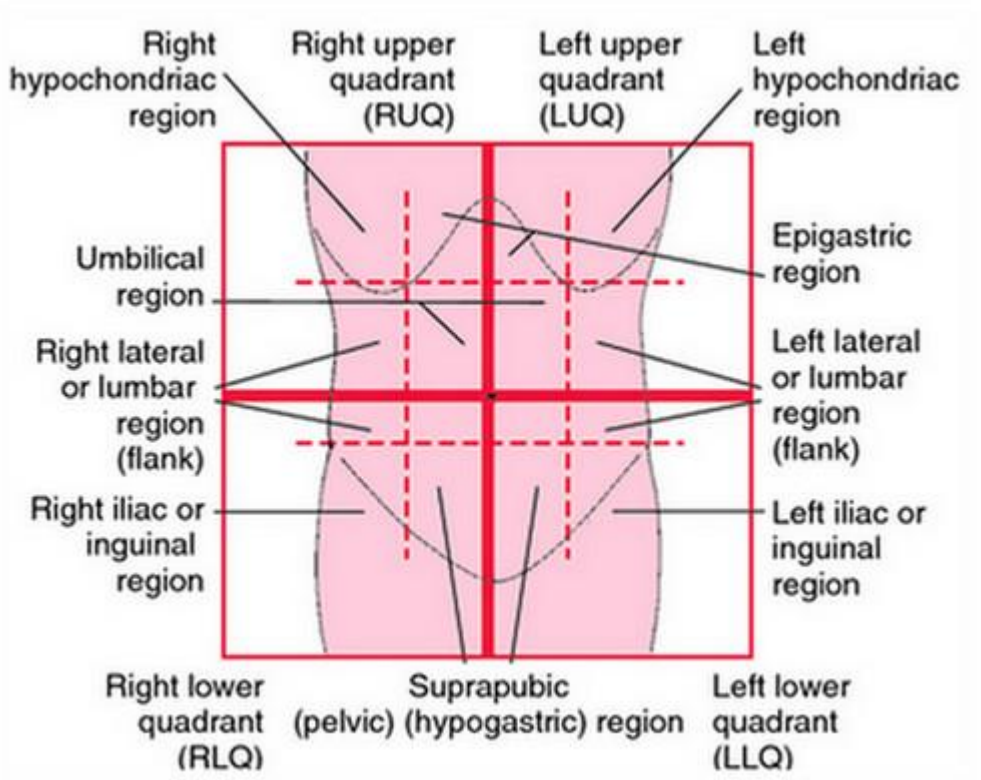


Figure 1. Abdominal quadrants[23]

Epidemiology

Chronic Abdominal pain (CAP) is a common complaint of patients seeking a primary care physician, it is a leading reason for referral to a gastroenterologist and the 4th frequent chronic pain syndrome in the general population, it represent about 13% of all surgical admissions.[7]

Every year atlest 1/3 of adult patients have an episode of abdominal pain which have been reported in some observational studies. The annual incidence of admissions to Emergency Departments for this symptom is 44/1000, whereas the hospital admission rate ranges between 18 and 42% depending on the studies.

An even more demanding challenge is managing geriatric patients: the admission rate of over 65s is as high as 63%, 20-33% require urgent surgical intervention , total mortality is between 2 and 13%.[24] Diagnostic errors can involve up to 70% of elderly patients.[22]

In 30% of cases a permanent diagnosis cannot even be made. The most common misdiagnosed causes are abdominal aneurysm, appendicitis, ectopic pregnancy, diverticulitis, bowel perforation, mesenteric ischemia and bowel obstruction.[22]

Despite the causes for acute abdominal pain can be >1000, about 80% of cases can be ascribed to acute appendicitis (26%), non specific abdominal pain (50%) and acute cholecystitis (8%).[22]

The prevalence of un specified chronic abdominal pain is suggested by the epidemiological data to be around 22.9 per 1,000 person-years. Abdominal pain is a common complaint with cross-sectional data suggesting that up to 25% of adult populations have abdominal pain once in their life time. The prevalence is equal across different age groups, ethnicities, and geographic regions. In a national, cross-sectional, telephone survey of US households, Sandler et al.[26] suggest that the prevalence of abdominal pain and discomfort was 22% overall, and 16% in individuals of age 60 and older. The same study suggests that women are more

likely to report abdominal pain than men. Other studies found that the overall frequency of abdominal pain and discomfort of more than six times per year was 21% in healthy individuals[27] and 24% in people of age 65 and older.[28] There is a wide range of variation in the reported prevalence of upper abdominal symptoms (mostly upper abdominal pain or discomfort) ranging from 8 to 54%.[29] The most likely explanation of the broad range in reported prevalence is variation in the definition of symptoms.[6]

Etiology and classification of Chronic Abdominal Pain

The following etiological classification may be practical and helpful for the evaluation of patients with chronic abdominal pain, although pain may arise from a vast number of causes in any system. [7]

BASED ON LOCATION[30]

I. Pain originating from the abdominal viscera (visceral abdominal pain)

GI tract: hollow organs

Oesophagus: Oesophagitis (e.g., Gastro-oesophageal reflux disease [GORD]); drug-induced (e.g., bisphosphonate, erythromycin); motility disorders (e.g., atypical achalasia); oesophageal cancer

Stomach: Chronic gastritis (e.g., Helicobacter pylori); drug/alcohol-induced; peptic ulcer disease; gastric cancer

Small bowel: Inflammation (e.g., Crohn's disease); drug-induced (e.g., aspirin, Nonsteroidal Antiinflammatory Drugs [NSAID]); subacute obstruction (e.g., volvulus, intussusceptions, Tuberculosis [TB] peritonitis), Meckels diverticulum, interloop adhesions

Large bowel: Inflammation (e.g., ulcerative colitis, Crohn's colitis, infectious gastroenteritis); subacute obstruction (e.g., volvulus, tumour); colorectal cancer, colonic adhesions.

GI tract: solid organs

Liver: Hepatocellular carcinoma, metastasis, abscesses, hepatic omental bands, Ladd's bands

Pancreas: Chronic pancreatitis, pancreatic cysts/pseudocysts

Gallbladder: Cholecystitis, cholelithiasis

Urogenital tract

Kidneys/ureter/bladder: Nephrolithiasis, pyelonephritis, perinephric abscess

Gynaecological diseases within the abdomen: endometriosis

Abdominal vasculature

- Chronic mesenteric ischaemia/intestinal ischaemia/abdominal angina
- Superior mesenteric syndrome

II. Pain referred from an extra-abdominal source (referred abdominal pain)

Pelvis

Chronic pelvic pain (CPP) (e.g., interstitial cystitis, endometriosis, adhesions, urethral syndrome, changes or dysfunction of the pelvic muscles)

Female genitalia and reproductive organs (e.g., Pelvic inflammatory disease [PID], endometriosis, ovarian cystic diseases, gynaecological malignancies).

Male genitalia and reproductive organs (e.g., prostatitis, prostate cancer, epididymitis, intermittent/recurrent torsion of testicle

Chest/thorax

- Lungs (e.g., malignancy)
- Pleura and chest wall

Musculoskeletal

- Abdominal wall (e.g., abdominal cutaneous nerve entrapment syndrome, abdominal wall hernia)
- Spine (e.g., radiculitis)

Neurogenic causes

- Herpes zoster

III. Systemic/metabolic causes

- Coeliac disease
- Lactose intolerance/lactase deficiency
- *Drugs*: narcotics, non-dihydropyridine calcium-channel blockers, vitamins, mineral supplements (e.g., iron, calcium, magnesium, and aluminum)
- *Porphyria*: acute intermittent
- *Heavy metal poisoning*: lead/arsenic poisoning
- Familial Mediterranean fever
- Paroxysmal nocturnal haemoglobinuria

IV. Functional GI disorders

- Irritable bowel syndrome
- Functional dyspepsia
- Functional abdominal pain syndrome

- Narcotic bowel syndrome

BASED ON PATHOPHYSIOLOGY

In addition to categorization by organ or system involvement, the underlying pathophysiology should also be considered.[30]

1. Mechanical obstruction

- Intestinal, urinary, or biliary tract obstruction usually presents acutely. Partial or intermittent obstruction may take longer to recognise and lead to chronic or recurrent abdominal symptoms.

2. Rupture of hollow viscera

- Usually associated with an acute presentation. However, small perforations with spontaneous sealing and resulting in the formation of local abscesses may lead to chronic abdominal pain.

3. Chronic inflammation

- Can lead to symptoms of chronic abdominal pain.
- Intestinal inflammation can involve different segments of the GI tract and be secondary to various aetiologies. Common examples are oesophageal inflammation due to gastro-oesophageal reflux, gastric inflammation due to Helicobacter pylori, and small and/or large bowel inflammation due to ulcerative colitis or Crohn's disease.
- Inflammatory processes involving other GI organs (e.g., pancreas, liver, gallbladder) and non-GI organs (e.g., urinary bladder and kidneys) should also be considered.

4. Ischaemia

- Reduction in intestinal blood flow (intestinal/mesenteric ischaemia) may be acute in onset with serious (and sometimes catastrophic) consequences; or it may be chronic, leading to chronic or recurrent GI symptoms.
- Chronic mesenteric ischaemia (sometimes also called intestinal angina) should be suspected in patients with the underlying atherosclerotic vascular disease and/or a smoking history who present with dull, crampy, upper/epigastric abdominal pain that usually appears within 1 hour after meals and subsides spontaneously over 2 to 3 hours. Other symptoms include nausea and vomiting, weight loss, and food aversion.
- Calcification of mesenteric vessels on radiography is suggestive, but further testing, including CT or MRI angiography and mesenteric duplex ultrasonography, are usually needed to confirm the diagnosis.

5. Drugs/medications

- Various drugs cause inflammation, injury, or even ulceration of the intestinal mucosa.
- Examples include oesophageal inflammation due to erythromycin or bisphosphonates, and gastric or small intestine inflammation due to chronic use of aspirin or NSAIDs.
- Certain drugs can cause abdominal symptoms, including pain, without overt inflammatory manifestations. Non-dihydropyridine calcium-channel blockers, such as diltiazem and verapamil, slow gut motility and lead to chronic constipation and pain. Common vitamin and mineral supplements, such as iron and calcium, can exacerbate constipation and abdominal pain, while

magnesium and aluminium, in high doses, can cause loose stools, occasionally with crampy pain.

- Chronic narcotic use, in addition contributing to chronic constipation, can contribute to visceral hyperalgesia or an over-sensitive bowel. Prolonged use of narcotics, especially short-acting agents, causes a "soar and crash" effect where temporary pain relief leads to a more sensitive intestinal tract and thus greater pain and escalating narcotic use. Chronic abdominal pain that occurs in the setting of chronic narcotic use, with or without escalating doses, and providing no relief of the pain, is known as narcotic bowel.

Chronic abdominal pain can be roughly divided into visceral, somatosensory, and functional. Visceral pain typically originates from deep and internal abdominal structures.

Visceral Chronic Abdominal Pain

Inflammatory Bowel Disease

Of the chronic abdominal pain etiologies, which are of a primarily visceral origin, the most common and most costly to our healthcare resources is that of infl ammatory bowel disease (IBD), specifically Ulcerative Colitis (UC) and Crohn's Disease (CD). Unfortunately, very limited data exist on tools that could help identify those patients with IBD that may go on to develop a chronic pain syndrome. Therefore, it is of particular importance to understand the current epidemiologic trends of the disease process itself, using a wealth of data currently available to researchers… IBD is an ongoing area of needed research as the past several decades have seen a rapid rise in incidence and shift in susceptible populations. Large

disparities are seen globally as changing worldwide demographics have seen a rise in areas previously believed to be resistant to disease.[6]

The incidence of IBD worldwide is generally thought to be in the range of 0.6–20.3/100,000 for Crohn's disease and 0.1–15.6/100,000 for Ulcerative colitis.[31] Such wide incidence range and high variability are due to a large disparity between geographical areas. Historically, believed to be a "westernized disease" or "urbanized disease," the highest IBD incidence rates are seen in North America, the United Kingdom, and northern Europe as compared to southern Europe, Asia, and Africa. In North America, incidence rates for IBD ranges from 2.2 to 14.3/100,000 with 3.1–14.6/100,000 cases of CD and 2.2–14.3 cases of UC diagnosed annually.[6]

In regards to gender prevalence, in UC, there is a male predominance; while in CD female, those gender differences appear to be decreasing.[31,32]

Breakdowns of racial and ethnic predispositions are another area that is continually changing. Historically, IBD was thought to be more common in Caucasians and people of Jewish descent, with lower rates in African-Americans and Asian Americans were documented. Data from urbanized areas of the United States have shown that disease rates amongst African-Americans and Caucasian populations are similar. Studies of migrant populations suggest that the ethnic and racial differences may be more related to lifestyle and environmental influences than true genetic differences.[31] In regards to potential risk factors identified for IBD are under current investigation which include cigarette smoking/tobacco use, diet, high stress occupations, sanitation and exposure to infection, gut flora, and oral contraceptives.[31,33,34] With a better understanding of the scope and makeup of the

IBD patient population, now shift our focus to a specific subset of this population, those patients who experience chronic abdominal pain. As IBD is a disease of chronic inflammation, it is not surprising that 50 to 70% of patients cite pain as their initial symptom, or as a prevalent symptom during exacerbations of their disease. What is surprising, however, is that up to 20% of IBD patients will report chronic pain, despite a clinical diagnosis of remission and negative endoscopic findings.[35] Up to 15% of them continue with opioid use for treatment of their chronic abdominal pain.[6] This is of particular importance, as studies have shown an increase in the morbidity and mortality of those patients which require chronic opioid use.[36]

Analysis from the Therapy Resource, Evaluation and Assessment Tool (TREAT) registry[36] showed that chronic use of opioids increased the risk of serious infections, possibly by decreasing gut transit, increasing bacterial growth within the gut, or masking early symptoms. Also, of concern with regards to chronic opioid use is the risk of narcotic bowel syndrome (NBS), risk of toxic megacolon, narcotic dependence, and masking of more serious complications, such as bowel perforation.[36,37] There is a limited data to identify those risk factors, or patients at a proportionally higher risk for chronic pain, or with need for ongoing opioid therapy. Edwards et al. found a high rate of preexisting psychiatric illness amongst IBD patients on chronic opiates (up to 67%).[37]

In a retrospective study of 291 CD patients over a 5-year period, Cross et al.[38] found that patients using chronic opioids were more likely to be female, at the higher rates of disability, a longer duration of disease, and were more likely to be active smokers.[38]

Finally, in a case–control study of 100 IBD patients, Hanson et al. found significant associations between chronic opioid use and female gender, two or more previous surgeries, higher rates of depression/anxiety, and a history of sexual, emotional, or physical abuse.[39] Again, as limited epidemiologic data are available it is difficult to make generalizations or truly make cause-effect relationships but it does identify a growing need for more data in this patient population.[6]

Chronic Pancreatitis

While not as common as IBD, chronic pancreatitis is an inflammatory condition that leads to progressive and irreversible destruction of tissue and has a significant impact on the quality of life of patients with ever increasing healthcare costs everywhere in the world. Epidemiologic studies regarding prevalence of chronic pancreatitis over the past several decades are few and not consistent. Given the natural history of the disease process, and constantly changing disease classification, clear comparison amongst patient groups is very difficult. In regards to the incidence and prevalence of the disease, it is rising.[6]

Most studies suggest the incidence of chronic pancreatitis to be around 3–14/100,000 in Europe, 6–7/100,000[40] in the United States,[41,42] and 5–6/100,000 in Japan.[43,44] The overall prevalence of the disease has been on the rise, with an increased incidence worldwide at 13–35 cases per 100,000.[41-44]

There is a great variability in peak age of onset of disease amongst the studies, but in general the mean age range when diagnosis is established is between 39.7 and 57 years of age.[40]

There is a marked disparity in disease prevalence between men and women, mostly related to a higher incidence of chronic alcoholism in men, with male to female ratios of 3:1. That may be direct consequence of majority, 68.5–91% of patients with chronic pancreatitis being men.[40,43,44]

In regards to etiology of disease, chronic alcohol use is the most common cause as 60–90% of cases can be related to alcohol.[45,46]

A recent study by Cote et al.[45] suggested that only 44.5% of causative etiology could be attributed to alcohol, and only 59.4% occurred in men. Smoking in particular has been identified as a potential major risk factor for developing chronic pancreatitis, as well as advancing the rate of progression.

The socioeconomic impact of chronic pancreatitis is of obvious concern. These patients who have a significantly poorer quality of life, require extended hospitalizations, and typically require chronic analgesia. According to current literature, 27–67% of patients with chronic alcoholic pancreatitis experience chronic pain, and as high as 80–90% of those patients report either chronic, or recurrent pain during the course of their illness.[47,48] In some of these cases the source of their pain is apparent, such as bile duct or duodenal stenosis, pancreatic fibrosis/inflammation, or intra-pancreatic causes, however, in the majority of the cases a definitive source of pain cannot be identified.[48] There is a limited data on the epidemiology of chronic pain in the setting of chronic pancreatitis.[6]

Probably the largest study comes from Mullady et al.[49] in which 540 chronic pancreatitis patients were identified of which 414 self identified a particular pain pattern A-E which were defined by the temporal nature (intermittent/ chronic) and

pain severity (mild, moderate, severe). This study revealed that 55% of patients identified a chronic pain pattern as opposed to intermittent. Of particular importance, 72.6% of patients that identified a chronic pain pattern required the use of daily pain medications.

Adhesions/Postsurgical

Intra-abdominal adhesion related diseases include postsurgical chronic abdominal pain syndromes, most common of which are post-cholecystectomy, herniorrhaphy, and lysis of adhesions. Very limited epidemiological data exist on this subset of patients, as the operative management remains controversial, and true causal relationships have been difficult to prove. In many patients who initially present with chronic abdominal pain, no immediate source of intra-abdominal adhesions can be identified.[50]

Postsurgical adhesions incidence varied in the literature, from 45 to 90–100%.[50-55] Indeed, a true causal relationship between presence of abdominal adhesions and chronic abdominal pain could not be consistently found in the literature.[50,53,54]

Despite the fact that the link between presence of adhesions and chronic abdominal pain is difficult to make, several studies provided evidence that diagnostic laparoscopy benefits this patient population, providing post surgical pain relief rates as high as 80%, even regardless of whether adhesiolysis was performed.[50,53]

Risk factors for development of adhesions post-surgery predominantly revolve around surgical approach, patient age, type of procedure, use of foreign

bodies such as peritoneal mesh, and presence or absence of a contaminated field (i.e., gallbladder debris).[50-55] Other risk factors for development of chronic post surgical pain included type of surgery, duration, open versus minimally invasive, intraoperative nerve damage and gender. Of these, most striking association is type of surgery, specifically cholecystectomy, herniorrhaphy, pelvic procedures, and adhesiolysis. Rates for post cholecystectomy chronic abdominal pain have been reported to be in the range of 3–56%. More specifically, risk factors include preexisting psychiatric illness, female gender, long duration of symptom prior to surgery, and pain at 6 weeks post-surgery. Post-herniorraphy chronic pain incidence rate was also high, from 0 to 63%. This data suggests that recurrent disease, presence of preoperative pain, severity acute postoperative pain, higher body mass index, and younger age correlate with higher rates of chronic pain development. On the other hand it seems to be consistent throughout the studies that older patients have a reduced risk for the development of chronic pain.[6]

Chronic Somatosensory Pain of the Abdomen

Somatic pain originates from nociceptors in superficial tissues (i.e., skin), or the musculoskeletal system (i.e., bones, ligaments, muscles, etc.). In addition, the nerves that innervate these superficial structures can incur injury leading to neuropathic causalgia.[6]

Postsurgical Pain

It is common to experience pain immediately after major abdominal surgery. However, chronic pain (defined as pain >6 months following surgery) varies in incidence from 3 to 80%, depending on the type of surgery performed.[56] Chronic

postsurgical pain can be associated with limb amputation (i.e., phantom limb pain), or post-thoracotomy.[57,58] Chronic abdominal pain after major abdominal surgery incidence varies from 3 to 50%.[59-61] Various peri-operative risk factors in patients undergoing specific surgery have been linked to chronic abdominal pain.[6]

Organic causes such as nerve damage, adhesions, or continued bowel dysfunction have been suggested as possible etiologies for continued pain at these postoperative intervals (3–12 months). Laparoscopic adhesiolysis has been attempted in chronic abdominal pain patients who have had previous abdominal surgery. Of the patients who underwent laparoscopic adhesiolysis, 47% became pain free, 36% reported relief, and 16% had no change in symptoms.[62] Similar results have been found in patients female patients reporting chronic pelvic pain.[63]

Chronic Abdominal Wall Pain

Chronic abdominal wall pain is a common, yet elusive, clinical entity that may account for up to 10% of patients seen in gastroenterologists' practice.[64] The difficulty in identifying chronic abdominal wall pain is that clinicians often search for etiologies affecting visceral organs.[6]

Radiculopathy

The abdominal wall is innervated by spinal nerves exiting T7-T12. Irritation of a nerve root due to disc herniation or degeneration will produce neurogenic pain in a radicular pattern. The patient may also have associated sensory deficits or decrease in elicited reflexes. Although L5-S1 and C5-C7 are the most commonly involved roots for radiculopathy, thoracic nerves can also produce radicular symptoms due to spinal pathology.[6]

Diabetic Neuropathy

Patients with long-standing diabetes mellitus can experience pain and/or weakness in the distal aspects of their extremities. Less frequently described is an abdominal radiculopathy originating from the thoracic nerves. Although no prospective clinical or epidemiological studies have investigated abdominal diabetic neuropathy.[6]

Post herpetic Neuralgia

Acute herpes zoster (shingles) is the reactivation of dormant varicella-zoster virus in ganglionic neurons.[6]

Functional Abdominal Pain

Abdominal pain of unknown origin represents a frustrating topic among gastroenterologists and pain physicians due to difficulties in diagnoses and management. Extensive gastrointestinal evaluations often fail to show any correctable pathology. This is due to the complexities of visceral innervation and the fact that some chronic abdominal pain may not be visceral in origin. Epidemiological studies suggest many patients with chronic abdominal pain have a functional GI disorder such as irritable bowel syndrome (IBS) or functional dyspepsia. Often the pain associated with functional GI disorders coexists with other organic disorders. Psychological risk factors such as fatigue, psychological distress, health anxiety, and illness behavior are predictors of the development of new onset abdominal pain.[6]

Common causes of functional abdominal pain include: IBS, functional dyspepsia, and functional abdominal pain syndrome (FAPS).[6]

Assessment and diagnosis

History

Patients should first be asked about the time course of pain, both as part of the evaluation for a surgical abdomen and because once a surgical abdomen has been excluded the remainder of the evaluation will be guided by the chronicity of the symptoms along with the location of pain. The history should include:[65]

- Location of pain.
- Radiation of pain.
- Factors that exacerbate or improve symptoms such as food, antacids, exertion, defecation.
- Associated symptoms including fevers, chills, weight loss or gain, nausea, vomiting, diarrhea, constipation, hematochezia, melena, jaundice, change in the color of urine or stool, change in the diameter of stool.
- Past medical and surgical history, including risk factors for cardiovascular disease and details of previous abdominal surgeries.
- Family history of bowel disorders.
- Alcohol intake.
- Intake of medications including over the counter medications such as acetaminophen, aspirin, and NSAIDs.
- Menstrual and contraceptive history in women.

