

The Outcome of Elective Diagnostic Laparoscopy in Diagnosing Chronic Abdominal Pain-in a Tertiary Health Care Centre

Dr. Sourav Shubham¹, Dr. Biswa Ranjan Mohapatra², Dr. Yagnadutta Rath³

Hi-tech Medical College and hospital, Bhubaneswar, Odisha, India

Abstract: *Background:* Chronic idiopathic pain syndromes are amongst the most challenging and demanding conditions to treat across the whole age spectrum. Despite these patients having undergone numerous diagnostic work ups, their pain remains a challenge to all known diagnostic and treatment methods. *Aims and Objectives:* We aim to evaluate the diagnostic and therapeutic efficacy of laparoscopy in the management of such patients in this prospective study. *Materials and methods:* Thirty five patients with chronic pain abdomen were included in this study. The pain in all these patients was either of unclear etiology or not responding to the treatment given after clinical assessment and lasting for more than 3 months duration. Pain of shorter duration and patients less than 14 years of age were excluded from the study. All patients were subjected to diagnostic laparoscopy and procedure. The results were tabulated and analyzed. *Results:* Females were more affected by this condition and the most common site of pain being the peri -umbilical region. A definitive diagnosis was made per operatively in 29 patients (82.85%) while in the remaining 6 (17.14%), no obvious pathology was detected. The most common findings in our study was post-operative adhesions (51.42%), followed by recurrent appendicitis (14.28%), Carcinoma (5.71%), Mesenteric lymphadenopathy and Tuberculosis (2.85% each). Pain assessment done at 1 month follow up showed pain relief in 85.7% and 3 month follow up showed pain relief in 70% of patients. *Conclusion:* Post operative adhesions form a majority of cause for causing chronic pain abdomen. Diagnostic laparoscopy is a safe and effective modality for the diagnostic and therapeutic management of such patients.

Keywords: Diagnostic laparoscopy, chronic pain abdomen ,post operative adhesions, diagnostic efficacy.

1. Introduction

Patients with chronic abdominal pain are amongst the most difficult to manage. Potentially it can be unrewarding for both the patient and the treating physician. Chronic abdominal pain is a difficult complaint.¹ It leads to evident suffering and disability, both physically and psychologically. Chronic abdominal pain is associated with poor quality of life.² Studies conducted with large community samples or hospital populations imply chronic abdominal pain is a pervasive problem. Most patients in this group would have already undergone many diagnostic procedures. More than 40% of the patients presenting with chronic abdominal pain have no specific etiological diagnosis at the end of their diagnostic workup^{3,4,5,6}. These searches for pathology often include such procedures as upper and lower gastrointestinal endoscopies, computerized tomography and screening for undetected carcinoma.

In many cases it prevents unnecessary/negative laparotomy. The rapid recovery and return to normal activity that follow diagnostic laparoscopic surgery provide an extra incentive for the surgeon to adopt more laparoscopic techniques.

2. Aims and Objectives

To study the efficacy of diagnostic laparoscopy in identifying the etiology of undiagnosed chronic abdominal pain

3. Materials and Methods

This study was conducted in the surgical wards of Hi-tech

medical College and Hospital. The study group consisted of 35 patients admitted to the surgical wards of

Hitech medical college and hospital, Bhubaneswar with pain abdomen of 3 months duration or more between December 2018 to June 2020. A detailed history was taken from each of the patient as per the proforma designed before the commencement of the study. The clinical examination findings were also recorded in the proforma. The results were then tabulated.

The recorded data included particulars of the patient, duration of illness, site of abdominal pain, other associated symptoms such as vomiting or fever or white discharge per vagina, past history of surgical explorations, co morbid conditions, investigations. Subsequently the intra operative findings, therapeutic/ diagnostic intervention done, correlation of the intra operative findings with the histopathology report, complications during the intra and post operative period and the relief from the pain were recorded and analysed.