Physical examination

The physical examination will vary depending upon the location and chronicity of the patient's symptoms. However, a typical examination will include:[65]

- Measurement of blood pressure, pulse, and temperature.
- Examination of the eyes and skin for jaundice.
- Auscultation and percussion of the chest.
- Auscultation of the abdomen for bowel sounds.
- Palpation of the abdomen for masses, tenderness, and peritoneal signs.
- Rectal examination including testing of stool for occult blood.
- Pelvic examination in women with lower abdominal pain.

Laboratory assessment

Patients with a surgical abdomen should have the following laboratory measurements.[65]

- Complete blood count with differential.
- Electrolytes, BUN, creatinine, and glucose.
- Aminotransferases, alkaline phosphatase, and bilirubin.
- Lipase.
- Urinalysis.
- Pregnancy test in women of childbearing potential.
- In the presence of fever or unstable vital signs, blood and urine cultures should be performed.

While these laboratory tests are important, they are not sufficient to rule in or rule out a diagnosis of surgical abdomen, as a surgical abdomen is a clinical diagnosis. Abdominal radiographs (including a plain radiograph and an upright or lateral decubitus radiograph) are a crucial step in decision making for the suspected surgical abdomen, as proximally dilated loops of bowel are the hallmark of intestinal obstruction, and free intraperitoneal air can confirm a suspicion of hollow organ perforation. Peritonitis in the absence of perforation or obstruction may not yield any conclusive radiographic findings. Where CT scanning is immediately available and necessary for further evaluation, as described below, abdominal plain films are not necessary, as they do not provide additional information.[65]

Reaching a definitive diagnosis and prompt management is usually delayed because invasive investigations are frequently required to come to a conclusive diagnosis. Abdominal pathology which may involve the bowel, peritoneum, lymph node or solid viscera may be the underlying cause for chronic abdominal pain. These patients tend to present with non-specific clinical features and remain a diagnostic dilemma for very long time. Imaging studies, biochemical and serological tests provide only indirect evidence of the underlying disease and many times remain inconclusive.[9] Thus diagnosis of underlying pathology in chronic abdominal pain then is largely dependent on direct visualization of abdominal cavity and obtaining tissue or ascitic fluid for histological confirmation by laparoscopy.[9]

DIAGNOSTIC LAPAROSCOPY

Historical perspective (Evolution of Laparoscopy)

Various milestones in the development of laparoscopic surgery are as follows;

- The first experimental laparoscopy was performed in Berlin in 1901 by German surgeon **George Kelling** of Dresden, who used cystoscope to peer in to abdomen of dog after first insufflating it with filtered air to which he called "celioscopy". [66]

- In 1901 **Dimitriott,** a Russian gynaecologist reported on "ventroscope" i.e. illumination of abdominal cavity during pregnancy using culdoscopy.[67]

- In 1910, **Hans C. Jacobaeus** of Stockholm, a Swedish physician used a cystoscope and examined abdomen and thoracic cavity and named it as "laparothoracoscopy". In 1923 he published his clinical result in 100 patients thus demonstrating the safety of the technique. [68]

- In 1911, **Bertram M. Bernheim**, from John Hopkins Hospital introduced first laparoscopic surgery to United States of America. He named the procedure of minimal access surgery as "organoscopy". The instrument used was proctoscope of half an inch diameter and ordinary light for illumination was used.

- In 1918, **O. Goetze** developed an automatic pneumoperitoneum needle characterized for its safe introduction into peritoneal cavity.

- In 1920, **Zollikofer** of Switzerland discovered benefit of CO_2 gas used for insufflation, rather than filtered atmospheric air or nitrogen.

- In 1925, **Redleshort**, a surgeon from Bristol Royal Infirmary reported his experiences with celioscope.

- In 1929, **Kalik** a German physician, introduced forward oblique (135 degrees) view lens system and dual trocar technique, and later in 1951 reported 2000 cases without any mortality.[69]

- In 1929, **Heinz Kalk**, a German gastroenterologist developed a 135 degree lens system and dual trocar approach and published "Experience with laparoscopy together with description of new instrument". He presented role of laparoscopy as a diagnostic method for liver and gall bladder diseases.

- In 1930, **Ruddock** an American surgeon reported 500 cases of diagnostic laparoscopy.[70]

- In 1934, **John C. Ruddock**, an American surgeon described laparoscopy as a good diagnostic method, many times superior than laparotomy. He used special instrument, which consists of special built in biopsy forceps with electro coagulation capacity, which he used for taking liver biopsies.

- In 1938, **Jonos Veress** developed a spring loaded obturator needle for inducing therapeutic pneumothorax in patients with tuberculosis which is the most commonly used device today for creation of pneumoperitoneum. [20]

- In 1939, **Heinz Kalk** published his experience of 2000 liver biopsy performed using local anaesthesia without mortality.

- In 1944, **Raoul Palmer** of Paris performed gynaecological examination using laparoscopy and placing the patients in Tredlenberg position, so air could fill the pelvis. He also stressed the importance of continuous intra abdominal pressure monitoring during laparoscopic procedure.

- In 1950, **Raoul Palmer** presented the first publication of Diagnostic Laparoscopy.

- In 1960, **Kurt Semm**, a German gynaecologist invented the automatic gas insufflator.

- In 1966, **Kurt Semm** developed automatic insufflator that precisely controlled gas flow and monitored intra abdominal pressure during laparoscopy. He also perfected intra and extra abdominal knot tying techniques and the instrument required for this maneuvers. He developed suction irrigation system, needle holder, cone shaped trocars, micro scissors, clip applicator atraumatic forceps. He did many laparoscopic surgeries to replace conventional operations namely management of ectopic pregnancies, tubal sterilization, appendicectomy and so on… No wonder he is recognized as "father of modern laparoscopic surgery". [71-73]

- In 1966, **Hopkins** a British physicist developed a rod-lens system for rigid endoscopes, enhancing image clarity.

- In 1970, gynaecologists had incorporated the technique in their practice. General surgeons, despite their exposure to laparoscopy remained confined to traditional open surgery.

- In 1972, **Clarke** invented, published, patented, presented, and recorded on film laparoscopic surgery, with instruments marketed by the Ven Instrument Company of Buffalo, New York, USA.[74]

- In 1978 **Hasson**, introduced an alternate method to trocar placement. He proposed a blunt mini laparotomy, which permits direct visualization of trocar introduction into peritoneal cavity.[75]

- In 1979, laparoscope was used as a diagnostic tool and 200 cases were studied and a variety of conditions were diagnosed.

- In 1980, **George Berci and Cushieri** used diagnostic laparoscopy for staging and evaluating patient with abdominal malignancies.[76-79]

- In 1980, General surgeons became more interested in the field of diagnostic laparoscopy after the advent of laparoscopic cholecystectomy.

- In 1980, in UK, **Patrick Steptoe** started to perform laparoscopic procedure.

- In 1983, **Prof. Kurt Semm**, a German gynaecologist performed the first incidental laparoscopic appendicectomy by looking at TV monitor, which started video guided laparoscopic surgeries.

- In 1985, **Erich Muhe** in Germany performed the first documented laparoscopic cholecystectomy.

- In 1987, **Philipe Mouret** got the credit to perform laparoscopic cholecystectomy in Lyons, France using video technique.[80]

- In 1989, **Motashaw**, an Indian introduced modern gynaecological laparoscopy in India.

- In 1991, **Tehemton Udwadia** performed the first laparoscopic cholecystectomy in India.[81,82]

- In 1994, a robotic arm was designed to hold the telescope with the goal of improving safety and reduced the need of skilled camera operator.

- In 1996, first live telecast of laparoscopic surgery was performed remotely via internet (Robotic telesurgery).

The history of diagnostic laparoscopy goes back over 100 years. Gynecologists and physicians were very active in this field in terms of viewing female pelvic organs and liver respectively, in hepatic disease. Until 30 years ago, and despite the efforts of investigators in this field, diagnostic laparoscopy was not taken up by surgeons except in a few centers, mainly in Europe. **Ruddock**, an American surgeon, reported 500 cases of diagnostic laparoscopy in 1930.[70]

General surgeons became more interested in the field of diagnostic laparoscopy in the early 1980s after the advent of laparoscopic cholecystectomy. Currently, diagnostic laparoscopy is getting wide acceptance as an alternative to laparotomy. This is primarily due to the growing experience and familiarity with laparoscopic surgery improvement in instrumentation as well as a high percentage of negative laparotomies. Physicians and surgeons might have to face patients in whom

the diagnosis remains uncertain despite utilizing all available laboratory and non-invasive diagnostic modalities. Diagnostic laparoscopy may help in avoiding unnecessary laparotomy, provide accurate diagnosis and help in planning the optimal therapy in these selected patients.

This study details the experience of 50 patients who had elective diagnostic laparoscopy for chronic abdominal disorders in whose history clinical examination, laboratory tests and non-invasive, or even invasive, radiological investigations had failed to give accurate diagnosis.

All these studies clearly defined that diagnostic laparoscopy is a safe and accurate procedure with several advantages over traditional procedure in cases with chronic abdominal pain.

Instrumentation

It includes all the equipments grouped together which make possible good visualization of the abdominal contents and contribute towards one of the most essential and important factors in making the laparoscopic surgeries popular with surgeons around the world. It contains

Optical system

It includes telescope, camera, light source, light cables and monitor. The telescope also called as laparoscopes is based on Hopkins rod system which includes a series of quartz rod lenses and image reversal system, optical fibres for the transmission of light, an objective lens and an eyepiece. They come in various sizes ranging from 3 to 10 mm and various angles 0, 30 and 45 degrees. Recently flexible

laparoscopes are available. A high intensity light source usually xenon provides adequate illumination to visualize the abdominal cavity. It is connected to the laparoscope by a fiber optic cable.

The video camera is attached directly to the eyepiece of the laparoscope which is connected to a high resolution video monitor.

Insufflator

The creation of working space for laparoscopic surgery within the abdominal cavity is generally accomplished using carbon dioxide gas which is delivered to the patient via automatic, high flow, pressure regulated insufflators. Ideally the pressure is maintained at 8 to 10 l/min. In addition to regulating gas flows, the insufflators monitors intra abdominal pressures and stops delivering CO_2 at a predetermined level. The pressure limit is usually set at 12 to 15 mm of Hg.

Veress needle

It is designed to achieve pneumoperitoneum prior to inserting laparoscopic trocars in a 'closed' fashion. It consists of an outer sharp cutting needle and inner blunt spring loaded obturator. As the Veress needle is inserted into the peritoneal cavity, resistance at the muscle fascia causes the blunt tip to retract backwards and once the cutting needle has penetrated freely into the peritoneal cavity, the blunt stylet springs forward beyond the cutting needle, thereby reducing risk to the intraperitoneal structures. The inner stylet is hollow with a side hole at its tip to allow instillation of liquid or gas. Both reusable and disposable needles are available.

Trocar and Cannula

The basic laparoscopic port consists of an outer hollow sheath or cannula, that has a valve to prevent CO_2 escape, a side part for instillation of gas and a port for instrument access. Most commonly used are 5mm and 10mm in diameters. The Hasson's cannula is used for gaining initial access into the abdominal cavity with an 'open' cut down technique.

Modulators

Grasper – There are a variety of these with differences in tip, handle, locking, rotation around the axes of shaft, insulation and facility to dismantle. The handle may have a pistol grip or motorcycle grip or a 'U' shaped spring handle. The tip may be curved, straight, fine/flat, serrated and non-serrated.

Dissector – One of the important is the Maryland dissector which is serrated.

Scissors – Curved, straight and hook scissors are commonly available. The 5mm curved scissor is the most versatile and commonly used. It can be used for both dissection and cutting.

Suction and Irrigation instrument – It is useful in keeping the dissection area clean and visible. Specialized fenestrated suction tips are better for removing large amounts of blood and fluids.

Clip applicators – They are available in medium, medium large and large sizes. It has to be withdrawn from the abdominal cavity each time for reloading.

Electrocautery Machine – Both unipolar and bipolar cautery are available. Bipolar cautery is highly effective for coagulating tissues or vessels locally. Monopolar is used for cutting and dissecting tissues.

Sterilization and Disinfection of Laparoscopic Instruments

Laparoscopic surgery requires the use of delicate optical and electronic equipments that would be damaged by heat. So other methods of sterilization and disinfection are used. High level of disinfection can be attained by using either ethylene dioxide gas sterilization for about 10 hours, or by chemical germicide gluteraldehyde formulations for 20 minutes.

High level disinfection with 20% gluteraldehyde for 20 minutes is the most popular method of disinfection. Solution once prepared can be used for a maximum of 14 days. It is popular because of advantages of excellent biocidal activity in the presence of organic contamination, non-corrosive action on endoscopes and optical instruments.

Formalin chamber is mainly utilized for shifting of instruments from one place to another.

Diagnostic laparoscopy

Diagnostic laparoscopy has become an integral part of general surgical procedures with the recent advancements in laparoscopic technology. Since surgeons are more oriented in viewing and dissection of different intra-abdominal areas and are proficient in the definitive management of complications in the procedures, diagnostic laparoscopy may be better off in the hands of surgeons.

Laparoscopy has proved to be an important tool in final minimally invasive exploration for selected medical patients with chronic abdominal disorders, the diagnosis of which remains uncertain despite employing the requisite laboratory and non-invasive imaging investigations. This study was done to evaluate the accuracy of elective diagnostic laparoscopy in patients with chronic abdominal disorders and its impact on the management of these patients.

Prior to laparoscopy, all the patients were investigated completely. Various investigations included blood count, ESR, electrolytes, urea and liver function tests, Mantoux test, and ultrasound (USG) and computerized (CT) scans of the abdomen. Magnetic resonance (MRI) scan was employed selectively, where indicated. Upper GI endoscopy, colonoscopy and barium meal and follow through were done in selected patients. Ascitic fluid analysis for biochemistry and cytology was performed in patients with clinical ascites. Where the accurate diagnosis could not be made despite all relevant investigations, diagnostic laparoscopy was requested for defining the pathology and obtaining tissue biopsy. No interventional radiology was available during the period under review.

Diagnostic laparoscopy was done electively under general anesthesia after preoperative anesthetic check-up. The two port technique was used routinely employing 10 mm sub umbilical port for telescope and 5 mm port for probing, diathermy and biopsy in the relevant abdominal quadrant. An additional 5mm port was inserted only if necessary. Urinary catheter was inserted. A nasogastric tube was inserted during the procedure if the stomach was distended. The whole peritoneal cavity, including the pelvis, was thoroughly examined routinely. Multiple biopsies

were obtained from the suspected pathology and sent for frozen section in order to confirm the adequacy of the sample.

The impact of the procedure was considered positive if the laparoscopy revealed a pathology which may be responsible for the patient's symptoms, or when the suspected pathology was excluded.

Advantages of Diagnostic Laparosopy

Diagnostic laparoscopy in patients with chronic abdominal pain can be performed as an adjuvant or even as an alternative to exploratory laparotomy.

1. It offers advantages of establishing diagnosis with benefits of minimally invasive surgery.
2. It reduces incidence of laparotomy for those diseases causing chronic abdominal pain which needs treatment after confirmation of diagnosis.
3. It is less traumatic and avoids prolonged exposure and manipulation of bowel, so less chances of paralytic ileus.
4. Reduced haemorraging which reduces the chance of needing blood transfusion.
5. Smaller incision which is better cosmetically.
6. Although procedure times are usually slightly longer, hospital stay is less, and often with a same day discharge which leads to a faster return to everyday living.

Complications

Insertion Related	Post-insertional Complication	Pneumoperitoneum Related
• Major vascular injury • Gastro intestinal injury • Bladder injury • Abdominalwall haemorrage • CO2 embolism	• Gastrointestinal perforation • Injury to solid organs • Hernias of abdominal wall	• Co2 embolism • Hypercarbia • Respiratory acidosis • Subacute emphysema • Pneumothorax • Pneumomediastinium

Role of laparoscopy in the diagnosis of chronic abdominal pain

Laparoscopy can identify abnormal findings and improve the outcome in a majority of patients with chronic abdominal pain, as it allows surgeons to see and treat many abdominal conditions that cannot be diagnosed otherwise.[83] It is a safe and effective tool and can establish the etiology and allows for appropriate interventions in such cases.[84] Abdominal adhesions are the most likely findings, especially in patients with a past history of abdominal operations.[85] Other findings such as appendiceal pathology, hepatobiliary causes, and endometriosis can be discovered and dealt with.[86] However, the role of laparoscopy in chronic abdominal pain is still debated by some authors who deny its value in adhesiolysis and consider it controversial and not evidence-based, and therefore, do not recommend it as a treatment for adhesions in patients with chronic abdominal pain.[87,88]

Nar AS et al.[19] in 2014 conducted a study to evaluate these potential benefits of diagnostic laparoscopy in cases of chronic abdominal conditions with uncertain diagnosis, this study was conducted on 120 subjects, expecting that in the coming future, it might obviate the need for imaging techniques in establishing the final diagnosis of these conditions. The study showed that, with laparoscopy providing tissue diagnosis, and helping to achieve the final diagnosis without any significant complication and less operative time, diagnostic laparoscopy is a safe, quick, and effective adjunct to non-surgical diagnostic modalities, for establishing a conclusive diagnosis, but whether it will replace imaging studies as a primary modality for diagnosis needs more evidence.

Kumar A et al.[89] in 2013 conducted a study to assess the diagnostic and therapeutic role of laparoscopy in patients with unexplained chronic abdominal pain (UCAP). Diagnostic laparoscopy was performed for 100 patients with UCAP not diagnosed by usual clinical examination and investigations. The pain in all patients was of unclear etiology despite all the investigative procedures. All patients were subjected to laparoscopic evaluation for their conditions. The findings and outcomes of the laparoscopy were recorded and analyzed. UCAP was common in females (62%) than in males. The most frequent laparoscopic findings detected were abdominal adhesions (30%), followed by pelvic inflammatory disease (25%), abdominal tuberculosis (12%), chronic appendicitis (8%), mesenteric lymphadenitis (5%) and diverticulosis (2%). In 18% of cases no identifiable cause could be found. Follow after two months revealed pain relief in 84% irrespective of cause of pain. The study concluded that, laparoscopy is an effective diagnostic and therapeutic modality in the management of patients with chronic abdominal pain.