As a part of the work up of a patient the following investigations were done routinely:

- Hemoglobin estimation Bleeding time
- Clotting time Random blood sugar
- Total leucocyte count and differential count Serum electrolytes
- Blood urea Serum creatinine
- Urine for albumin, sugar and microscopic examination Electrocardiogram
- Ultrasonogram abdomen and Chest X Ray.
- The other investigations listed below were done as and

when indicated Blood :

- Erythrocyte Sedimentation Rate

Fasting blood sugar and post prandial blood sugar

Imaging

- Erect X Ray abdomen Barium studies
- Esophago gastro duodenoscopy Colonoscopy
- Computerised tomograph of the abdomen

Written informed consent was taken prior to all the procedures.

Inclusion Criteria

- All cases of undiagnosed (by conventional methods and investigations such as detailed history, clinical examination, blood counts, urine examination, USG abdomen, Plain x ray abdomen) chronic abdominal pain >3months duration of both sex.
- All cases of undiagnosed chronic abdominal pain in patients >14years of age.
- Cases of clinically diagnosed chronic abdominal pain of >3 months duration not responding to the treatment given.

Exclusion Criteria

- All cases of undiagnosed chronic abdominal pain <3months duration of both sex.
- All cases of undiagnosed chronic abdominal pain in patients <14years of age.

All surgeries were carried out under general anaesthesia. All patients had a Ryle’s tube inserted and bladder catheterized prior to anaesthesia. Pneumoperitoneum was created using Hasson’s technique. A 10mm umbilical camera port was inserted and two lateral 5mm ports depending on the organ

of interest and the suspected pathology.

The sites of port insertion varied depending on the presence or absence of previous abdominal surgery scars. Diagnostic laparoscopy of the abdomen was carried out carefully inspecting the entire visceral contents of the abdomen for any pathology. Starting from the liver, the gall bladder, anterior surface of the stomach, large intestine, entire length of small intestine with particular emphasis on appendix and terminal ileum, anterior surfaces of the retroperitoneal organs, uterus, fallopian tubes and ovaries and peritoneal surface. Adhesions between the bowel loops or to the anterior abdominal wall was also looked for.

The surgical procedure carried out were depending on the intra operative findings and as per indications which ranged from biopsy from suspicious lesions to adhesiolysis to appendectomy.

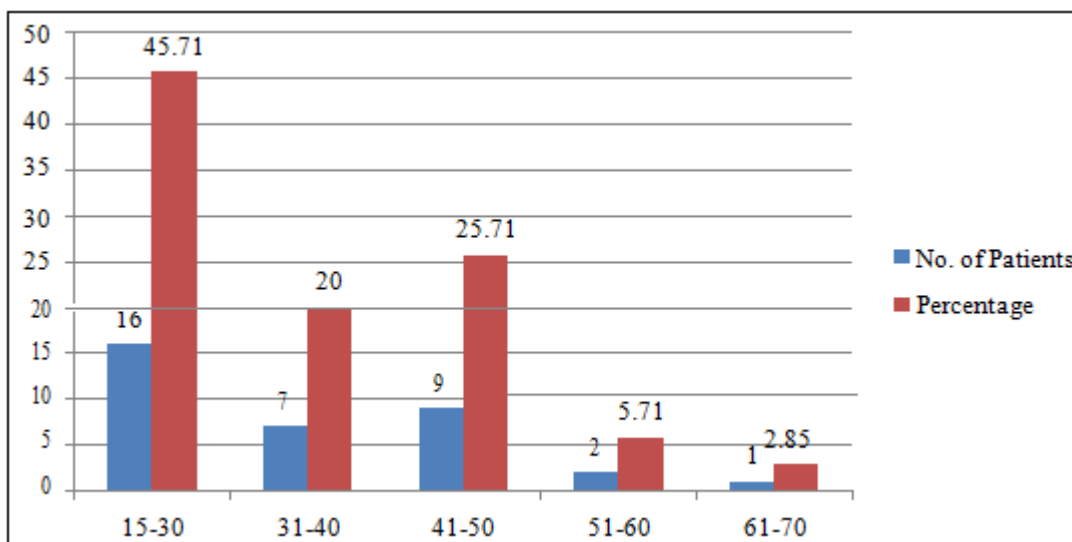
All the ports were closed using absorbable suture materials at the end of the procedure.

4. Results

Age Distribution:

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

Age (in Years)	No. of Patients	Percentage (%)
15-30	16	45.71
31-40	7	20
41-50	9	25.71
51-60	2	5.71
61-70	1	2.85
Total	35	100



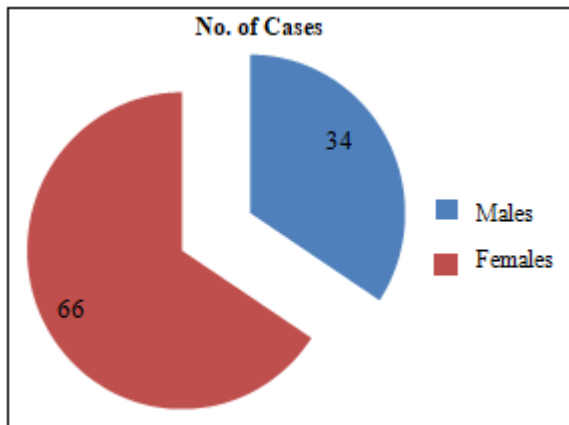
Graph 1: Showing age distribution

Our study of 35 patients with chronic pain abdomen showed a peak incidence of chronic pain abdomen in the third decade. The youngest patient in our study was 15 years and the oldest patient being 69years. The mean age of presentation was 35 years.

Sex Distribution:

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

Sex	No. of cases	Percentage (%)
Male	12	34.28
Female	23	65.71

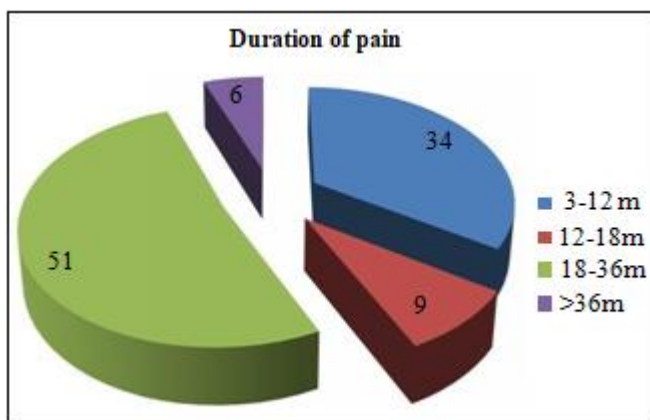


Graph 2: Showing Sex Distribution

Our study of 35 patients showed a female preponderance to chronic pain abdomen (66%).

Table 3: Duration of pain before laparoscopy

Duration of pain (months)	No. of patients	Percentage (%)
3-12	12	34.28
12-18	3	8.57
18-36	18	51.42
>36	2	5.71

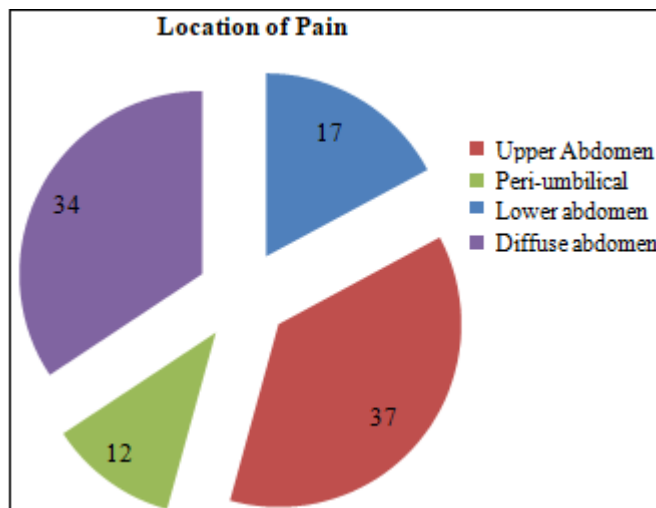


Graph 3: Duration of Pain before Diagnostic Laparoscopy

51% of the patients in our study gave a history of pain abdomen of duration between 18 to 36 months.