Chafekar AP et al.[14] in 2016 conducted a study to analyze the diagnostic and therapeutic value of laparoscopy in chronic, undiagnosed abdominal pain. Thirty patients with chronic abdominal pain who had undergone diagnostic laparoscopy were included in this study. The pain in all patients was of undetermined aetiology in spite of all the investigations done. The findings, interventions performed and outcomes of the laparoscopy were recorded and analyzed. Final diagnosis after reports of histopathological examination and pelvic fluid analysis, was established in 86.6% of the patients and was inconclusive in 13.3% of the patients. The most common finding was abdominal tuberculosis which was found in 13 (43.3%) patients; followed by adhesions found in 5 (16.6%) patients. Recurrent appendicitis was found in 5 (16.6%) patients, which was confirmed by histopathological examination. Pelvic Inflammatory Disease was found in 2 patients. No specific cause of chronic abdominal pain could be found in 4 (13.3%) patients. 26 (86.6%) patients found significant subjective relief of pain post operatively while four patients reported no decrease in pain. Authors concluded that, in selected patients, Laparoscopy is an effective diagnostic and therapeutic modality in the management of patients with chronic abdominal pain.

Another study by Naniwadekar RG et al.[2] to assess the diagnostic and therapeutic role of laparoscopy in patients with unexplained chronic abdominal pain during the period of two years from May 2013 to May 2015 enrolled 50 cases in Krishna Institute of Medical Sciences, Karad. Chief complaints of majority of patients were pain in abdomen lasting for months, on and off vomiting, fever and distension. Detail history was taken followed by general and physical examination. This project by its very nature involved the use of hematological, biochemical,

pathological and microbiological investigations, radiological investigations including ultrasonography, CT and MRI; and also expert surgical management including laparoscopy. Patients were treated in the same hospital in the span of study and followed till discharge. Maximum age incidence in patients of chronic abdomen was in the age group of 31-40 years, while pathology was found highest in 41–50 years. Females outnumbered males in this study. Most common causes of chronic abdomen were abdominal Koch's and adhesions. Abdominal Koch's was the most common cause of intestinal obstruction and recurrent chronic abdominal pain. Laparoscopy assisted surgery was done in 48% of the cases, while diagnostic and therapeutic laparoscopy was done in 26% of the cases. Conversion rate of laparoscopy to laparotomy in chronic abdomen was 8%. Complications occurred in 10% of the patients with chronic abdomen during laparoscopy Nine patients had no obvious pathology. It was concluded that, siagnostic laparoscopy is a safe, feasible and accurate tool for management of patients with chronic abdomen.

More recently Umamaheshwar Rao T.[16] conducted a study to evaluate the benefits of diagnostic laparoscopy in cases of chronic abdominal conditions with uncertain diagnosis. This study was conducted in 150 patients in Department of Surgery with uncertain diagnosis after five weeks of onset of symptoms was patients who had history of abdominal pain for three months or more, if physical examination and diagnostic tests are unrevealing, previous history of abdominal operation. Laparoscopy was performed after completion of all the necessary hematological, biochemical, radiological, and ascetic fluid analysis, gastrointestinal endoscopic and imaging techniques, and Mantoux test. This study was done in 150 patients who had chronic abdominal pain showed peak incidence in 3rd decade and

the age group of 18-25 had the highest percentage of 30%. Males were 52 and females were 98. Duration of pain in laparoscopy was the highest in 15-25 weeks. Lower abdomen had more number of cases i.e 100. Findings during laparoscopy were highest in appendicitis. The study concluded that, laparoscopy is an effective and therapeutic in the diagnosis and management of patients with abdominal pain.

Another prospective and retrospective study of 142 patients of chronic abdominal pain who underwent diagnostic laparoscopy in our surgery department from June, 2006 to December, 2015 was done by Saxena P.[11] A descriptive analysis of data collected from case records of these patients was done to study the varied clinical picture, laboratory reports, radiological findings, laparoscopic findings and histological reports. The usefulness of laparoscopy to confirm the diagnosis and in clinical management of these patients of chronic abdominal pain was evaluated. Results: Laparoscopy was performed in 142 patients of chronic abdominal pain with unsettled diagnosis. A conclusive diagnosis could be made in 136 of these patients. The common causes of chronic abdominal pain were abdominal tuberculosis, adhesions, bands, small intestinal strictures, chronic appendicitis, abdominal malignancy and various gynecological diseases. Gynecological problems causing chronic abdominal pain were pelvic inflammatory disease, ovarian cyst, tubo-ovarian mass, hydrosalpinx, fibroid uterus, bulky uterus, endometriosis. Thus laparoscopy provided positive diagnosis of in 136 (95.77%) patients based on laparoscopic findings, histological reports, ascitic fluid analysis and cytology. It was concluded that, in patients suspected to have abdominal pathology early laparoscopy may be useful to establish a conclusive diagnosis with acceptably low

morbidity (<5%). An early resort to laparoscopy can resolve the diagnostic dilemma and early treatment can be instituted.

Kassa V and Ajmera M.[90] in 2017 evaluated the potential benefits of diagnostic laparoscopy in cases of chronic conditions with uncertain diagnosis and concluded that, diagnostic laparoscopy has a definitive role in the management of patients with chronic pain abdomen and should be an important investigative tool in the armamentarium of all practicing surgeons.

Despite the fact that, diagnostic laparoscopy is fast becoming acceptable in surgical practice its role in ascertaining the diagnosis of nonspecific abdominal pain needs to be validated by evidence base.

METHODOLOGY

The present study was conducted in the Department of General Surgery, KLES Dr. Prabhakar Kore Hospital and Medical Research Centre, Belagavi from January 2016 to December 2016.

Study design

The study design was hospital based cross sectional study.

Study period and duration

The present one year study was conducted from January 2016 to December 2016.

Place

This study was conducted in the Department of General Surgery, KLES Dr. Prabhakar Kore Hospital and Medical Research Centre, Belagavi a tertiary care teaching hospital attached to KLE University's Jawaharlal Nehru Medical College, Belagavi.

Source of Data

Patients presenting with history of chronic abdominal pain since ≥8 weeks with uncertain diagnosis despite, bio-chemical and radiological investigations attending out patient Department, Department of General Surgery, KLES Dr. Prabhakar Kore Hospital and Medical Research Centre, Belagavi during the study period were included in the study.

Sample size

A total of 55 patients were included in the study.

Sampling procedure

The sample size was determined using the following formula.

$n = 4 \times p \times q \div d^2$

Where, n = Sample size

p = prevalence 63% based on earlier study[6]

q = 1 – p

d = Standard error that is, 13%

Therefore,

$n = (4 \times 63 \times 37) \div 13^2$

= 55.17 ~ 55

Hence the sample size of 55 was considered for the present study.

Selection criteria

Inclusion

- Undiagnosed patients with history of chronic abdominal pain for the past ≥ 8 weeks despite biochemical and other radiological investigations like USG/CT/MRI.
- Age ≥ 18 years.
- Patients willing to participate in the study and providing written informed consent for participation.

Exclusion

- Patients diagnosed with chronic abdominal pain.

- Patients lost to follow up.
- Pregnant women
- Patients who are not fit for general anaesthesia.

Ethical clearance

The study was approved from the Institutional Ethical Committee, Jawaharlal Nehru Medical College, Belagavi prior to the commencement.

Informed Consent

The patients fulfilling selection criteria were informed in detail especially the procedure of diagnostic laparoscopy was explained about the nature of the study and a written informed consent was obtained (Annexure I).

Method of collection of data

Demographic data including age and gender was noted. Patients were interviewed for the past medical and surgical history along with presenting complaints. Symptoms like, fever, diarrhea, constipation, burning and micturation were recorded. The patients were subjected to clinical examination and details about pain like severity of pain based on VAS score, duration of pain, site of pain, nature of pain were noted. These findings were recorded on a predesigned and pretested proforma (Annexure II).

Investigations

The selected patients underwent following investigations.

- Hemoglobin

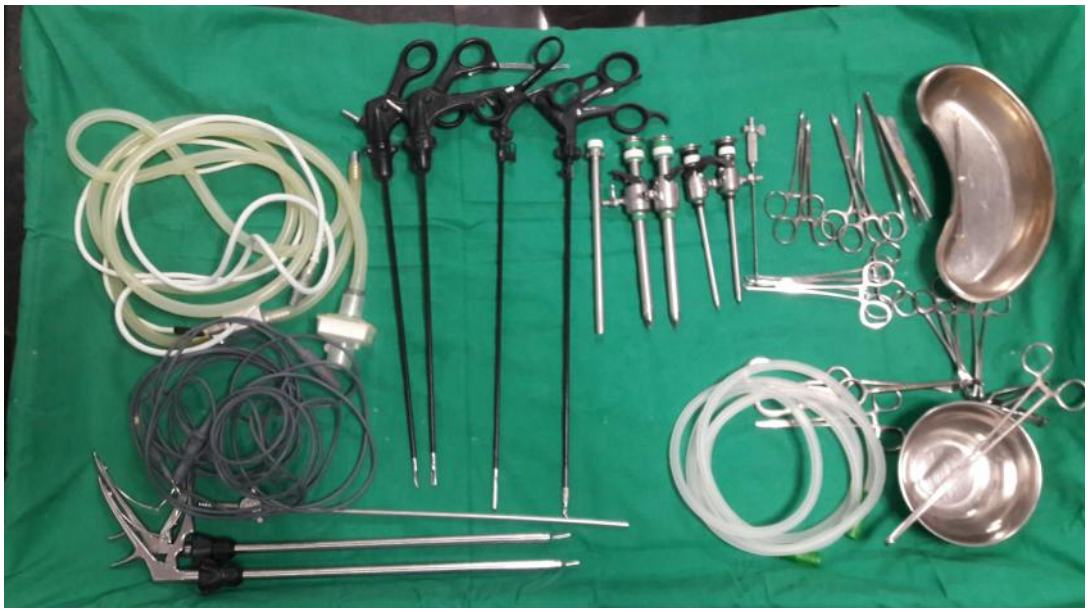
- Total leucocyte counts
- Direct count
- Random blood sugar
- Platelet count
- Liver function test
- Urine – Routine and microscopy
- Serum creatinine
- Radiological investigations wherever indicated.
    - Ultrasound abdomen
    - Computed tomography (CT)
    - Magnetic resonance imaging (MRI)

Procedure

After the evaluation of pre-operative investigations and fitness for anesthesia The selected patients were subjected to diagnostic laparoscopy either by open or closed technique by single surgeon. Laparoscopy was done under general anesthesia in all patients. Patients were kept nil by Mouth for 12 hours prior to surgery. Initial port placement was umbilical, by the open technique. 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. The abdominal cavity was examined to the extent possible in each case. Interventions such as adhesiolysis, appendicectomy, 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 adenexa in females, rectum and sigmoid colon, ileocecal region, Cecum, appendix, ascending colon transverse colon,

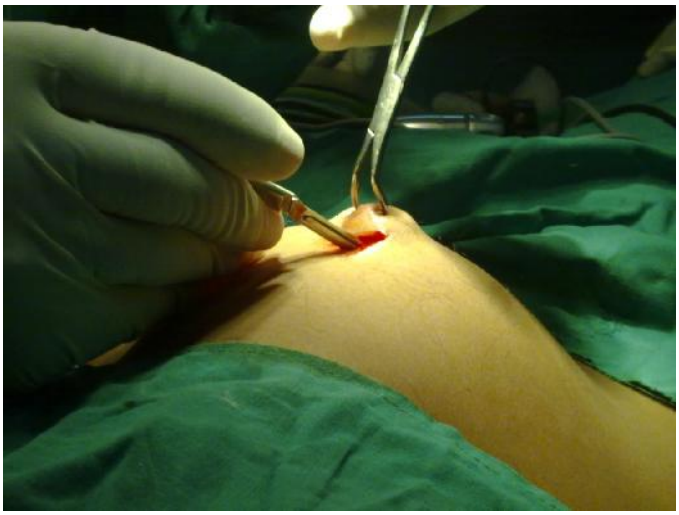
stomach, duodenum, gallbladder, liver, spleen and descending colon were serially visualized and examined. The patient was then turned in reverse trendelenberg position for examination of upper abdomen. With the help of bowel grasping forceps the whole length of small bowel could be walked over for direct visualization and examination. The final diagnosis was established after the reports of biopsy examination.

Following the procedure, patients received appropriate treatment, based on the findings of the laparoscopy. The general anesthesia protocol was remained same for all patients.

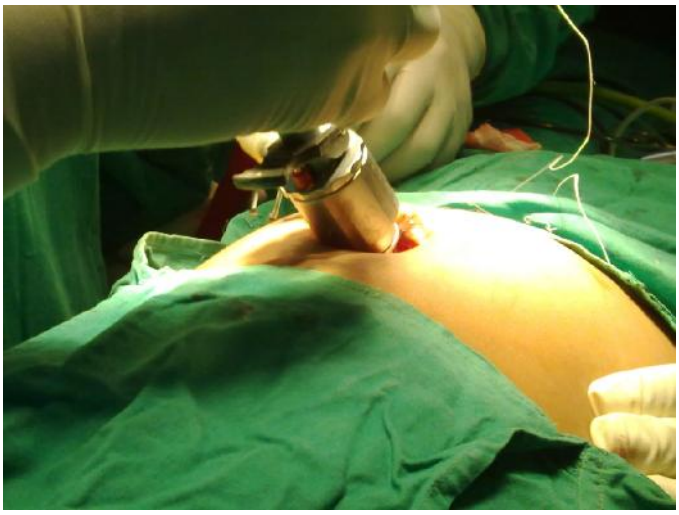


Photograph 1. Laparoscopic instruments

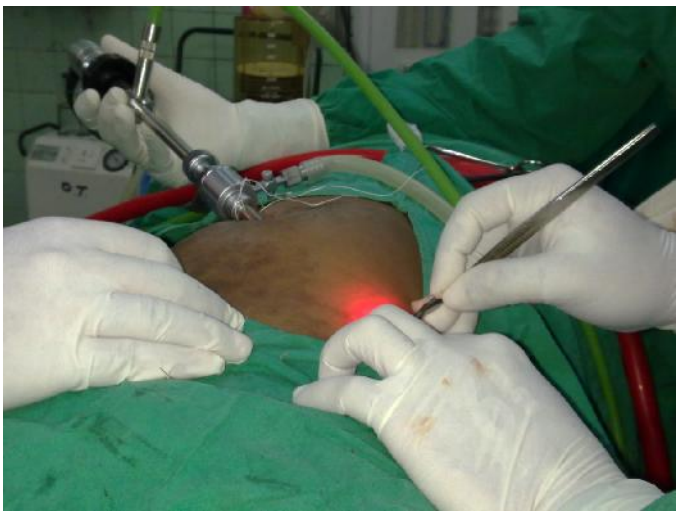
Photograph 2. Laparoscopic Monitor



Photograph 3. Infraumbilical port incision



Photograph 4. Insertion of Hasson's cannula



Photograph 5. Insertion of additional ports

Follow up

Patients were followed up every 15 days for a period of two months that is 15, 30, 45 and 60 days for assessment of pain.

Assessment of pain

Pain was assessed using visual analog score (VAS) ranging from 0 to 10. Visual analogue scale was explained to the patient during pre operative visit considering zero as no pain and 10 as maximum pain point.

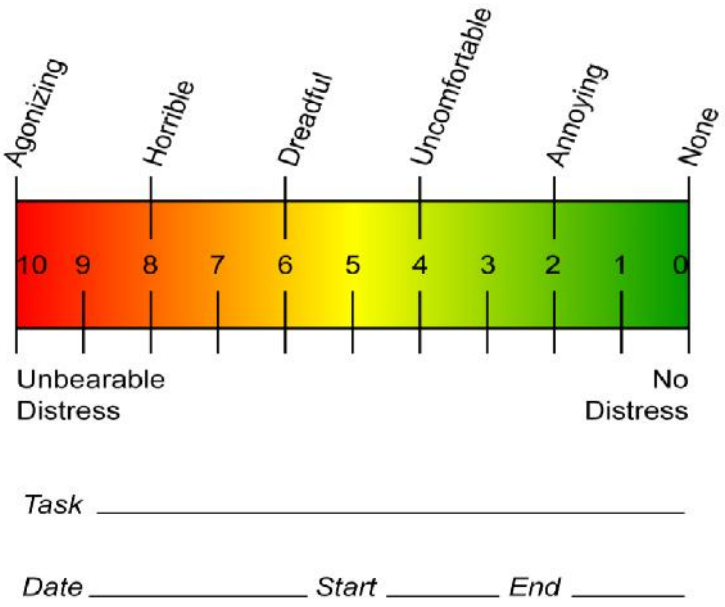


Figure 2. Visual analog scale

The assessment of pain was done at enrolment, post operative follow ups that is, day 15, day 30, day 45 and day 60.

Statistical analysis

The data obtained was coded and entered in Microsoft Excel Spreadsheet. The categorical data was expressed as rates, ratios and percentages. Continuous data

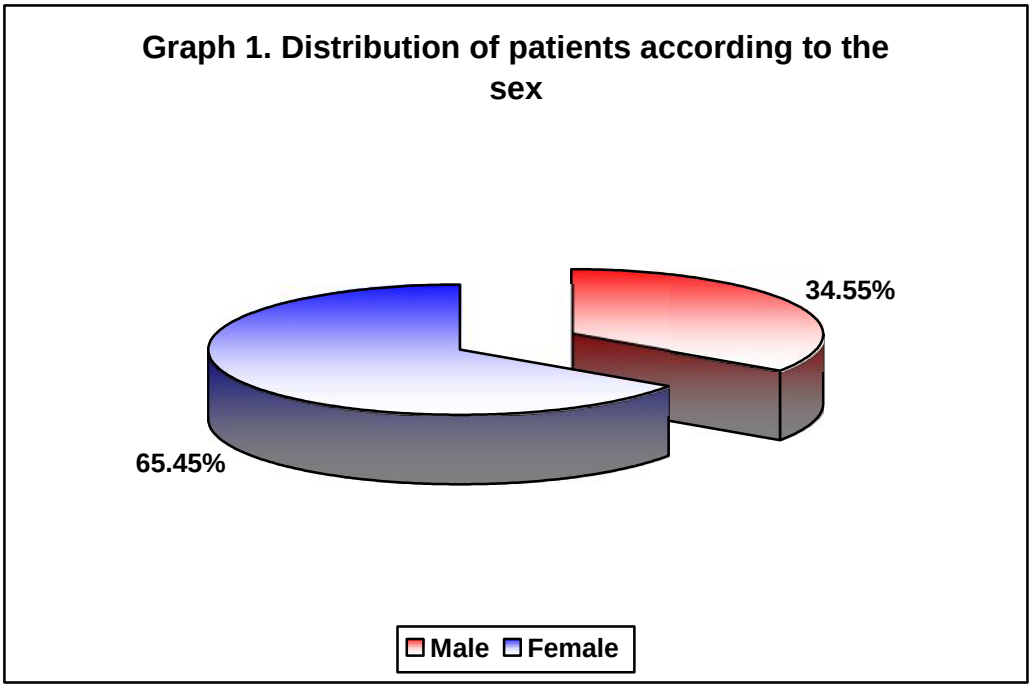
was expressed as mean±standard deviation. The comparison of mean pain scores at different follow ups was done by analysis of variance (one way ANOVA test). 'p' value of less than or equal to 0.05 at 95% confidence interval was considered as statistically significant.

RESULTS

This on year cross-sectional study was done in the Department of General Surgery, KLES Dr. Prabhakar Kore Hospital and Research Center, Belagavi, from January 2016 to December 2016. A total of 55 patients presenting with chronic abdominal pain for the duration of ≥8 weeks with uncertain diagnosis were enrolled. The data obtained was analysed and the final results were interpreted as below.

Table 1. Distribution of patients according to the sex

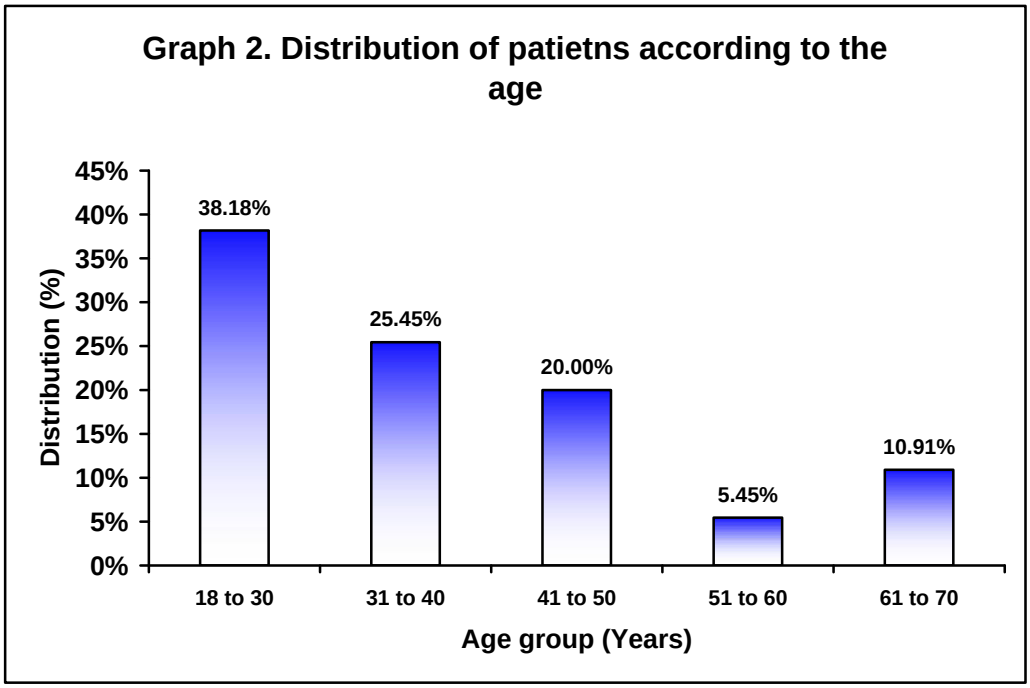
Sex	Distribution (n=55)	
	Number	**Percentage**
Male	19	34.55
Female	36	65.45
Total	**55**	**100.00**



In the present study 65.45% of the patients were females and 34.55% were males. The male to female ratio was 1:1.89.