Table 4: Location of Pain

Region of pain	No. of Patients	Percentage (%)
Upper abdomen	6	17.14
Peri umbilical	13	37.14
Lower abdomen	4	11.42
Diffuse abdomen	12	34.28

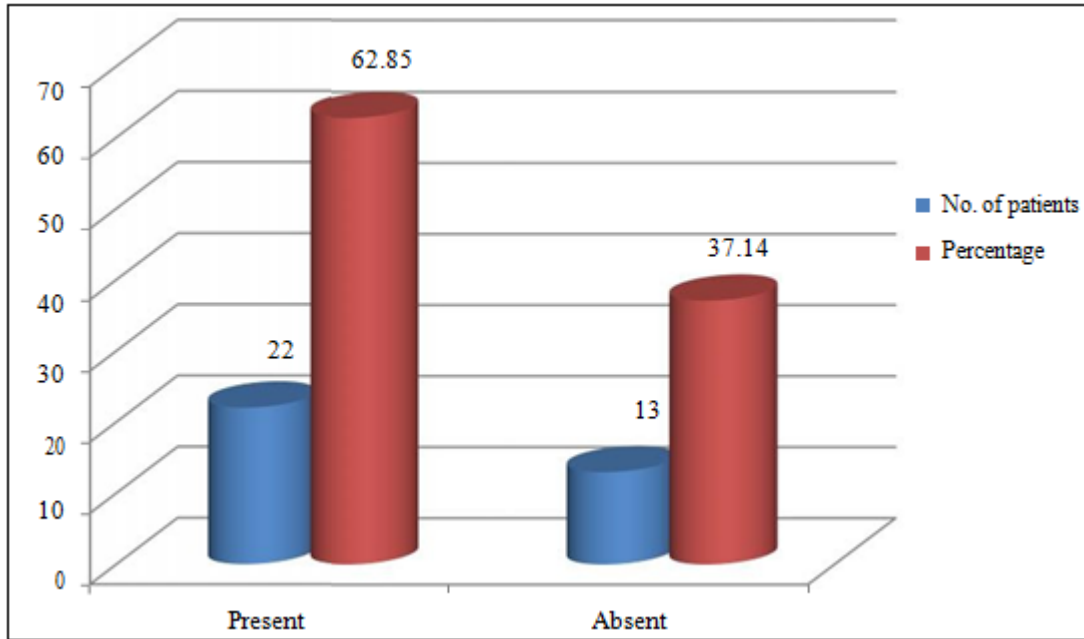


Graph 4: Showing Location of Pain

The majority of the patients in our study of 35 patients presented with peri-umbilical region pain. It was followed closely by diffuse pain abdomen.

Table 5: History of Previous Abdominal Surgeries

History of Surgery	No. of cases	Percentage (%)
Present	22	62.85
Absent	13	37.14

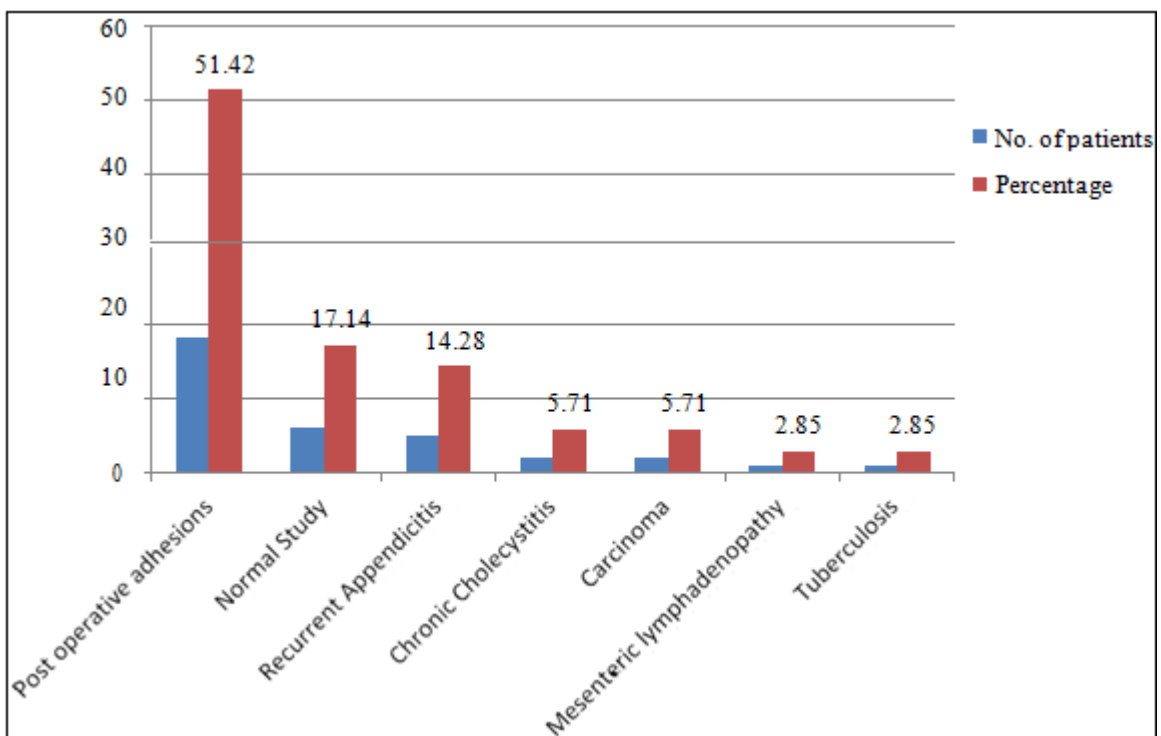


Graph 5: Showing number of patients with history of previous abdominal surgeries

Around 22(63%) of patients in our study had undergone a previous surgery compared to 13 (37%) of them without any history of abdominal surgeries. Most of the patients had a previous history of tubectomy and subsequent adhesions.

Table 6: Findings at laparoscopy and intervention done

Diagnosis	Procedure	No. of Patients	Percentage (%)
Post operative adhesions	Adhesiolysis	18	51.42
Normal Study	No intervention	6	17.14
Recurrent Appendicitis	Appendectomy	5	14.28
Chronic Cholecystitis	Cholecystectomy	2	5.71
Carcinoma	Biopsy	2	5.71
Mesenteric Lymphadenopathy	Biopsy	1	2.85
Tuberculosis (Strictures)	Resection Anastomosis with Cat 1 ATT	1	2.85



Graph 6: Showing findings at laparoscopy and treatment adopted

In our study of 35 patients, the most common finding was post operative adhesions, in 51.42% of patients. Most of the patients in this group were females and had a past history of abdominal surgery, tubectomy in most cases. Adhesiolysis was done in all these patients.

The next most common finding at laparoscopy in our study was a normal study (17.14%). These patients were just observed and followed up.

Recurrent appendicitis was our per operative diagnosis in 14.28% of our patients. The appendices felt firm to palpate per operatively. Appendectomy was done in such patients. Subsequent histopathological examination confirmed our diagnosis in most of these cases. One of the patient in this group had adhesions between the appendix and the lateral abdominal wall. Adhesiolysis and appendectomy was done. HPE turned out to be chronic inflammation in the appendix

and hence included in this group for statistical analysis.

We did laparoscopic cholecystectomy for 2 of our patients. HPE confirmed our findings in this group of patients. 2 patients were diagnosed with carcinoma per operatively. One of them being Carcinoma pancreas and the other had peritoneal deposits whose biopsy turned out to be AdenoCarcinoma. Mesenteric lymph node biopsy was done in 1 patient.

Diagnosis of tubercular strictures was made in 1 patient. This patient underwent resection and anastomosis of the long segment stricture and stricturoplasty for another short segment stricture by open method. Post operatively, he was started on anti tubercular drugs and the patient followed up. Histopathological examination confirmed tuberculosis.