Table 2. Distribution of patients according to the age

Age group (years)	Distribution (n=55)	
	Number	**Percentage**
18 to 30	21	38.18
31 to 40	14	25.45
41 to 50	11	20.00
51 to 60	3	5.45
61 to 70	6	10.91
Total	**55**	**100.00**



In this study most of the patients were aged between 18 to 30 years (38.18%). The mean age was 37.67±14.45 years and the median age was 36 years with range 18 being minimum to 68 years being maximum.

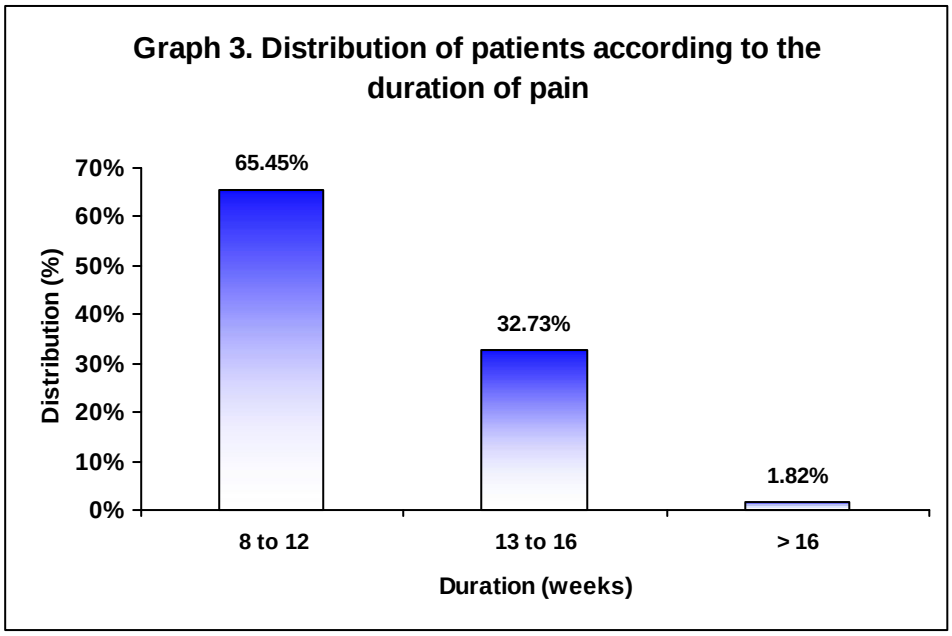
Table 3. Distribution of patients according to the marital status and educational status

Parameters	Findings	Distribution (n=55)	
		Number	**Percentage**
Marital status	Single	8	14.55
	Married	47	85.45
	Total	**55**	**100.00**
Education	Graduate	30	54.55
	Post graduate	1	1.82
	Secondary	10	18.18
	Primary	2	3.64
	Studying	12	21.82
	Total	**55**	**100.00**

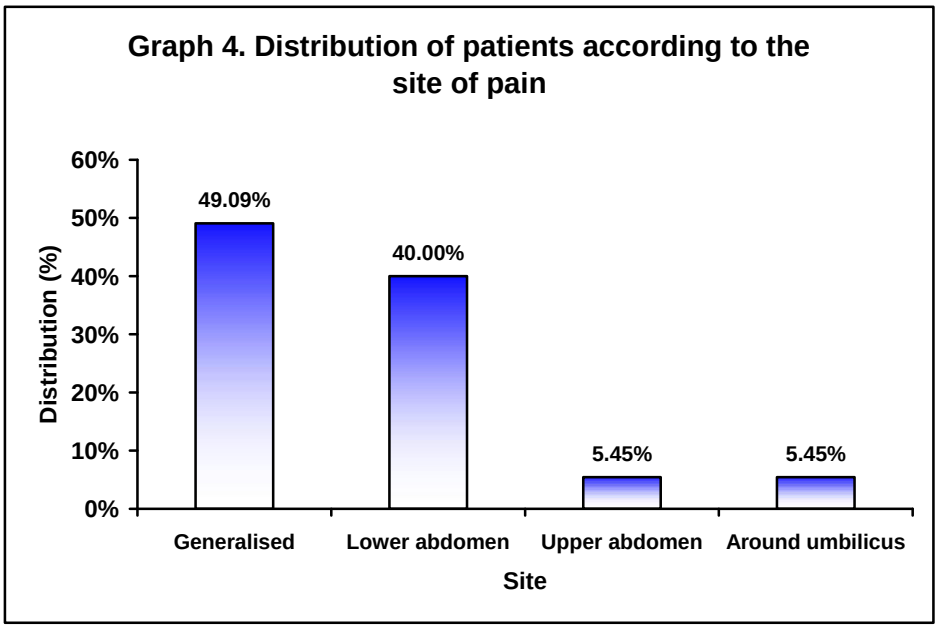
In the present study most of the patients were married (84.45%) and 54.55% of the patients were graduates.

Table 4. Distribution of patients according to the characteristics of the pain

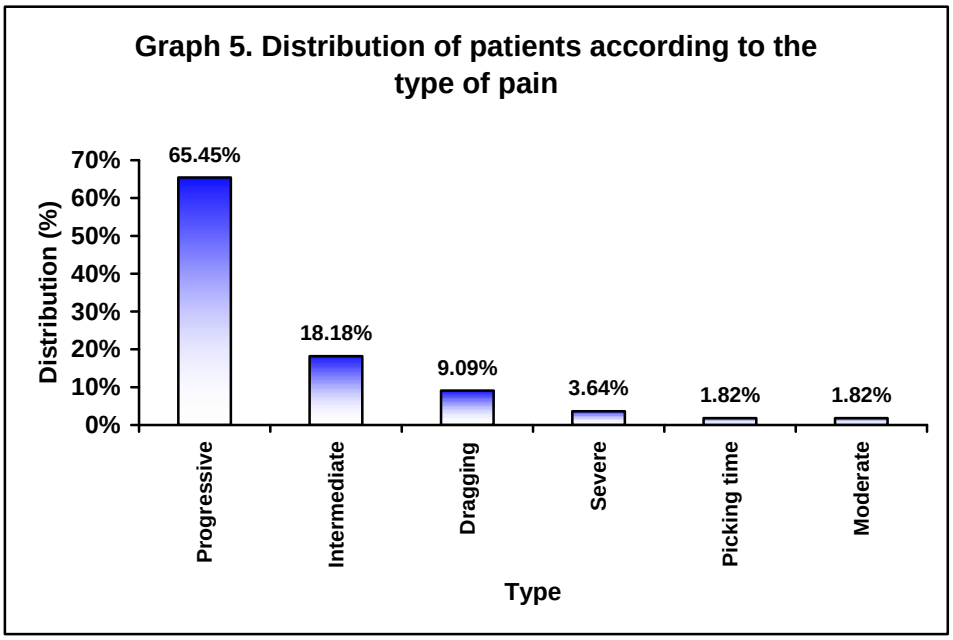
Characteristics	Findings	Distribution (n=55)	
		Number	**Percentage**
Duration (weeks)	8 to 12	36	65.45
	13 to 16	18	32.73
	> 16	1	1.82
	Total	**55**	**100.00**
Site	Generalised	27	49.09
	Lower abdomen	22	40.00
	Upper abdomen	3	5.45
	Around umbilicus	3	5.45
	Total	**55**	**100.00**
Type	Progressive	36	65.45
	Intermediate	10	18.18
	Dragging	5	9.09
	Severe	2	3.64
	Moderate	1	1.82
	Pricking time	1	1.82
	Total	**55**	**100.00**
Severity	Intermediate	18	32.73
	Moderate	17	30.91
	Severe	12	21.82
	Progressive	7	12.73
	Mild	1	1.82
	Total	**55**	**100.00**



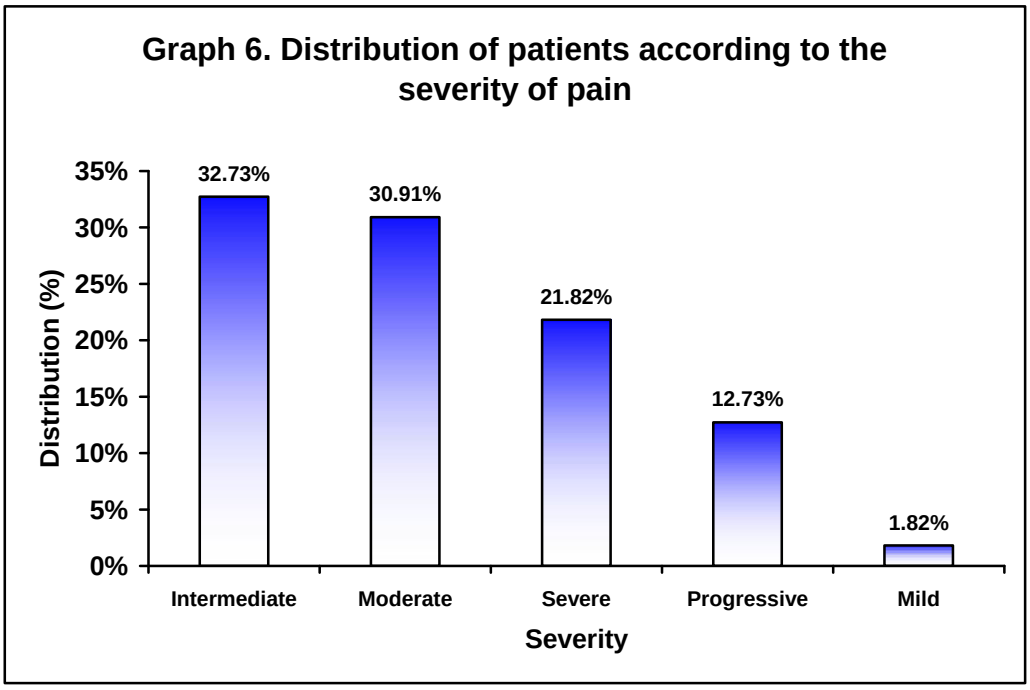
In this study 65.45% of the patients reported duration of pain as 8 to 12 weeks. The mean duration of pain was 10.80±2.78 and median duration was noted as 7 weeks (Range – 8 to 16 weeks).



In the present study 49.09% of the patients had generalized pain while 40% of the patients reported lower abdominal pain.



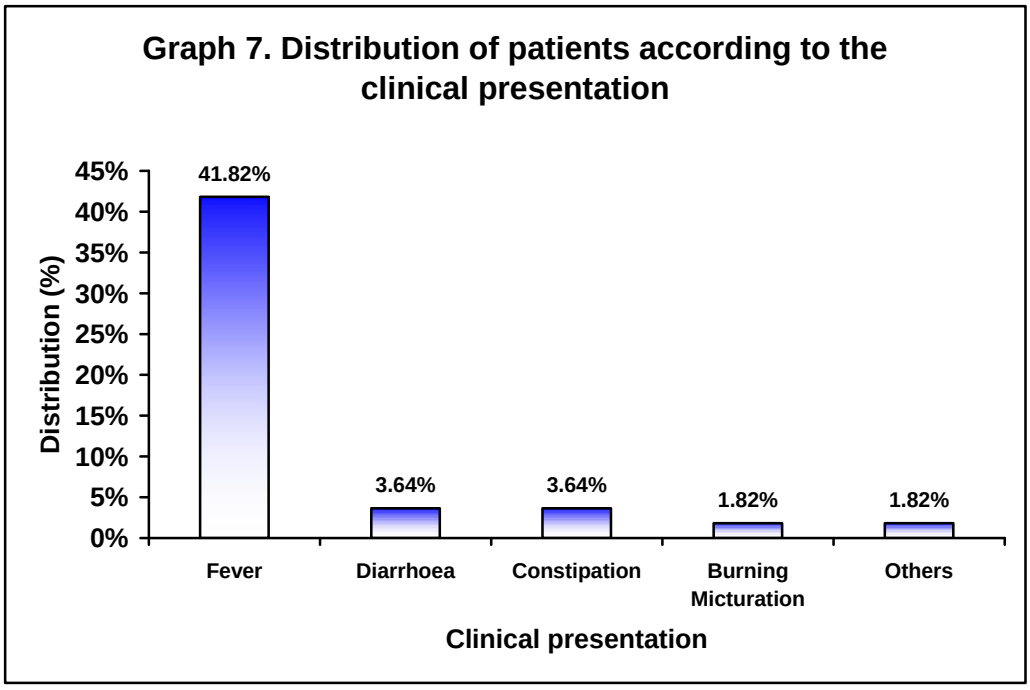
In the present study 65.45% of the patients had progressive pain.



In this study 32.73% of the patients had intermediate pain while 30.91% of the patients reported moderate pain.

Table 5. Distribution of patients according to the clinical presentation

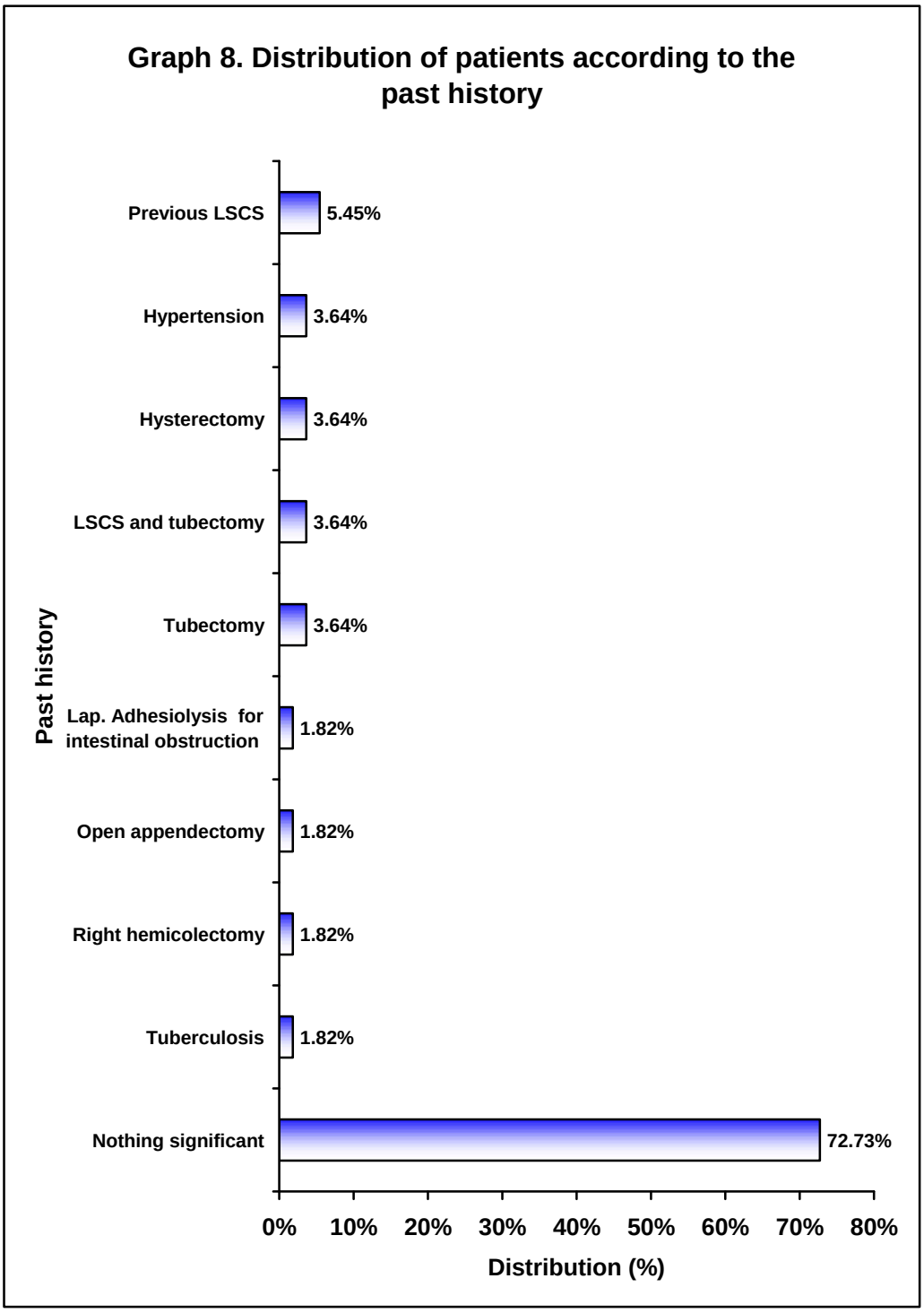
Clinical presentation	Distribution (n=55)	
	Number	**Percentage**
Fever	23	41.82
Diarrhoea	2	3.64
Constipation	2	3.64
Burning Micturation	1	1.82
Others	1	1.82



In this study 41.82% of the patients presented with fever, the other clinical features noted were diarrhoea (3.64%), constipation (3.64%), burning micturation (1.82%) and others (1.82%).

Table 6. Distribution of patients according to the past history

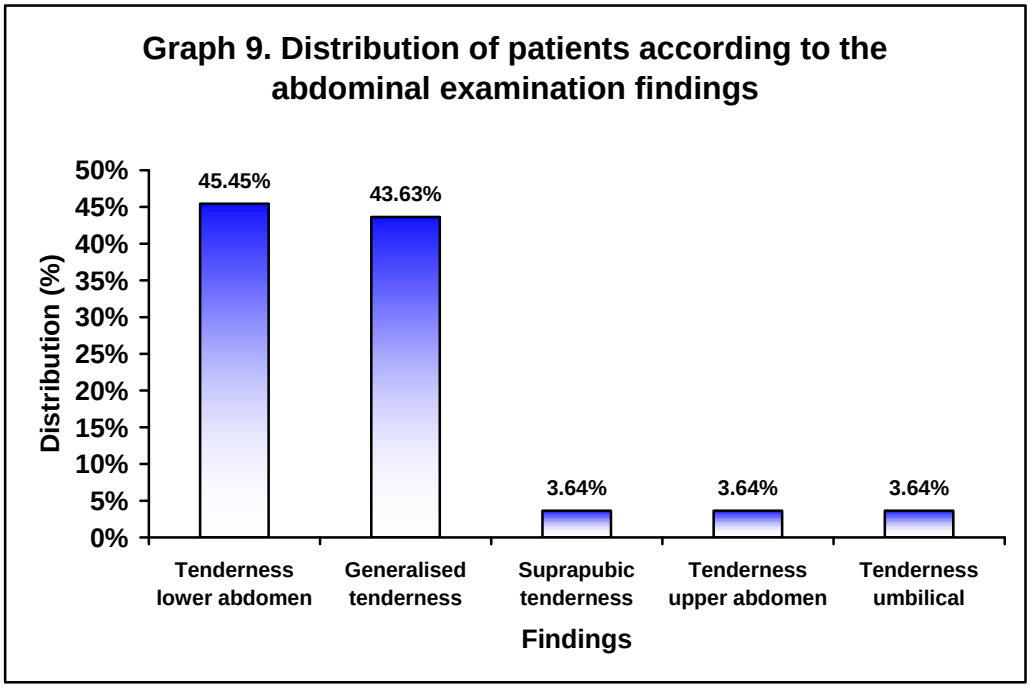
Past history	Distribution (n=55)	
	Number	**Percentage**
Previous LSCS	3	5.45
Hypertension	2	3.64
Hysterectomy	2	3.64
LSCS and tubectomy	2	3.64
Tubectomy	2	3.64
Lap. Adhesiolysis for intestinal obstruction	1	1.82
Open appendectomy	1	1.82
Right hemicolectomy	1	1.82
Tuberculosis	1	1.82
Nothing significant	40	72.73
Total	**55**	**100.00**



In the present study 72.73% of the patients did not report any significant past history. In the remaining, 5.45% of the females reported history of previous LSCS and 3.64% of the women reported hysterectomy and 3.64% of the patients had history of hypertension.