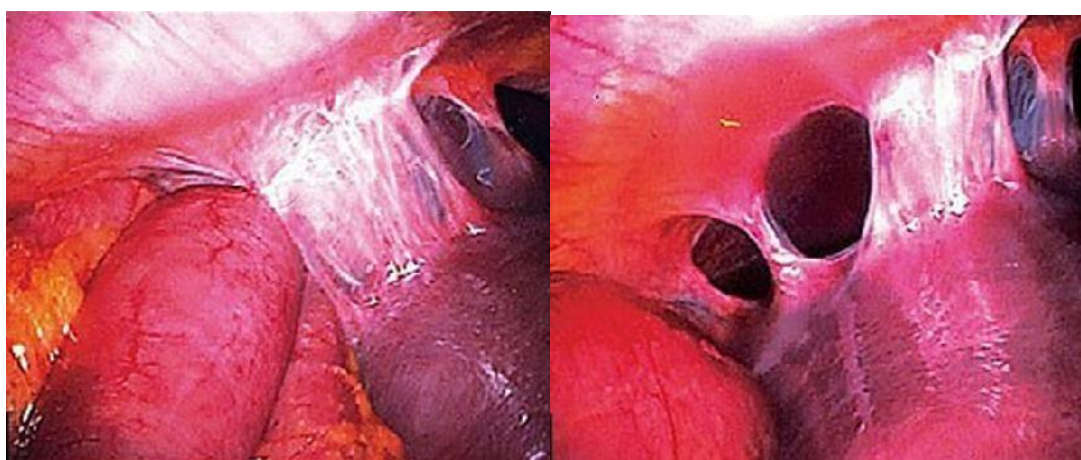


Figure 22: Per operative Finding: Adhesions



Figure 23: Per operative Finding: Strictures



Figure 24: Recurrent Appendicitis



Figure 25: Rec. Appendicitis with Adhesions

Morbidity:

In most of our cases there was no post operative complications except in three patients who developed surgical site infection which was managed conservatively by appropriate antibiotic cover and alternate day wound dressing. No mortality was encountered in our study group.

Duration of hospital stay:

Post operative hospital stay ranged from 4 to 11 days with a mean duration of stay of 5.5 days.

Duration of procedure:

The average length of the operative time was 67.14 minutes and two patients required conversion to an open procedure. Both the cases were converted due to technical difficulties.

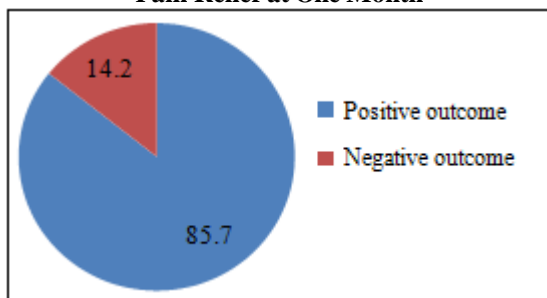
Follow up:

During the follow up period, all patients were re-evaluated for pain. The patients were reviewed at one month and three months post operatively. Subjective assessment of pain was done during the follow up and positive outcome (less pain or disappearance of pain) was noted and negative outcome (persistence of pain or worsening pain) was also noted. 5 patients were lost to follow up at the three month time frame.

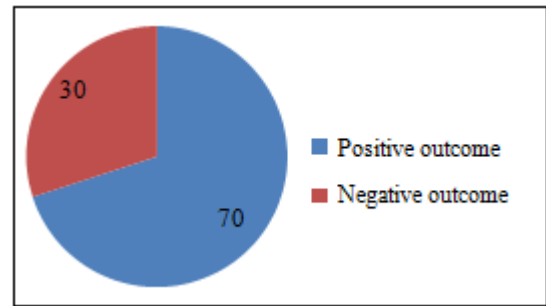
Table 7: Post Operative Pain Relief

Duration (in months)	Positive Outcome (%)	Negative Outcome (%)
At 1	85.71	14.29
At 3	70	30

Pain Relief at One Month



Pain Relief at Three Months



Graph 7: Post operative pain relief

5. 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 is to study the efficacy of diagnostic laparoscopy as an investigative and therapeutic 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. The study confirmed that in this difficult patient group, laparoscopy could safely identify abnormal findings and can improve the outcome in a majority of the cases.

In this prospective study 35 patients were considered who were admitted in the surgical wards of HITECH MEDICAL COLLEGE& Hospital, between December 2018 and June 2020. All patients had pain abdomen lasting for more than a period of three months.

Age and Sex Incidence

There were 12 males and 23 female patients in the study. The age group of patients in this study ranged from 15to 69 years with the average age being 35years. Male: Female ratio was 1:1.9

Table 8: Comparison of average age incidence

Study	Average age in years
Klingensmith et al ¹⁵	39
Thanaponsathron et al ³⁹	27.5
Raymond et al ¹⁸	42
Gouda M El- Labban and Emad N Hokkam ⁴⁰	36
Present study	35

In a study involving 34 patients by Klingensmith et al,¹⁵ the majority were women (85%). The average age in their study was 39years (Range 21-75years).

In a study by Thanaponsathron et al,³⁹ of 30 patients with chronic right lower quadrant pain, the average age was 27.5 years.

In a study by Raymond et al¹⁸ for utility of laparoscopy in chronic abdominal pain involving 70 patients, the average age was 42 years.

In a study by Gouda M El- Labban and Emad N Hokkam⁴⁰ involving 30 patients, the average age of presentation was 36 years.

All the above studies show that the female sex was more commonly afflicted by chronic pain abdomen and the average age at presentation in our study is comparable with the aforementioned studies.

Pain Duration:

In our study, the duration of pain ranged between 3 months to 3 years.

In a study by Raymond et al¹⁸ of 70 patients, the duration of pain ranged from 3 months to 5 years.

In a study by Gouda M El- Labban and Emad N Hokkam⁴⁰ involving 30 patients, the duration of pain ranged from 3 to 15 months.

Prior Surgery:

Table 9: Comparison of Past History of Abdominal Surgeries

Study	No. of patients with Prior surgery (%)
Gouda M El- Labban and Emad N Hokkam ⁴⁰	56.6
KinnareshAshwin Kumar Baria ⁴¹	22
Present study	62.8

In our study of 35 patients, 22 patients had previous history of abdominal surgery.

In a study by Klingensmith et al¹⁵ involving 34 patients, most of the patients had previous history of abdominal surgery.

In a study by Gouda M El- Labban and Emad N Hokkam⁴⁰ involving 30 patients, 17 had a previous history of abdominal surgery.

In a study by KinnareshAshwin KumarBaria⁴¹ involving 50 patients, 11 of them had a past history of abdominal surgery.

Laparoscopic Diagnosis:

In our study comprising 35 patients, laparoscopy identified pathology in 29 patients (82.85%).

No abnormality was found in the remaining 6 patients (17.14%) who were just observed without any intervention.

Post operative adhesions:

Table 10: Comparison of Patients with Adhesions

Study	No. of patients with adhesions (%)
Lavonius M et al ¹⁷	63
Klingensmith et al ¹⁵	56
Present study	51.42

51.42% of the patients in our series were found to have intestinal adhesions secondary to a prior abdominal surgery, mostly tubectomy (in 8 patients). Some patients had a past history of appendectomy (in 7), cholecystectomy (in 2), hysterectomy (in 4) and one patient had a prior history of

laparotomy for hollow viscous perforation. Adhesiolysis was done as a therapeutic procedure.

LavoniusM et al¹⁷ in their study of laparoscopy for chronic abdominal pain in 46 patients reported post operative adhesions in 63% of cases.

In a study by Klingensmith et al¹⁵ involving 34 patients, 56% of them underwent adhesiolysis.

In a study by VafaShayani et al⁴² involving 18 cases, laparoscopic adhesiolysis resulted in a 77.8% cure rate from chronic abdominal pain.

In a study by Dunker S et al⁴³ laparoscopic adhesiolysis resulted in a positive outcome in more than 50% of patients. Normal Study

Table 11: Comparison of Patients with Normal Study at Laparoscopy

Study	Normal study (%)
Salky B A et al ¹⁶	24
Kinnaresh Ashwin Kumar Baria ⁴¹	10
Vander Velpen et al ³²	23
Klingensmith et al ¹⁵	26
Onders RP and Mittendorf EA ¹⁸	14.2
Present study	17.14

17.14% of patients in our study did not have any pathology detected per operatively.

In a study by Salky B A et al¹⁶ involving 265 patients, normal laparoscopic findings were recorded in 24%.

In a study by KinnareshAshwin Kumar Baria⁴¹ involving 50 patients, 10% of them had no identifiable cause detected after laparoscopic examination.

In a study by Vander Velpen et al³² a 23% of patients with uncertain diagnosis at the end of the procedure was reported.