Table 7. Distribution of patients according to the abdominal examination findings

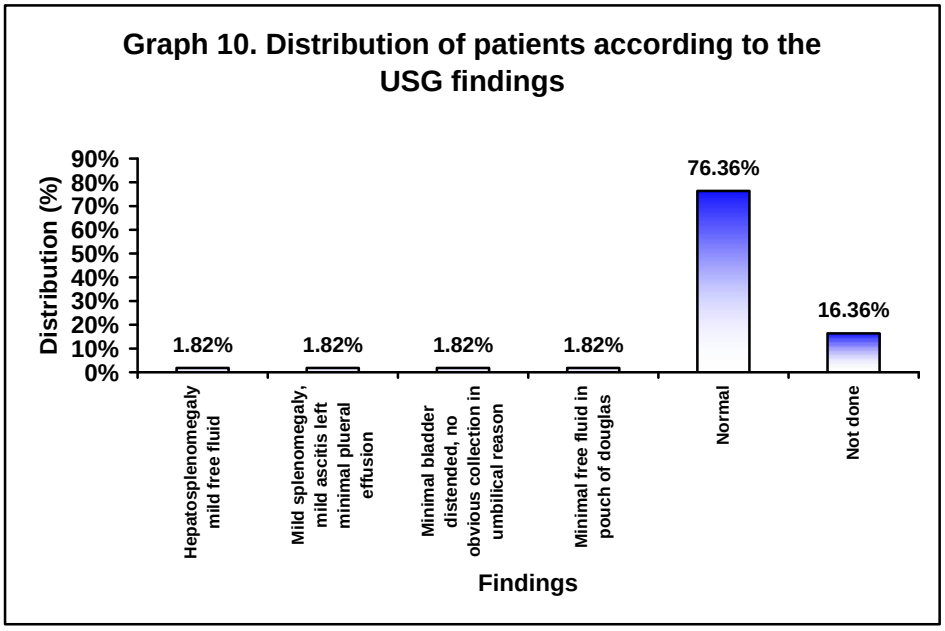
Findings	Distribution (n=55)	
	Number	**Percentage**
Tenderness lower abdomen	25	45.45
Generalised tenderness	24	43.63
Suprapubic tenderness	2	3.64
Tenderness upper abdomen	2	3.64
Tenderness umbilical	2	3.64
Total	**55**	**100.00**



In this study on abdominal examination, tenderness over lower abdomen was noted in 45.45% of the patients while 43.63% of the patients had generalised tenderness.

Table 8. Distribution of patients according to the USG findings

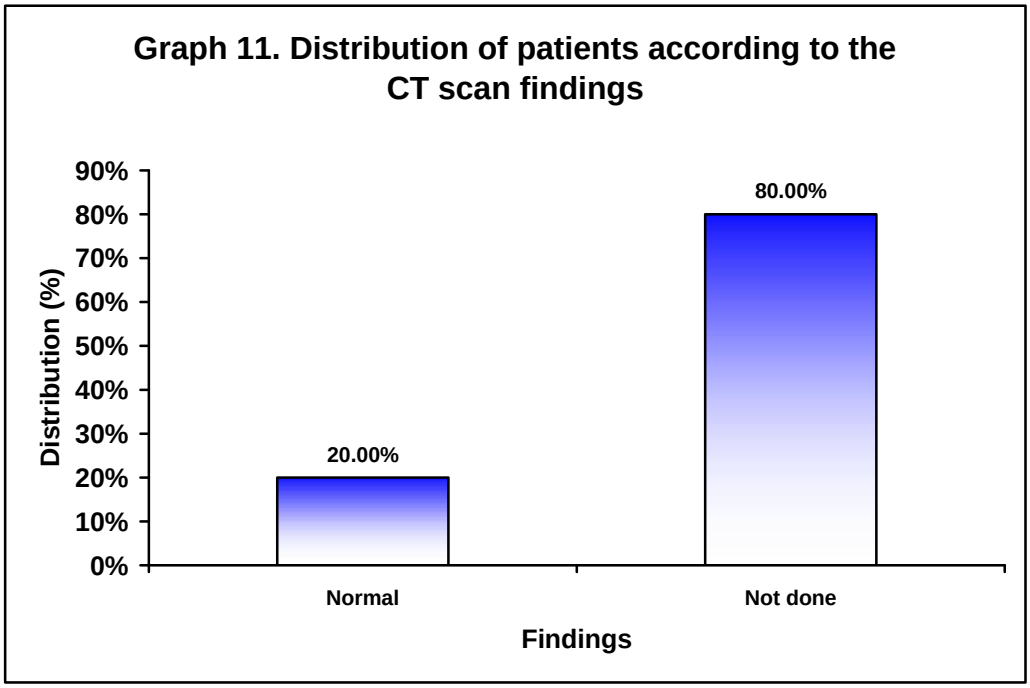
Findings	Distribution (n=55)	
	No.	**%**
Normal	42	76.36
Hepatosplenomegaly mild free fluid	1	1.82
Mild splenomegaly, mild ascitis left minimal plueral effusion	1	1.82
Minimal bladder distended, no obvious collection in umbilical reason	1	1.82
Minimal free fluid in pouch of douglas	1	1.82
Not done	9	16.36
Total	**55**	**100.00**



In the present study USG was done among 46 patients (83.64%) and majority of the patients had normal USG findings (76.36%). In those with abnormal USG findings, 1 patient each (1.82%) had hepatosplenomegaly mild free fluid, mild splenomegaly, mild ascitis left minimal plueral effusion, minimal bladder distended, no obvious collection in umbilical reason and minimal free fluid in pouch of Douglas.

Table 9. Distribution of patients according to the CT scan findings

Findings	Distribution (n=55)	
	Number	**Percentage**
Normal	11	20.00
Not done	44	80.00
Total	**55**	**100.00**

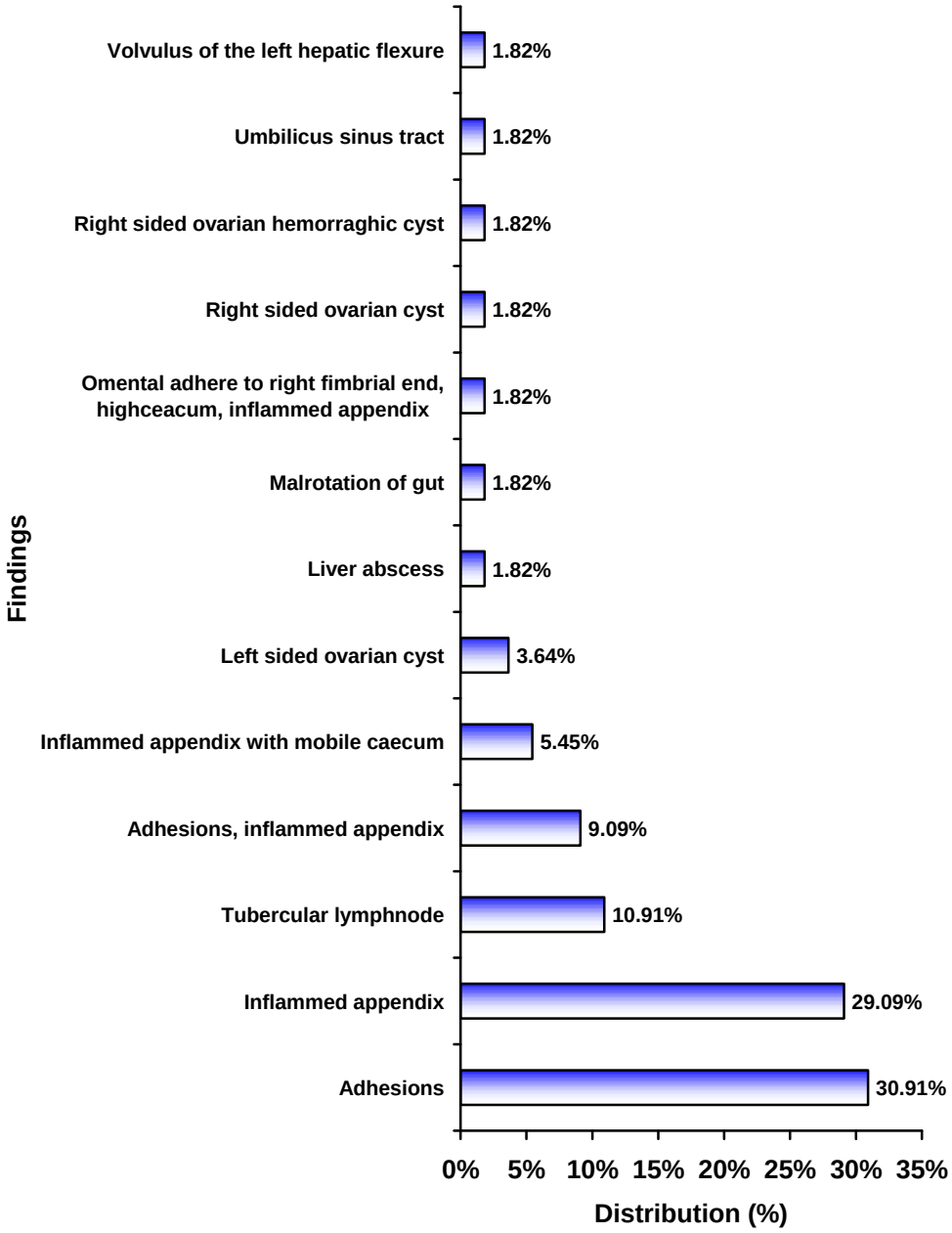


In this study, CT was done among 11 (20%) patients and CT findings revealed normal findings in all the 11 (20%) patients.

Table 10. Distribution of patients according to the surgical findings

Findings	Distribution (n=55)	
	No.	**%**
Adhesions	17	30.91
Inflammed appendix	16	29.09
Tubercular lymphnode	6	10.91
Adhesions with inflammed appendix	5	9.09
Inflammed appendix with mobile caecum	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, highceacum, inflammed appendix	1	1.82
Right sided ovarian cyst	1	1.82
Right sided ovarian hemorraghic cyst	1	1.82
Umbilicus sinus tract	1	1.82
Volvulus of the left hepatic flexure	1	1.82
Total	**55**	**100.00**

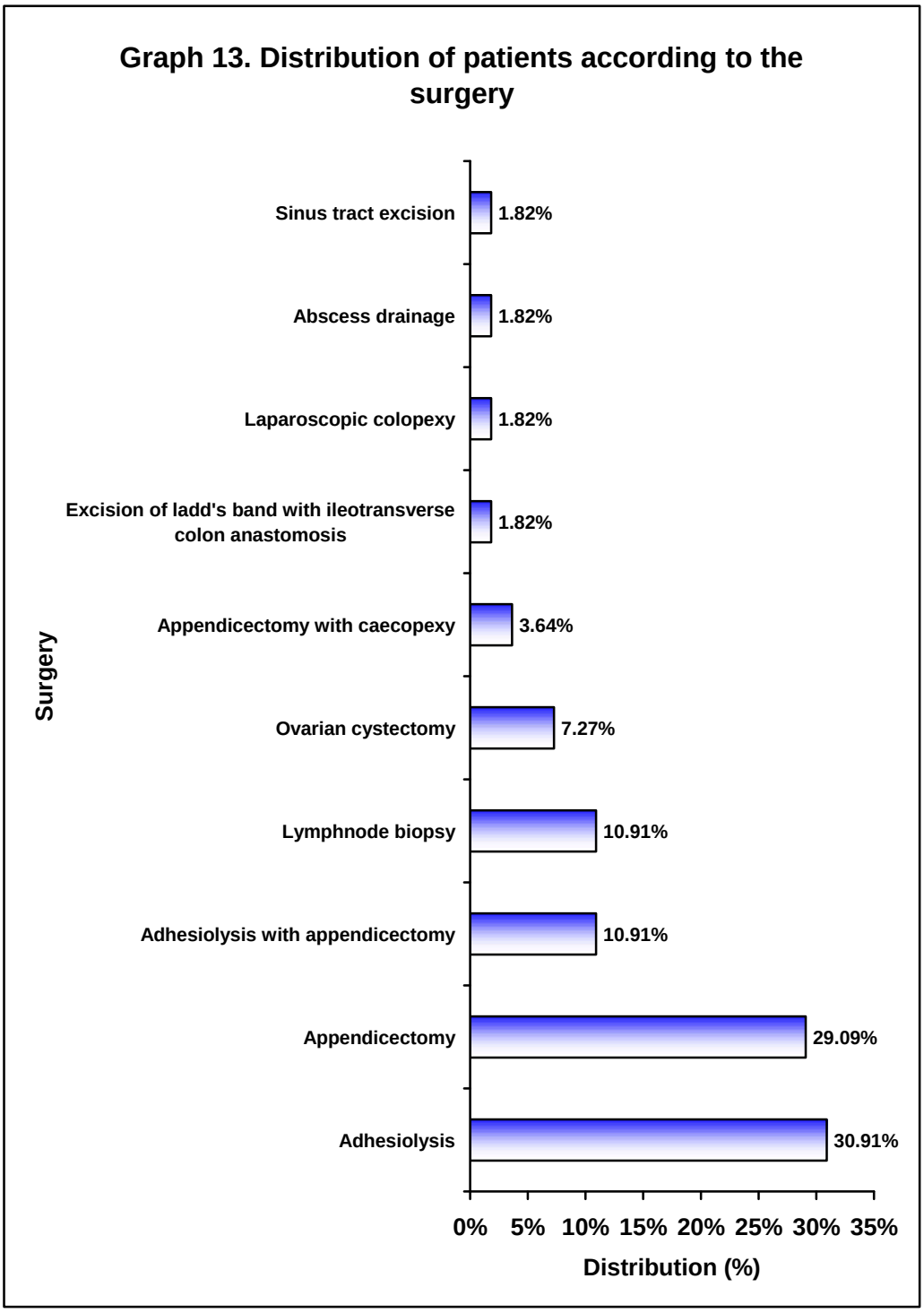
Graph 12. Distribution of patients according to the surgical findings



In the present study the most common surgical findings were adhesions (30.91%) followed by inflamed appendix (29.09%). The other surgical findings are as depicted in table 10 and graph 12.

Table 11. Distribution of patients according to the surgery

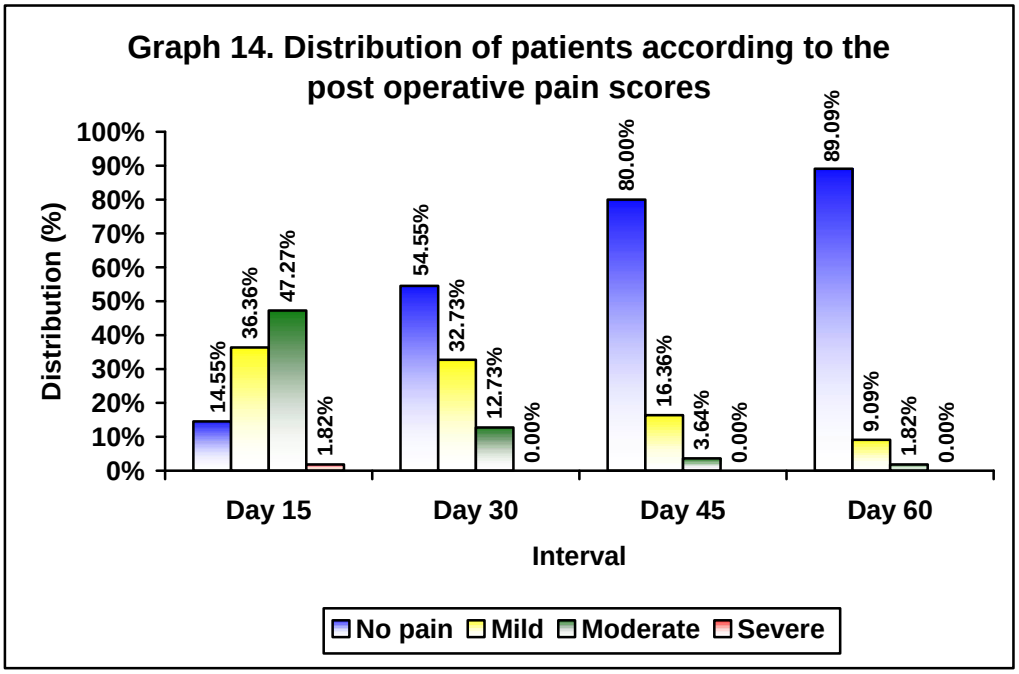
Surgery	Distribution (n=55)	
	Number	**Percentage**
Adhesiolysis	17	30.91
Appendicectomy	16	29.09
Adhesiolysis with appendicectomy	6	10.91
Lymphnode biopsy	6	10.91
Ovarian cystectomy	4	7.27
Appendicectomy with caecopexy	2	3.64
Excision of ladd's band with ileotransverse colon anastomosis	1	1.82
Laparoscopic colopexy	1	1.82
Abscess drainage	1	1.82
Sinus tract excision	1	1.82
Total	**55**	**100.00**



In this study the most common surgical procedure performed was adhesiolysis (30.91%) followed by appendicectomy (29.09%). The other procedures performed are as depicted in table 11 and graph 13.

Table 12. Distribution of patients according to the post operative pain scores

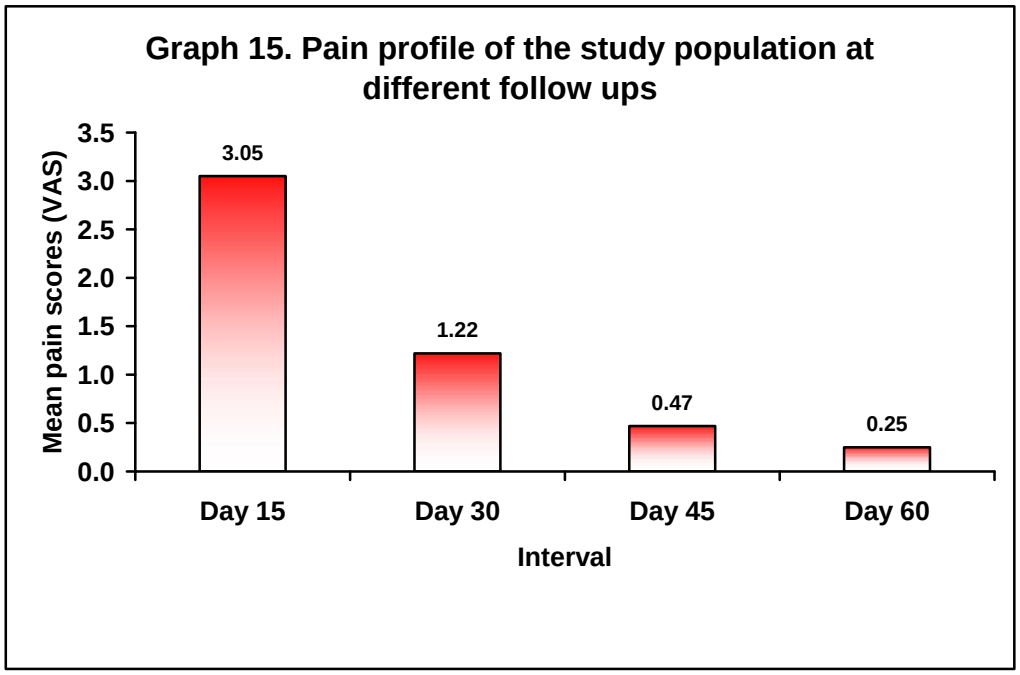
VAS scores	Intervals							
	15 days (n=55)		30 days (n=55)		45 days (n=55)		60 days (n=55)	
	No.	%	No.	%	No.	%	No.	%
No pain (0)	8	14.55	30	54.55	44	80.00	49	89.09
Mild (0 to 3)	20	36.36	18	32.73	9	16.36	5	9.09
Moderate (4 to 6)	26	47.27	7	12.73	2	3.64	1	1.82
Severe (> 6)	1	1.82	0	0.00	0	0.00	0	0.00
Total	**55**	**100.00**	**55**	**100.00**	**55**	**100.00**	**55**	**100.00**



In the present study on day 15, 47.27% of the patients had moderate pain and 14.55% of the patients had no pain. On day 30, 54.55% of the patients had no pain while pain was absent among 80% of the patients on day 45 and 89.09% of the patients on day 60.

Table 13. Pain profile of the study population at different follow ups

Interval	Mean pain scores (VAS) (n=55)	
	Mean	**SD**
Day 15	3.05	1.88
Day 30	1.22	1.54
Day 45	0.47	1.02
Day 60	0.25	0.78
F value	47.287	
P value	**<0.001**	

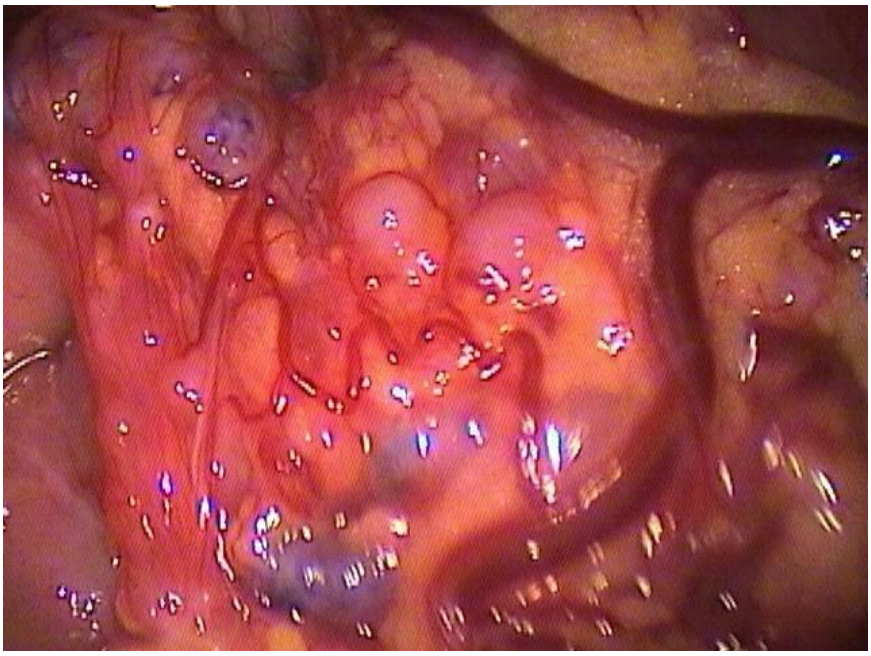


In this study the mean VAS gradually reduced from 3.05±1.88 on day 15 to 1.22±1.54 on day 30, 0.47±1.02 on day 45 and 0.25±0.78 on day 60. This reduction was statistically significant ($p<0.001$).

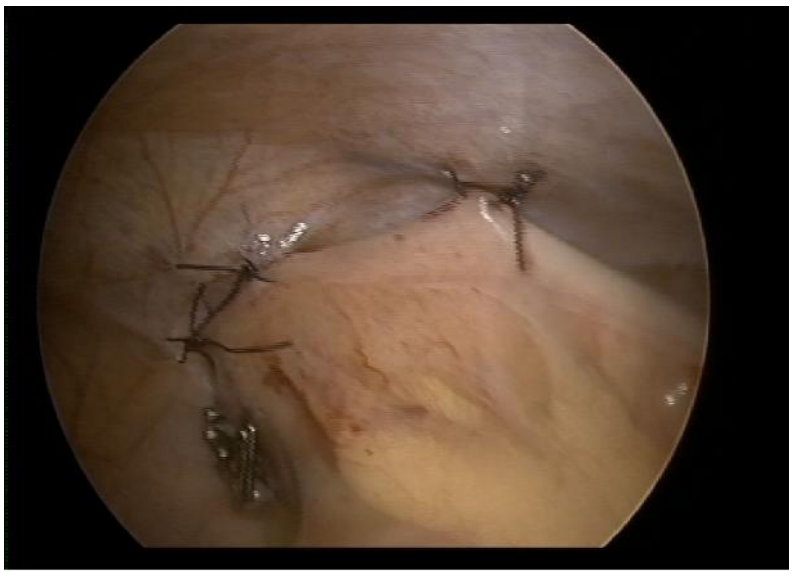
Table 14. Clinical and biochemical profile of the study population

Variables	Mean (n=55)		Median	Range	
	mean	SD		Min.	Max.
Age (Years)	37.67	14.45	36	18	68
Pain scores at enrolment (VAS)	7.45	0.74	7	6	9
Duration of pain (weeks)	10.80	2.78	10	8	16
Weight (Kgs)	62.65	6.68	60	50	82
Pulse rate (/minute)	76.39	6.19	76	60	92
Systolic blood pressure (mm Hg)	121.45	10.26	120	100	150
Dialostic blood pressure (mm Hg)	77.95	8.33	80	70	96
Respiratory rate (/minute)	17.80	1.99	18	14	22
Temperature(^{0}C)	97.71	0.99	98.2	94.2	99.2
Haemoglobin (gm%)	12.02	1.76	12.2	8.4	15.6
TLC (cumm)	8803.89	3859.00	9100	3900	30000
Platelet count (Lakh)	2.79	0.82	2.65	1.2	4.8
RBS (mg/dL)	102.29	15.82	98	71	160
Blood urea (mg/dL)	24.51	10.23	24	10	68
Serum creatinine (mg/dL)	0.94	0.24	0.9	0.5	1.5

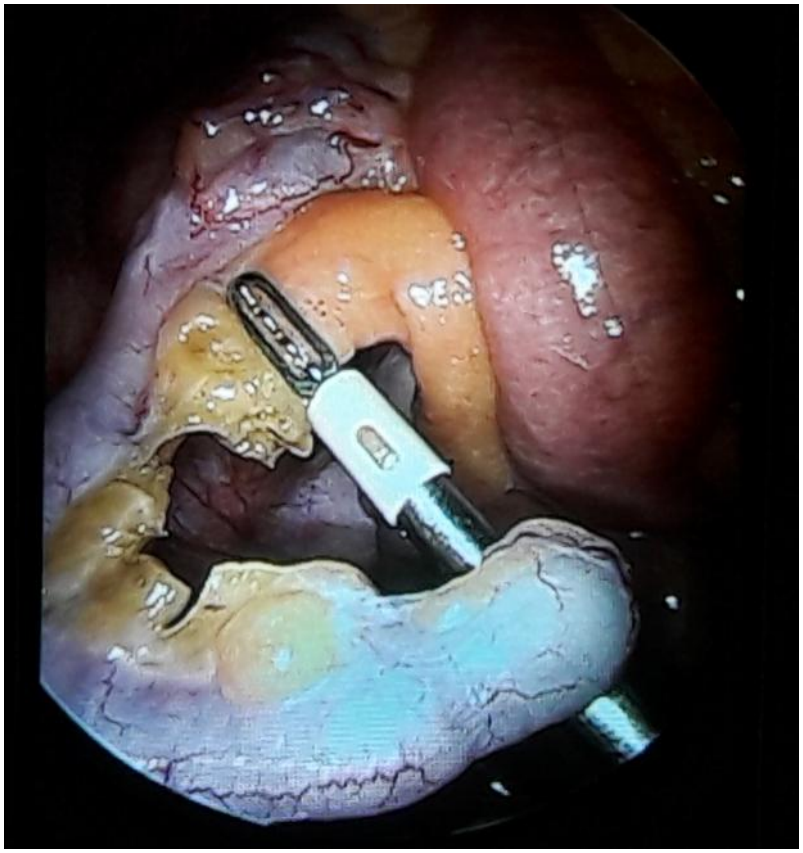
The clinical and biochemical profile of the study population is as shown table 14.



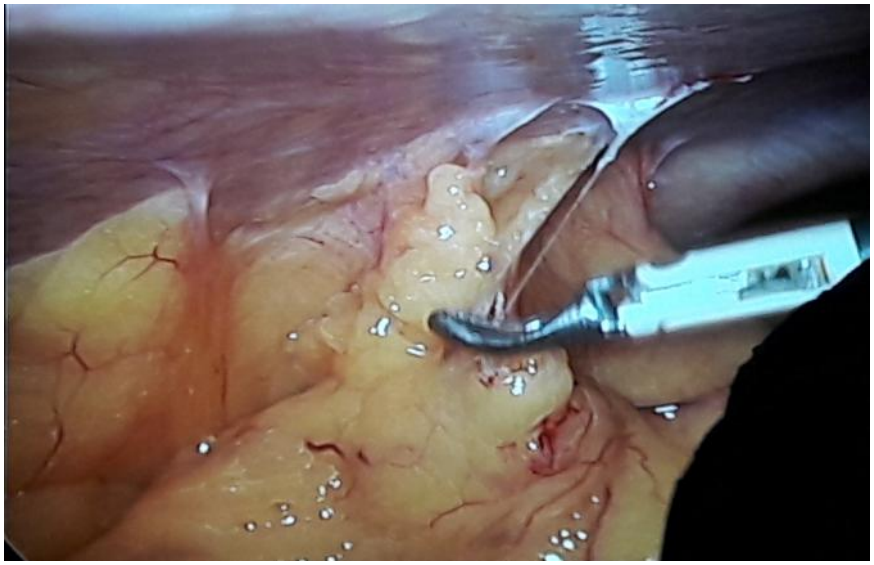
Photograph 6. Tuberculous mesentric lymphadenopathy



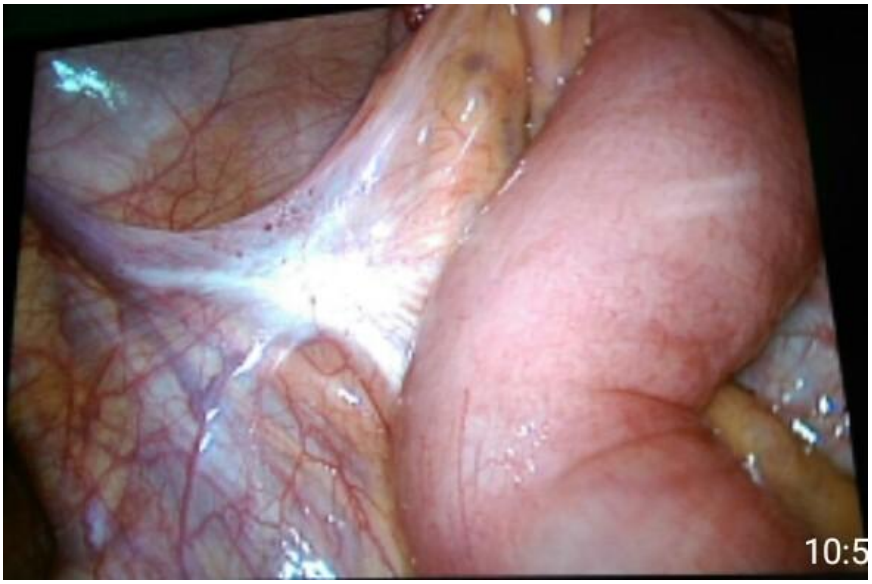
Photograph 7. Mobile caecum (Caecopexy)



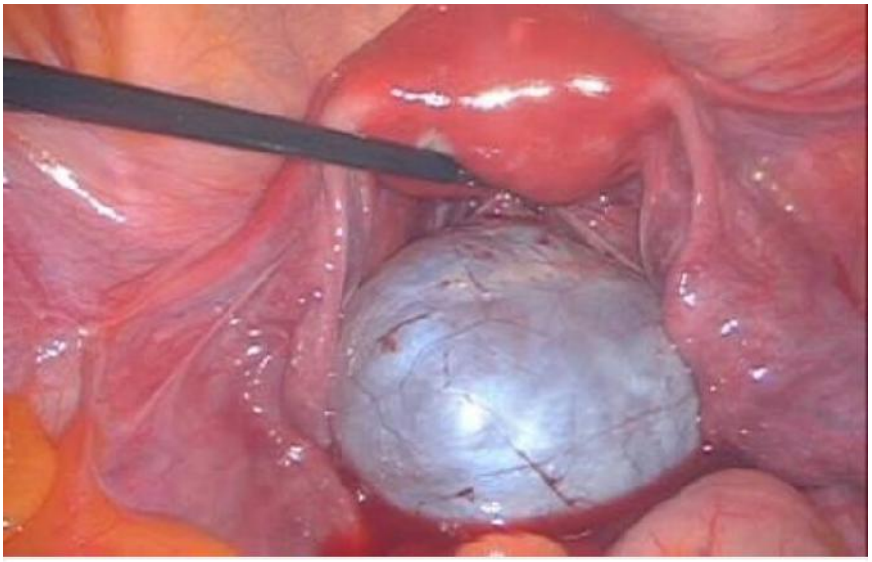
Photograph 8. Inflammed appendix



Photograph 9. Adhesions



Photograph 10. Pulled up caecum



Photograph 11. Ovarian cyst

DISCUSSION

Chronic abdominal pain is a common problem dealt not only by the general surgeon but by all practicing physicians. Even after extensive non-invasive work up of such patients, the exact cause of pain abdomen is seldom known. The aim of our study was to study the efficacy of diagnostic laparoscopy as an investigative modality in the diagnosis and management of patients with chronic pain abdomen. Diagnostic laparoscopy makes it possible for the surgeon to directly visualize the contents of the abdominal cavity better than any other investigative modality.[14] The present study evaluated the causes of chronic abdominal pain in undiagnosed patient based on biochemical and radiological investigations and to study outcome in terms of pain relief in such patients on follow up after elective diagnostic laparoscopy.

The present one year cross-sectional study was conducted in the Department of General Surgery, KLES Dr. Prabhakar Kore Hospital and Research Center, Belagavi. A total of 55 patients presenting with chronic abdominal pain for the duration of ≥8 weeks with uncertain diagnosis with evidence of bio-chemical and radiological investigations from January 2016 to December 2016 were studied.

In the present study more than two third of the patients (65.45%) were females and 34.55% were males with the male to female ratio was 1:1.89. these findings suggest that chronic abdominal pain is widely prevalent among females. These findings were several other studies by Naniwadekar RG et al.[2] Kumar A. et al.[89] and Kassa V et al. and Ajmera M.[90] from India. According to Gamal I. Moussa and Amal E. Mahfouz.,[91] diagnostic laparoscopy was done in 56 patients presenting with chronic abdominal pain, out of which majority (71.3%) were females. The

higher number of females in the present study may be explained by the number of gynaecological procedures the females undergo during the pregnancy like caesarean sections and hysterectomy and tubectomy.

In this study age ranged between ranged 18 to 68 years. More than one third of the patients were aged between 18 to 30 years (38.18%) and the mean age was 37.67±14.45 years and the median age was 36 years. these findings suggest that, the occurrence of chronic abdominal pain is mostly in younger individuals. The age distribution pattern observed in the present study was comparable to a study by Naniwadekar RG et al.[2] who found that maximum patients of chronic abdominal pain were from age group of 31-40 years, i.e. 15 out of 50 cases (30%). Kumar A et al.[89] in a similar study reported mean age of the patients as 34.42±2.56 years. Similarly in a study by Kassa V. et al.[90] age group of patients ranged from 12 to 65 years with the average age being 33 years which was comparable with the present study. In contrast to these observations studies by Klingensmith et al.[92] and Raymond et al.[93] with majority of the patients being women reported average age as 49 and 42 years respectively which was slightly high compared to the present study.

In order to establish precise cause of abdominal pain, patients should be asked about the time course of pain, both as part of the evaluation for a surgical abdomen and because once a surgical abdomen has been excluded the remainder of the evaluation will be guided by the chronicity of the symptoms along with the location of pain. The history of location of pain, radiation of pain, associated symptoms including fevers, chills, weight loss or gain, nausea, vomiting, diarrhea, constipation, hematochezia, melena, jaundice, change in the color of urine or stool, change in the diameter of stool, past medical and surgical history, including risk

factors for cardiovascular disease and details of previous abdominal surgeries, alcohol intake, menstrual and contraceptive history in women has utmost importance in confirming the etiology of pain.[65]

In the present study with regard to other demographic characteristics majority of the patients were married (84.55%) and more than half of the study population was comprised of graduates (54.55%). With respect to history of chronic abdominal pain, the duration of pain ranged between 8 to 16 weeks and most of the patients (65.45%) reported duration of pain as 8 to 12 weeks. The mean and median duration of pain was 10.80±2.78 and 7 weeks respectively. The mean VAS score at presentation was suggestive of severe pain in most of the patients (mean VAS 7.45±0.74 and median VAS score was 7 with range 6 being minimum and 9 being maximum) Further nearly half of the study population (49.09%) had generalized pain while and 65.45% of the patients reported progressive pain and 32.73% of the patients had intermediate pain. Though 49.09% percent had genaralised pain, 40% of the patients had lower abdominal pain and 5.45% of the patients each had upper abdominal pain and pain around umbilicus.

In this study the most common clinical presentation was fever noted in 41.82% of the patients. Though not common but other clinical presentation noted were diarrhea (3.64%), constipation (3.64%), burning micturation (1.82%) and miscellanenous (1.82%).

In the present study majority (72.73%) of the patients did not report any significant past history. Among the others, 5.45% of the females reported history of previous LSCS and 3.64% of the women had history of hysterectomy while 3.64%

of the patients revealed history of hypertension. As discussed above the higher incidence of chronic abdominal pain in females can be explained by the higher rate of gynaecological procedures among women.

It is reported that, the physical examination in patients with chronic abdominal pain varies depending upon the location and chronicity of the patient's symptoms. A typical examination should include measurement of blood pressure, pulse, and temperature, examination of the eyes and skin for jaundice, auscultation and percussion of the chest, auscultation of the abdomen for bowel sounds, palpation of the abdomen for masses, tenderness, and peritoneal signs, rectal examination including testing of stool for occult blood and pelvic examination in women with lower abdominal pain.[65] In this study with regard to vitals mean systolic blood pressure was 121.45±10.26 mm Hg and mean diastolic blood pressure was 77.95 ±8.33 mm Hg, the mean respiratory rate and temperature were 17.80 ± 1.99 per minute and 97.71±0.99 ^{0}C respectively and mean pulse rate was noted as 76.39±6.19 beats/minute suggesting normal vitals. On abdominal examination, tenderness over lower abdomen was noted in 45.45% of the patients while 43.63% of the patients had generalised tenderness.

Further with regard to biochemical profile, mean haemoglobin levels (12.02±1.76 gm%), TLC (8803.89±3859.00 /cumm), platelet count (2.79±0.82 lakhs/cumm), Random blood sugar (102.29±15.82 mg/dL), blood urea nitrogen (24.51±10.23 mg/dL), serum creatinine (0.94±0.24 mg/dL) were well within normal limits. With regard to radiological profile, of the 55 patients studied, USG was done in 46 patients (83.64%) and 76.36% of the patients had normal USG findings and one patient each (1.82% each) had echogenic mass lesion in left adnexa,

hepatosplenomegaly mild free fluid, mild splenomegaly with mild ascitis left minimal plueral effusion, minimal bladder distended, no obvious collection in umbilical reason and Minimal free fluid in pouch of Douglas. The CT was conducted among 11 (20%) patients of which, one patient (1.82%) had celiac artery compression syndrome and 10 patients (18.18%) had normal findings. However, these diagnosis did not result in chronic abdominal pain.

The causes of chronic abdominal pain include organic disorders like abdominal tuberculosis, intestinal adhesions, appendicitis, pelvic inflammatory disease as well functional disorders like IBS, functional dyspepsia and motility disorders. It is imperative to rule out any organic cause of pain before a patient is categorized as having a functional abdominal pain.[14]

In the present study the most common surgical findings were adhesions (30.91%) followed by inflamed appendix (29.09%) and tubercular lymph node (10.91%).

Adhesions, whether congenital or postoperative are also difficult to diagnose with imaging techniques and laparoscopy provides the means of diagnosing as well as performing intervention in the form of adhesiolysis in these patients.[14] The most frequent abdominal pathology detected in our study were abdominal adhesions noted in 30.91% of the patients. This observation was consistent with a study by Kumar A et al.[89] who reported the most frequent abdominal pathology as abdominal adhesions in 30%. Also, Tiwari and Peters[94] and Di lorenzo and colleagues,[95] reported an incidence of 31.5% and 18.6% respectively. Adhesions will cause chronic abdominal pain if it restrict the mobility or distensibility of abdominal organs especially the bowel.[96] In contrast to the observations noted in the present study and

the studies by Kumar A. et al.,[89] Tiwari and Peters[94] and Di lorenzo and colleagues,[95] Naniwadekar RG et al.[2] in their recent study reported Abdominal Koch's was the most frequent cause of chronic abdominal pain after excluding gynaecological cases.

In this study by inflamed appendix (29.09%) was the second most common cause of the diagnosis was made based on the presence of adhesions between the appendix and surrounding structures, presence of a long, kinked appendix or presence of a faecolith. Recurrent Appendicitis as an entity has been well documented and has been a common diagnosis at laparoscopy in a number of studies.14-16.[D1] In a study by Kassa V et al.[90] recurrent appendicitis was the second most common diagnosis (16.66%). Raymond and his colleagues[93] reported 15.7% chronic appendicitis.

In the present study the other uncommon findings noted were tubercular lymphnode (10.91%) adhesions with inflamed appendix (9.09%), left sided ovarian cyst (3.64%), inflammed appendix with mobile caecum (5.45%), liver abscess (1.82%), malrotation of gut (1.82%), mobile caecum with inflammed appendix (1.82%), omental adhesion to the right fimbrial end with highceacum with inflammed appendix (1.82%), right sided ovarian cyst (1.82%), right sided ovarian hemorraghic cyst (1.82%), umbilicus sinus tract (1.82%) and Volvulus of the left hepatic flexure (1.82%).

In this study 30.91% of the patients were found to have adhesions, adhesiolysis was done as a therapeutic procedure. Accordingly adhesiolysis was the most common surgical procedure performed in 30.91% of the patients and Also by

inflamed appendix (29.09%) was the second most common cause hence appendicectomy was the next common procedure done in 29.09% of the patients followed by adhesiolysis with appendicectomy and Lymphnode biopsy (10.91%). The other uncommon procedures performed were ovarian cystectomy (7.27%), appendicectomy with caecopexy (3.64%), excision of ladd's band with ileotransverse colon anastomosis (1.82%), Laparoscopic colopexy (1.82%), Abscess drainage (1.82%) and sinus tract excision (1.82%). In a study by Klingensmith et al.[92] involving 34 patients, 56% of them underwent adhesiolysis. In a study by Shayani et al.[97] involving 18 cases, laparoscopic adhesiolysis resulted in a 77.8% cure rate from chronic abdominal pain. In a study by Dunker S et al.[98] laparoscopic adhesiolysis resulted in a positive outcome in more than 50% of patients.

Laparoscopic surgery is a method in which the peritoneal cavity can be visualised without making large surgical incisions.[89] It has modified the management of many surgical diseases.[99] Diagnostic laparoscopy is now accepted as the preferred primary approach to many disease processes.[100] In the present study the overall pain relief was noted 49 (89.09%) patients. This finding was consistent with a study by Kumar A et al. who reported (86%) in terms of less or no pain, after two months of laparoscopy. In this study on day 15 post procedure, 47.27% of the patients had moderate pain, 36.36% of the patients had mild pain and 14.55% of the patients had no pain that is 0 VAS. There was increase in patients with no pain that is 0 VAS from 14.55% on day 15 to 54.55% on day 30, and further increase to 80% on day 45 and marginal increase on day 60 that is 89.09% suggesting excellent pain relief in difficult patient group that is patients presenting with severe chronic pain with the duration of 10 weeks without the relevant biological and radiological

investigation. Also the mean VAS gradually reduced from 3.05±1.88 on Day 15 to 1.22±1.54 on Day 30, 0.47±1.02 on Day 45 and 0.25±0.78 on Day 60 This reduction was statistically significant ($p<0.001$). However, post procedure pain persisted in 6 (10.90%) patients. Of whom 5 (9.09%) patients had mild pain (VAS score 2) each one of them had undergone appendicectomy with caeapexy, appendicectomy, lymphnode biopsy, ovarian cystectomy and sinus tract excision and one patients who had moderate pain (VAS 4) had undergone excision of ladd's band with ileotransverse colon anastomosis. All these patients had presented with severe pain (VAS score of either 8 or 9).

Overall, laparoscopy is safe, quick and effective modality of investigation for chronic abdominal pain. It has a high diagnostic and therapeutic efficacy. Ability to pin point a cause for the abdominal pain or exclude a more major cause for pain not only avoids further investigations but also plays a significant role in alleviating the fears in the minds of the patients. Not only does laparoscopy point to a diagnosis, it has the added advantage that therapeutic intervention can be done at the same sitting in most cases thus avoiding another hospitalization or another exploration of the abdomen.[D2] Hence the present study confirms that diagnostic laparoscopy makes it possible for the surgeon to directly visualize the contents of the abdominal cavity better than any other investigative modality and could safely identify abnormal findings and can improve the outcome in a majority of the difficult patient group who present with any type of severe chronic pain with the duration of almost 10 weeks without the relevant biological and radiological background providing hint for the confirmation of diagnosis. Laparoscopy allows for performing every possible

procedure, limited only by the skill, training and coordination of the laparoscopy surgical team.[14,101-103]

The present study showed that, laparoscopy offers a definitive diagnosis in a large number of these patients who present with undiagnosed chronic abdominal pain and also provides therapeutic intervention. Relief of pain is obtained in a large number of these patients which makes laparoscopy as a excellent diagnostic modality in the management of chronic abdominal pain. However these findings need further validation due to potential limitations of this study. The present study was a single centre and smaller sample size hence the findings cannot be generalized to entire population.

CONCLUSION

Based on the findings of this study it may be concluded that, adhesions and inflamed appendix are important causes of chronic abdominal pain. The other important causes of chronic abdominal pain are tubercular lymphnode and adhesions with the inflamed appendix. However, left sided ovarian cyst, inflammed appendix with mobile caecum, liver abscess, malrotation of gut, mobile caecum with inflammed appendix, omental adhesion to the right fimbrial end with high ceacum with inflammed appendix, right sided ovarian cyst, right sided ovarian hemorraghic cyst, umbilicus sinus tract and volvulus of the left hepatic flexure are uncommon causes of chronic abdominal pain. Elective diagnostic laparoscopy in selected patients, offers excellent pain relief. Hence laparoscopy is an effective diagnostic modality in the management of patients with chronic abdominal pain.

SUMMARY

Chronic abdominal pain is a significant clinical problem and is often a diagnostic challenge due to no specific diagnosis after biochemical and radiological evaluation. Diagnostic laparoscopy, is a minimally invasive procedure that could potentially be diagnostic and also therapeutic for chronic undiagnosed abdominal pain. Present study aimed to know the causes of chronic abdominal pain in undiagnosed patient on biochemical and radiological investigations at the same time to study outcome in terms of pain relief in such patients on follow up after elective diagnostic laparoscopy.

The present cross-sectional study was done in the Department of General Surgery, KLES Dr. Prabhakar Kore Hospital and Research Center, Belagavi for the duration of on year from January 2016 to December 2016. A total of 55 patients presenting with chronic abdominal pain for (≥8 weeks) with uncertain diagnosis were studied. The salient findings of the study are summarized as below.

- Most of the patients (65.45%) were females, and the male to female ratio was 1:1.89.

- The most common age patients was 18 to 30 years (38.18%) and the mean age was 37.67±14.45 years.

- Most of the patients were married (84.55%) and 54.55% of the patients were graduates.

- Most of the patients (65.45%) had duration of pain between 8 to 12 weeks. The mean duration of pain was 10.80±2.78 weeks.

- 49.09% of the patients had generalized pain while 40% of the patients reported lower abdominal pain and 65.45% of the patients had progressive pain. 32.73% of the patients had intermediate pain while 30% of the patients reported moderate pain.

- Fever was noted in 41.82% of the patients and other clinical features were diarrhea (3.64%), constipation (3.64%), micturation (1.82%) and others (1.82%).

- 5.45% of the females reported history of previous LSCS and 3.64% of the women reported hysterectomy and 3.64% of the patients had history of hypertension.

- Tenderness over lower abdomen was noted in 45.45% of the patients while 43.6.% of the patients had generalised tenderness.

- USG was done in 46 patients (83.64%) and majority of the patients had normal USG findings (76.36%).

- CT was done in 11 (20%) patients. CT findings revealed normal findings in all 11 (18.18%) patients.

- The most common surgical finding were adhesions (30.91%) followed by inflamed appendix (29.09%).

- The most common surgical procedure performed was adhesiolysis (30.91%) followed by appendicectomy (29.09%).

- On day 15, 47.27% of the patients had moderate pain and 14.55% of the patients had no pain. On day 30, 54.55% of the patients had no pain while pain was absent among 80% of the patients on day 45 and 89.09% of the patients on day 60.

- The mean VAS gradually reduced from 3.05±1.88 on Day 15 to 1.22±1.54 on Day 30, 0.47±1.02 on Day 45 and 0.25±0.78 on Day 60 This reduction was statistically significant ($p<0.001$).

Based on the findings of this study it may be concluded that, adhesions and inflamed appendix are important causes of chronic abdominal pain. Furthermore Elective diagnostic laparoscopy in selected patients, offers excellent pain relief. Hence laparoscopy is an effective diagnostic modality in the management of patients with chronic abdominal pain.

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ANNEXURE I – CONSENT FORM

ROLE OF DIAGNOSTIC LAPAROSCOPY IN CHRONIC ABDOMINAL PAIN WITH UNCERTAIN DIAGNOSIS A ONE YEAR CROSS SECTIONAL STUDY

Objective and purpose of the study

This research is intended to assess role of diagnostic laparoscopy in chronic abdominal pain with uncertain diagnosis. The principal investigator of the study is Dr. *** **** ***** under the guidance of Dr. **** ***** ******

Procedure

If you agree to be part of the research study you will be asked the relevant history and will be subjected to relevant clinical examination and investigations and diagnostic procedure.

Benefits

The benefits of the procedure under study are early recovery time, better cosmetics and minimal complication.

Risks

There is no additional risk as compared to standard treatment. Taking part in this study is voluntary. You may choose not to take part in this study, or if you decide to take part you can later change my mind and withdraw from the study. Your decision will not change the present or future health care or other services that you receive. The study doctor or sponsorer may stop your participation in this study any time. If you choose not to take part in the study you will receive the standard treatment for patients with your condition.

Privacy and Confidentiality

All information collected about you during the course of this study will be kept confidential to the extent permitted by law. The code numbers will identify you in this research record. Information from this study may be published but your identity will be confidential in any publication.

Institution / Sponsor's policy

Doe's not apply to this research.

Voluntary participation / withdrawn

Your participation in this study is entirely voluntary and you may withdraw from the study at any time.

Financial incentives for participation

You will not be paid / offered any gifts / incentives for participating in the study.

Authorization to public the results

Question Contact Details

Whom should I contact if needed some clarification or help at any time during the study period?

You shall be free to contact the bellow mentioned name address any during the study period for any clarification or help you may desire for

Dr. ** **** ********
Investigator,
PG in General Surgery
Jawaharlal Nehru Medical College,
Belagavi - – 590 010
Phone Number: ***** *****

Dr. ** * *********
MS (General Surgery)
Professor,
Jawaharlal Nehru Medical College,
Belagavi – 590 010

In case you need any further information regarding your rights as study participant you may contact

Dr. ** ******,**
Chairman,
J.N.M.C Ethical Committee for Human Research,
Professor Department of Pathology,
Jawaharlal Nehru Medical College,
Belgavi – 590 010
Phone Number: *** *******,
Extn: ****

ANNEXURE II – PROFORMA

Patient Identification Data

In Patient Number:	Date:
Name:	DOA:
Age & Sex:	DOS:
Unit:	DOD:

Marital status:

Educational status:

Chief complaints:

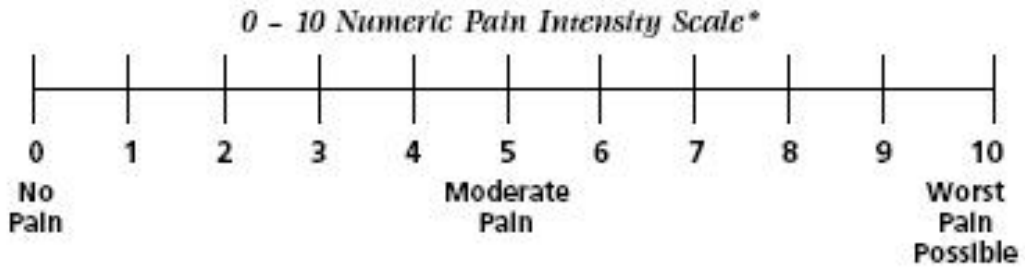
Pain

1 - Site

2 – Nature

3 – Severity

Duration of pain



4 – Associated symptoms

1.	Fever:	Yes/No
2.	Diarrhoa:	Yes/No
3.	Constipation	Yes/No
4.	Burning Maturation	Yes/No

5. Others

3. Past History

4. Personal History

5. Family History

6. General Physical Examination

Built and Nourishment: Weight:

Pallor : Icterus:

Cyanosis: Clubbing:

Edema: Lymphadenopathy:

Vital Signs

PR: /Min BP: mmHg

RR: /Min Temp: ^{0}C

7. Systemic examination

Per Abdomen:

Cardio Vascular System:

Respiratory system:

8. Clinical Impression

9. Investigation

1. Bio-chemical investigation

Blood Routine: HB Total leucocyte count:

Platelet count: Random blood sugar:

Blood urea: Serum creatinine:

LFT: Bleeding time:

Clotting time:

2. Urine routine and microscopy

3. Radiological investigation

USG:

CT scan:

MRI scan:

10. Operation details

Anesthesia General Anesthesia:

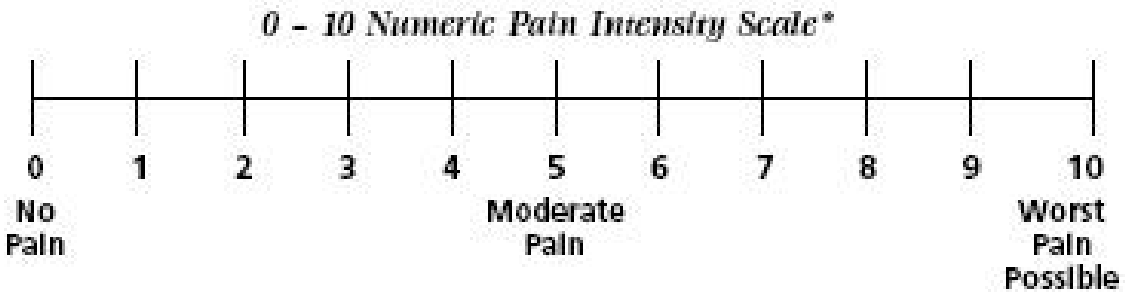
Duration of surgery:

Surgery findings:

11. On follow up assessment of pain for 2 consecutive months for every 15 days

Pain on	**15th day**	**30th day**	**45th day**	**60th day**
VAS Score				

Any other complaints



ANNEXURE III – KEY TO MASTER CHART

-	-	Absent
+	-	Present
^{0}C	-	Degree Celsius
Adhes	-	Adhesiolysis
Append.	-	Appendicectomy
AU	-	Around umbilicus
BP	-	Blood pressure
CT	-	Computed tomography
cumm	-	Cubic millimeter
D	-	Dragging
DOA	-	Date of admission
DOD	-	Date of discharge
DOS	-	Date of surgery
EOLB	-	Excision of ladd's band
F	-	Female
GA	-	General anaesthesis
Gen.	-	Generalised
gm%	-	Gram in percentage
Gr	-	Graduate
HRS	-	Hours
HTN	-	Hypertension
Hyst	-	Hysterectomy
I	-	Intermediate

IO	-	Intestinal obstruction
Kgs	-	Kilograms
LA	-	Lower abdomen
LSCS	-	Lower segment caesarean section
M	-	Male
Mr	-	Married
Md	-	Moderate
MBD	-	Minimal bladder distended
mg/dL	-	Miligram per deciliter
MI	-	Mile
min	-	Minute
mmHg	-	Millimeter of mercury
MSMA	-	Mild splenomegaly, mild ascitis
N	-	Normal
ND	-	Not done
NS	-	Nothing significant
NVBS	-	Normal vascular breath sounds
OA	-	Open appendectomy
OARFE	-	Omental adhere to right fimbrial end
P	-	Progressive
PE	-	Pleural effusion
P.T	-	Pricking time
Pgr	-	Post Graduate
PR	-	Pulse rate
Prev	-	Previous

Prm	-	Primary
RBS	-	Random blood sugar
RH	-	Right hamicolectomy
S	-	Severe
Sec	-	Secondary
Sg	-	Single
St	-	Studying
Suprap	-	Suprapubic
TB	-	Tuberculosis
Tend	-	Tenderness
TLC	-	Total leukocyte count
Tubect	-	Tubectomy
UA	-	Upper abdomen
Umb	-	Umbilical
USG	-	Ultrasound
VAS	-	Visual analog scale
W.B	-	Well built

ANNEXURE III - MASTER CHART

Serial number	In patient number	Demographic data								Chief complaints										History			General physical examination														Systemic examination		
										Pain					Associated symptoms														Vital signs										
																														BP (mmHg)									
		Age (Years)	Sex	DOA	DOS	DOD	Unit	Marital status	Educational status	VAS Score	Duration of pain(weeks)	Site	Nature	Severity	Fever	Diarrhoa	Constipation	Burning Micturition	Others	Past history	Personal history	Family history	Built and nourishment	Weight (Kgs)	Pallor	Icterus	Cyanosis	Clubbing	Edema	Lymphadenopathy	PR (min)	Systolic	Dialostic	Respiratory rate (min)	Temperature(0C)	Per abdomen	Cardiovascular system	Respiratory system
1	742243	41	F	#######	6/15/2016	#######	F	Mr	Prm	8	20	L.A	P	I	-	+	+	-	-	NS	-	-	WB	60	-	-	-	-	-	-	74	130	90	18	98	Tend LA	S1S2+	NVBS
2	745671	45	F	7/4/2016	7/4/2016	7/7/2016	C	Mr	Sec	7	8	L.A	P	I	-	-	-	-	-	Tubect	-	-	WB	75	-	-	-	-	-	-	82	130	90	16	97	Tend LA	S1S2+	NVBS
3	713782	31	F	#######	1/31/2016	#######	A	Mr	Gr	7	8	L.A	I	Md	+	-	-	-	-	NS	-	-	WB	60	-	-	-	-	-	-	76	120	70	18	98.4	suprap Tend	S1S2+	NVBS
4	738141	20	F	#######	5/26/2016	#######	F	Mr	Gr	7	8	Gen.	D	Md	-	-	-	-	-	NS	-	-	WB	60	-	-	-	-	-	-	78	130	90	18	97.6	Tend. LA	S1S2+	NVBS
5	724827	68	M	#######	3/17/2016	#######	C	Mr	Sec	7	8	Gen.	M	MI	+	-	+	-	-	NS	-	-	WB	66	-	-	-	-	-	-	79	130	90	19	98.12	Tend. LA	S1S2+	NVBS
6	736075	50	F	#######	3/16/2016	#######	G	Mr	Sec	8	12	Gen.	I	Md	-	-	-	-	-	NS	-	-	WB	58	-	-	-	-	-	-	82	120	70	16	97.2	Gen. Tend.	S1S2+	NVBS
7	725287	65	M	5/4/2016	5/4/2016	6/8/2016	G	Mr	Sec	7	16	Gen.	P	Md	+	-	-	-	-	NS	-	-	WB	60	-	-	-	-	-	-	70	130	90	20	98.7	Tend UA	S1S2+	NVBS
8	754956	28	F	8/9/2016	8/9/2016	#######	E	Mr	Gr	8	8	U.A	I	P	+	-	-	-	-	NS	-	-	WB	54	-	-	-	-	-	-	74	120	70	18	99.2	Gen. Tend.	S1S2+	NVBS
9	756840	40	M	#######	7/14/2016	#######	E	Mr	Gr	8	8	U.A	I	Md	+	-	-	-	-	NS	-	-	WB	60	-	-	-	-	-	-	60	120	70	17	98.2	Tend UA	S1S2+	NVBS
10	747204	62	F	#######	31/6/2016	7/7/2016	D	Mr	Gr	9	10	L.A	P.T	S	+	-	-	-	-	HTN	-	-	WB	82	-	-	-	-	-	-	74	130	70	16	99.2	Gen. Tend.	S1S2+	NVBS
11	747344	30	F	#######	7/11/2016	#######	E	Mr	Gr	8	10	Gen.	D	I	+	+	-	-	-	NS	-	-	WB	65	-	-	-	-	-	-	76	110	70	20	98.2	Gen. Tend.	S1S2+	NVBS
12	776362	44	F	#######	########	#######	D	Mr	Gr	8	12	Gen.	I	P	+	-	-	-	-	Prev LSCS	-	-	WB	60	-	-	-	-	-	-	74	110	70	16	98.2	Gen. Tend.	S1S2+	NVBS
13	762341	30	F	#######	########	#######	B	Mr	Gr	7	12	L.A	I	P	-	-	-	-	-	NS	-	-	WB	54	-	-	-	-	-	-	76	110	70	21	97.2	Tend. LA	S1S2+	NVBS
14	742161	42	M	#######	9/14/2016	#######	C	Mr	Sec	8	14	Gen.	I	P	+	-	-	-	-	NS	-	-	WB	60	-	-	-	-	-	-	74	110	70	18	98.2	Gen. Tend.	S1S2+	NVBS
15	742561	34	M	#######	8/12/2016	#######	B	Mr	Gr	8	8	Gen.	P	P	+	-	-	-	-	NS	-	-	WB	60	-	-	-	-	-	-	82	130	90	16	99.2	Gen. Tend.	S1S2+	NVBS
16	756950	40	F	9/4/2016	9/4/2016	#######	B	Mr	Sec	7	10	L.A	P	Md	+	-	-	-	-	LSCS, tubect	-	-	WB	65	-	-	-	-	-	-	80	130	80	18	97.2	Tend. LA	S1S2+	NVBS
17	746110	38	F	#######	7/14/2016	#######	E	Mr	Pgr	8	8	Gen.	D	I	+	-	-	-	-	NS	-	-	WB	60	-	-	-	-	-	-	82	120	70	16	98.2	Tend. LA	S1S2+	NVBS
18	734875	60	M	5/9/2016	5/9/2016	#######	F	Mr	Prm	9	10	A.U	P	S	-	-	-	-	-	NS	-	-	WB	70	-	-	-	-	-	-	82	130	90	22	97.2	Tend Umb.	S1S2+	NVBS
19	746166	38	F	7/8/2016	7/8/2016	7/6/2016	E	Mr	Gr	8	16	Gen.	P	S	-	-	-	-	-	Prev LSCS, Tubect	-	-	WB	65	-	-	-	-	-	-	68	130	80	16	98.4	suprap Tend	S1S2+	NVBS
20	764418	35	F	#######	6/10/2016	#######	A	Mr	Gr	6	10	U.A	S	Md	-	-	-	-	-	Prev LSCS	-	-	WB	68	-	-	-	-	-	-	74	120	90	18	96.2	Tend Umb.	S1S2+	NVBS
21	809880	30	F	#######	########	#######	F	Mr	Gr	7	16	Gen.	D	S	-	-	-	-	-	NS	-	-	WB	71	-	-	-	-	-	-	80	110	90	16	98.2	Gen. Tend.	S1S2+	NVBS
22	800040	32	F	#######	########	#######	F	Mr	Gr	8	8	L.A	S	S	+	-	-	-	-	NS	-	-	WB	60	-	-	-	-	-	-	78	120	70	18	96.2	Tend. LA	S1S2+	NVBS
23	769274	22	F	#######	########	#######	D	Mr	St	6	8	L.A	P	I	-	-	-	-	-	NS	-	-	WB	60	-	-	-	-	-	-	78	130	91	20	98.2	Tend. L.A.	S1S2+	NVBS
24	748282	48	M	#######	7/15/2016	#######	C	Mr	Gr	7	10	Gen.	P	I	-	-	-	-	-	HTN	-	-	WB	65	-	-	-	-	-	-	82	150	90	18	99.2	Gen. Tend.	S1S2+	NVBS
25	766174	26	F	#######	########	#######	A	Mr	Gr	7	10	L.A	P	I	-	-	-	-	-	NS	-	-	WB	60	-	-	-	-	-	-	84	130	80	16	97.2	Tend. LA	S1S2+	NVBS
26	736616	21	M	9/7/2016	9/10/2016	#######	B	Sg	St	7	10	L.A	I	Md	+	-	-	-	-	NS	-	-	WB	62	-	-	-	-	-	-	64	110	70	18	98.2	Tend. LA	S1S2+	NVBS
27	782065	40	F	#######	########	#######	E	Mr	Sec	8	12	L.A	P	Md	+	-	-	-	-	NS	-	-	WB	54	-	-	-	-	-	-	78	130	80	22	97.2	Tend. LA	S1S2+	NVBS
28	781752	58	F	#######	########	#######	F	Mr	Sec	9	14	L.A	P	S	-	-	-	-	-	TB	-	-	WB	70	-	-	-	-	-	-	76	140	70	14	97.2	Gen. Tend.	S1S2+	NVBS
29	786900	36	M	#######	########	#######	F	Mr	Gr	6	12	Gen.	P	I	-	-	-	-	-	NS	-	-	WB	64	-	-	-	-	-	-	78	130	80	16	96.2	Gen. Tend.	S1S2+	NVBS
30	811896	48	F	#######	11/1/2016	#######	G	Mr	Gr	7	14	Gen.	P	I	-	-	-	-	-	Hyst	-	-	WB	68	-	-	-	-	-	-	82	120	96	19	98.2	Gen. Tend.	S1S2+	NVBS
31	798448	67	M	#######	########	#######	B	Mr	Sec	8	10	Gen.	P	I	-	-	-	-	-	NS	-	-	WB	52	-	-	-	-	-	-	84	120	80	16	97.2	Gen. Tend.	S1S2+	NVBS
32	787367	18	M	#######	########	#######	E	Sg	St	7	10	Gen.	P	I	-	-	-	-	-	RH	-	-	WB	60	-	-	-	-	-	-	76	130	80	18	95.2	Gen. Tend.	S1S2+	NVBS
33	773502	19	F	#######	########	#######	B	Sg	St	8	10	L.A	I	P	+	-	-	-	-	NS	-	-	WB	55	-	-	-	-	-	-	78	110	70	20	97.2	Tend. LA	S1S2+	NVBS
34	744426	30	F	8/8/2016	8/11/2016	#######	E	Mr	St	7	16	L.A	P	Md	-	-	-	-	-	Prev LSCS	-	-	WB	60	-	-	-	-	-	-	68	120	70	16	98.2	Tend. LA	S1S2+	NVBS

ANNEXURE III - MASTER CHART

Serial number	In patient number	Bio-chemical investigation									Urine routine and microscopy	Radiological investigation		Operation details				Assessment of pain (VAS score)			
		Haemoglobin (gm%)	TLC (cumm)	Platelet count (lakh)	RBS (mg/dL)	Blood urea (mg/dL)	Serum creatinine (mg/dL)	Liver function test	Bleeding time	Clotting time		USG	CT scan	Anesthesia	Duration of surgery (Hours)	Surgical findings	Surgery	15th day	30th day	45th day	60th day
1	742243	11.1	6400	3.8	96	21	1.1	N	N	N	N	N	ND	GA	90	mobile caecum with inflammed appendix	appendicectomy, caeapexy	6	4	2	2
2	745671	13.8	6500	2.58	98	40	0.9	N	N	N	N	N	ND	GA	120	OARFE, highceacum, inflammed appendix	adhesolysis+appendicectomy	2	2	0	0
3	713782	11.2	8800	3.6	94	24	0.7	N	N	N	N	N	ND	GA	90	right sided ovarian cyst	ovarian cystectomy	2	0	0	0
4	738141	11	7660	3.5	96	18	1.4	N	N	N	N	N	ND	GA	60	inflammed appendix	appendicectomy	0	0	0	0
5	724827	13.1	6700	3.4	160	22	0.8	N	N	N	N	N	ND	GA	60	inflammed appendix	appendicectomy	4	0	0	0
6	736075	12.2	9500	2.8	126	26	0.9	N	N	N	N	N	ND	GA	90	inflammed appendix	appendicectomy	0	0	0	0
7	725287	13.1	10200	2.4	140	24	0.9	N	N	N	N	ND	N	GA	120	tubercular lymphnode	lymphnode biopsy	4	2	0	0
8	754956	14.2	9600	2.65	98	24	0.8	N	N	N	N	N	ND	GA	60	adhesions	adhesiloysis	2	2	0	0
9	756840	10.2	7000	3.74	94	17	1.32	N	N	N	N	N	ND	GA	120	inflammed appendix	appendicectomy	4	2	2	2
10	747204	13.7	7000	4.8	110	68	1.5	N	N	N	N	heptosplenomegaly mild free fluid	ND	GA	120	liver abscess	abscess drainage	6	4	2	0
11	747344	10.2	4700	3.7	96	18	0.9	N	N	N	N	mild splenomegaly, mild ascitis left minimal PE	ND	GA	120	tubercular lymphnode	lymphnode biopsy	6	3	4	2
12	776362	13.2	9200	2.6	94	32	0.9	N	N	N	N	N	ND	GA	90	adhesions	Adhesiolysis	2	0	0	0
13	762341	10.4	8200	2.1	94	24	0.8	N	N	N	N	N	ND	GA	90	inflammed appendix	Appendicectomy	0	0	0	0
14	742161	10.2	9700	3.2	94	32	0.7	N	N	N	N	N	ND	GA	120	adhesions	Adhesiloysis	4	2	0	0
15	742561	9.9	9500	2.2	94	24	0.8	N	N	N	N	N	ND	GA	60	tubercular lymphnode	lymphnode biopsy	2	0	0	0
16	756950	14.5	8200	2.4	96	22	0.9	N	N	N	N	N	ND	GA	90	inflammed appendix	Appendicectomy	0	0	0	0
17	746110	13.2	15480	4.3	98	16	1	N	N	N	N	N	ND	GA	120	right sided ovarian hemorraghic cyst	ovarian cystectomy	2	2	0	0
18	734875	9	3900	1.52	81	22	1	N	N	N	N	N	ND	GA	120	adhesions	Adhesiloysis	0	0	0	0
19	746166	10.2	9100	3.3	96	29	0.8	N	N	N	N	N	ND	GA	120	adhesions	Adhesiloysis	0	0	0	0
20	764418	12.4	9200	1.2	102	40	1.1	N	N	N	N	ND	N	GA	90	adhesions	Adhesiloysis	0	0	0	0
21	809880	15.3	10200	1.97	84	44	0.8	N	N	N	N	minimal free fluid in pouch of douglas	ND	GA	90	tubercular lymphnode	lymphnode biopsy	2	0	0	0
22	800040	9.8	11230	2.97	98	18	0.8	N	N	N	N	N	ND	GA	120	Inflammed appendix with adhesions	ashesiolysis+appendectomy	4	2	0	0
23	769274	15.6	3900	3	114	27	0.76	N	N	N	N	N	N	GA	90	Inflammed appendix with adhesions	ashesiolysis+appendectomy	4	0	0	0
24	748282	13.7	6000	1.95	118	28	1.4	N	N	N	N	N	ND	GA	120	adhesions	Adhesiloysis	2	2	0	0
25	766174	12.4	10200	2.4	88	33	1.1	N	N	N	N	ND	N	GA	80	left sided ovarian cyst	ovarian cystectomy	0	0	0	0
26	736616	14.6	7820	3.34	96	20	0.8	N	N	N	N	N	ND	GA	60	inflammed appendix	Appendicectomy	4	4	0	0
27	782065	11.4	6000	1.68	132	13	0.745	N	N	N	N	N	ND	GA	90	left sided ovarian cyst	ovarian cystectomy	6	2	0	2
28	781752	9.2	5400	4.07	88	14	0.7	N	N	N	N	ND	N	GA	60	Malrotation of gut	EOLB with ileotransverse anastomosis	7	6	4	4
29	786900	14.7	4300	1.61	92	25	1.3	N	N	N	N	N	ND	GA	60	adhesions	Adhesiloysis	3	0	0	0
30	811896	12.9	9600	2.38	105	20	0.86	N	N	N	N	N	N	GA	120	Inflammed appendix with adhesions	ashesiolysis+appendectomy	4	2	0	0
31	798448	11.2	8000	1.8	92	34	1.1	N	N	N	N	ND	N	GA	60	inflammed appendix	Appendicectomy	2	0	0	0
32	787367	12.2	9200	2.4	102	36	0.8	N	N	N	N	N	ND	GA	100	adhesions	Adhesiloysis	4	0	0	0
33	773502	12.1	10400	2.8	92	32	0.9	N	N	N	N	ND	N	GA	90	adhesions	Adhesiloysis	2	0	0	0
34	744426	11.2	6400	3.2	92	24	0.9	N	N	N	N	N	ND	GA	60	adhesions	Adhesiloysis	2	0	0	0

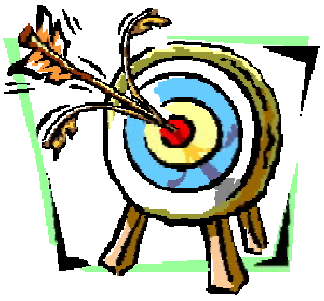
ANNEXURE III - MASTER CHART

Serial number	In patient number	Demographic data								Chief complaints										History				General physical examination															Systemic examination		
										Pain					Associated symptoms															Vital signs										
																														BP (mmHg)										
		Age (Years)	Sex	DOA	DOS	DOD	Unit	Marital status	Educational status	VAS Score	Duration of pain(weeks)	Site	Nature	Severity	Fever	Diarrhoa	Constipation	Burning Micturition	Others	Past history	Personal history	Family history	Built and nourishment	Weight (Kgs)	Pallor	Icterus	Cyanosis	Clubbing	Edema	Lymphadenopathy	PR (min)	Systolic	Dialostic	Respiratory rate (min)	Temperature(0C)	Per abdomen	Cardiovascular system	Respiratory system
35	748283	48	M	7/7/2016	7/9/2016	#######	F	Mr	Gr	8	16	A.U	D	I	+	-	-	-	-	NS	-	-	WB	54	-	-	-	-	-	-	64	110	70	18	97.2	Tend. LA	S1S2+	NVBS
36	765160	21	M	#######	10/7/2016	#######	A	Mr	St	7	9	L.A	I	P	+	-	-	-	-	NS	-	-	WB	65	-	-	-	-	-	-	64	100	70	18	98.4	Tend. LA	S1S2+	NVBS
37	764296	28	F	7/7/2016	7/9/2016	#######	A	Mr	Gr	8	10	A.U	P	Md	+	-	-	+	-	NS	-	-	WB	52	-	-	-	-	-	-	76	110	80	14	97.2	Gen. Tend.	S1S2+	NVBS
38	765346	18	M	#######	10/9/2016	#######	D	Sg	St	8	8	L.A	P	I	+	-	-	-	-	NS	-	-	WB	50	-	-	-	-	-	-	74	120	80	16	98.2	Tend. LA	S1S2+	NVBS
39	798715	21	F	#######	9/27/2016	#######	F	Mr	St	6	8	L.A	P	S	+	-	-	-	-	NS	-	-	WB	68	-	-	-	-	-	-	72	110	70	18	97.2	Tend. LA	S1S2+	NVBS
40	773633	42	F	#######	########	#######	E	Mr	Sec	7	10	Gen.	P	I	+	-	-	-	-	Hyst	-	-	WB	68	-	-	-	-	-	-	88	130	70	20	98.2	Gen. Tend.	S1S2+	NVBS
41	773488	65	F	#######	########	#######	D	Mr	Gr	8	12	Gen.	P	I	-	-	-	-	-	NS	-	-	WB	55	-	-	-	-	-	-	76	110	70	18	97.2	Gen. Tend.	S1S2+	NVBS
42	798715	21	F	#######	8/13/2016	#######	F	Sg	St	7	10	L.A	P	I	-	-	-	-	-	NS	-	-	WB	58	-	-	-	-	-	-	74	120	80	16	98.2	Tend. LA	S1S2+	NVBS
43	761976	30	F	#######	9/24/2016	#######	B	Mr	Gr	8	10	L.A	P	S	-	-	-	-	-	NS	-	-	WB	61	-	-	-	-	-	-	78	110	70	21	97.2	Tend. LA	S1S2+	NVBS
44	789179	31	M	#######	7/18/2016	#######	D	Mr	Gr	7	8	L.A	P	S	-	-	-	-	-	NS	-	-	WB	68	-	-	-	-	-	-	68	130	80	22	96.2	Tend. LA	S1S2+	NVBS
45	721935	22	M	#######	3/1/2016	3/5/2016	A	Sg	St	7	14	Gen.	P	I	-	-	-	-	-	NS	-	-	WB	64	-	-	-	-	-	-	84	110	70	18	97.2	Gen. Tend.	S1S2+	NVBS
46	714645	65	M	#######	1/24/2016	2/6/2016	C	Mr	Gr	9	12	Gen.	P	I	-	-	-	-	-	lap adhes. for IO	-	-	WB	74	-	-	-	-	-	-	88	140	90	22	98.2	Gen. Tend.	S1S2+	NVBS
47	796186	37	F	#######	3/2/2016	4/1/2016	F	Mr	Gr	7	10	Gen.	P	S	-	-	-	-	-	NS	-	-	WB	68	-	-	-	-	-	-	68	120	80	16	99.2	Gen. Tend.	S1S2+	NVBS
48	720317	40	F	#######	2/25/2016	2/6/2016	G	Mr	Gr	8	8	L.A	P	Md	-	-	-	-	-	NS	-	-	WB	58	-	-	-	-	-	-	74	110	70	18	98.2	Gen. Tend.	S1S2+	NVBS
49	800284	48	M	#######	4/20/2016	#######	A	Mr	Gr	7	8	Gen.	P	Md	-	-	-	-	-	NS	-	-	WB	68	-	-	-	-	-	-	78	130	80	16	97.2	Tend. LA	S1S2+	NVBS
50	767286	27	F	#######	########	#######	D	Mr	Gr	7	10	Gen.	P	Md	-	-	-	-	-	Tubect	-	-	WB	60	-	-	-	-	-	-	92	110	70	16	98.2	Tend. L.A	S1S2+	NVBS
51	781591	35	F	1/5/2016	1/8/2016	#######	F	Mr	Gr	7	14	L.A	P	S	-	-	-	-	-	NS	-	-	WB	78	-	-	-	-	-	-	78	130	80	20	94.2	Tend. LA	S1S2+	NVBS
52	803954	45	F	5/8/2016	5/12/2016	#######	F	Mr	Gr	8	10	Gen.	P	Md	-	-	-	-	-	NS	-	-	WB	64	-	-	-	-	-	-	68	110	80	16	98.2	Gen. Tend.	S1S2+	NVBS
53	716548	55	M	#######	2/2/2016	2/5/2016	G	Mr	Gr	7	10	Gen.	P	Md	-	-	-	-	-	NS	-	-	WB	72	-	-	-	-	-	-	74	130	80	18	99.2	Gen. Tend.	S1S2+	NVBS
54	718990	19	F	#######	2/16/2016	#######	D	Sg	St	7	12	Gen.	P	Md	-	-	-	-	-	OA	-	-	WB	58	-	-	-	-	-	-	72	110	70	16	97.2	Gen. Tend.	S1S2+	NVBS
55	774633	18	F	#######	########	#######	E	Sg	St	7	9	Gen.	P	Md	+	-	-	-	-	NS	-	-	WB	60	-	-	-	-	-	-	76	120	80	18	98.4	Tend. LA	S1S2+	NVBS

ANNEXURE III - MASTER CHART

Serial number	In patient number	Bio-chemical investigation									Radiological investigation		Operation details				Assessment of pain (VAS score)			
		Haemoglobin (gm%)	TLC (cumm)	Platelet count (lakh)	RBS (mg/dL)	Blood urea (mg/dL)	Serum creatinine (mg/dL)	Liver function test	Bleeding time	Clotting time	Urine routine and microscopy	USG	CT scan	Anesthesia	Duration of surgery (Hours)	Surgical findings	Surgery	15th day	30th day	45th day	60th day
35	748283	13.7	6000	4.8	140	18	1.4	N	N	N	N	N	ND	GA	120	adhesions	Adhesiloysis	4	2	0	0
36	765160	12.2	9200	2.6	104	32	0.8	N	N	N	N	N	ND	GA	120	inflammed appendix	Appendicectomy	2	0	0	0
37	764296	12.4	8630	2.5	98	42	0.8	N	N	N	N	N	ND	GA	90	adhesions	Adhesiloysis	4	2	0	0
38	765346	13	4900	1.8	117	13	0.6	N	N	N	N	ND	N	GA	90	inflammed appendix	Appendicectomy	2	0	0	0
39	798715	8.5	9500	3.49	110	22	0.9	N	N	N	N	N	ND	GA	90	inflammed appendix	Appendicectomy	3	0	0	0
40	773633	12.7	10300	3.2	104	27	1.2	N	N	N	N	MBD, no obvious collection in umbilical reason	ND	GA	120	umbilicus sinus tract	sinus tract excision	5	2	2	2
41	773488	11.8	11300	1.5	130	19	0.58	N	N	N	N	N	ND	GA	120	tubercular lymphnode	lymphnode biopsy	6	4	2	0
42	798715	12.2	3900	2.2	108	22	1	N	N	N	N	N	ND	GA	90	inflammed appendix	Appendicectomy	4	2	0	0
43	761976	11.7	13000	2.4	94	16	0.8	N	N	N	N	ND	N	GA	120	Adhesions, inflammed appendix	adhesiloysis, appendicectomy	2	0	0	0
44	789179	12.8	9500	1.8	96	32	0.9	N	N	N	N	N	ND	GA	60	adhesions	Adhesiloysis	4	0	0	0
45	721935	14.8	7700	2.44	108	17	1.3	N	N	N	N	N	ND	GA	60	inflammed appendix	Appendicectomy	2	0	0	0
46	714645	11.4	15000	3.3	114	10	0.5	N	N	N	N	ND	N	GA	120	volvulus of the left hepatic flexure	laparoscopic colopexy	6	4	2	0
47	796186	10.5	5800	1.9	88	33	1	N	N	N	N	N	ND	GA	60	adhesions	Adhesiloysis	2	0	0	0
48	720317	11.2	9200	2.8	96	10	0.9	N	N	N	N	N	ND	GA	60	inflammed appendix	Appendicectomy	4	0	0	0
49	800284	14.2	11550	3.2	108	11	1.1	N	N	N	N	N	ND	GA	60	adhesions	Adhesiloysis	2	0	0	0
50	767286	11.3	10200	3.26	71	18	0.61	N	N	N	N	N	ND	GA	90	inflammed appendix	Appendicectomy	4	0	2	0
51	781591	8.4	10244	3.18	84	24	1.5	N	N	N	N	N	ND	GA	60	inflammed appendix	Appendicectomy	2	0	0	0
52	803954	9.4	6200	2.3	94	14	1.2	N	N	N	N	N	ND	GA	60	tubercular lymphnode	lymphnode biopsy	4	2	0	0
53	716548	11.5	6300	2.4	108	28	0.89	N	N	N	N	N	ND	GA	90	Adhesions, inflammed appendix	adhesiloysis, appendicectomy	4	2	2	0
54	718990	10.8	10200	4	106	12	0.8	N	N	N	N	N	ND	GA	60	adhesions	Adhesiloysis	4	2	0	0
55	774633	13.3	7400	3.02	98	17	0.7	N	N	N	N	N	ND	GA	120	inflammed appendix with mobile caecum	Appendicectomy with caecopexy	6	4	2	0

Introduction



Objectives

Review of Literature

Methodology

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Discussion

Conclusion

Summary

Bibliography

Annexure-I

Annexure-II

Annexure-III