In a study by Klingensmith et al¹⁵ involving 34 patients, 26% of patients needed no operative intervention other than laparoscopic exploration.

In a study by Onders RP and Mittendorf EA¹⁸ involving 70 patients, no abnormality was detected in 14.2 % of cases.

Recurrent Appendicitis:

5 (14.28%) of patients in our study were diagnosed to have recurrent appendicitis.

Histopathological examination confirmed the diagnosis in 4 of them. One of the specimens was reported normal. This is still justifiable because it makes the diagnosis of appendicitis less likely if the patient complains of similar pain in the future.

Laparoscopy is a useful technique for the diagnosis and treatment of abdominal pain even if the appendix is normal on inspection.⁴⁴

In a study by Onders RP and Mittendorf EA¹⁸ involving 70

patients, appendiceal pathology was detected in 7.14% of cases.

Diagnostic Efficacy of Laparoscopy:

Table 12: Diagnostic Efficacy of Diagnostic Laparoscopy

Study	No. of patients	Diagnosis achieved (%)
Raymond P et al ¹⁸	70	85.7
Karl Miller et al ¹⁴	59	89.8
Klingensmith et al ¹⁵	34	65
Schrenk P et al ⁴⁵	92	87
KinnareshAshwin Kumar Baria ⁴¹	50	90
Andreollo et al ⁴⁶	168	86.3
Salky BA et al ¹⁶	265	76
Gouda M El- Labban and Emad N ⁴⁰	30	83.3
Present study	35	82.85

The present study findings correlate well with other published studies.

Therapeutic efficacy of diagnostic laparoscopy:

Table 13: Therapeutic Efficacy

Study	No. of patients	Efficacy (%)
Klingensmith et al ¹⁵	34	73
VafaShayani et al ⁴²	18	77.8
Miller K et al ¹⁴	59	89.3
KinnareshAshwin Kumar Baria ⁴¹	50	94
Chao K et al ⁴⁷	41	78
Onders RP et al ¹⁸	70	70
Paajnen et al ⁴	35	>70
Present study	35	70

Therapeutic efficacy here denotes the percentage of patients who reported a positive outcome (no pain or decrease in pain) at the time of follow up.

The efficacy of diagnostic laparoscopy achieved in the present study compares well with other previous studies.

6. Conclusion

Laparoscopy has an effective diagnostic accuracy and therapeutic efficacy in the management of patients who present to us with chronic abdominal pain, especially in whom conventional methods of investigations have failed to elicit a cause for the pain.

Laparoscopy is safe, quick and effective modality of investigation for chronic abdominal pain.

Diagnostic laparoscopy 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.

Laparoscopy prevents unnecessary laparotomy in a significant number of

7. Cases

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

References

- [1] American Academy of Paediatrics Subcommittee on Chronic Abdominal Pain. Chronic Abdominal Pain in children, Pediatrics 2005; 115:812-5.
- [2] Ferrell BR. The impact of pain on quality of life: A decade of research. NursClin North Am.1995; 30:609-24.
- [3] Camilleri M. Management of patients with chronic abdominal pain in clinical practice. Neurogastroenterol Motil. 2006; 18:499-506.
- [4] Paajanen, Hannu, Julkunen, Kristiina, Waris, Heidi, Laparoscopy in Chronic Abdominal Pain: A Prospective Nonrandomized Long-term Follow-up Study, Journal of Clinical Gastroenterology, Feb 2005, 39(2), p. 110-114.
- [5] Townsend CO, Sletten CD, Bruce BK, Rome JD, Luedtke CA, Hodgson JE. Physical and emotional functioning of adult patients with chronic abdominal pain: Comparison with patients with chronic back pain. J Pain. 2005;6:5-83.
- [6] McGarrity TJ, Peters DJ, Thompson C, McGarrity SJ. Outcome of patients with chronic abdominal pain referred to chronic pain clinic. Am J Gastroenterol. 2000; 95:1812-6.
- [7] C. Palanivelu, Art of laparoscopic surgery, Textbook and atlas, Chapter 12- Diagnostic laparoscopy- Indication, tuberculosis and adhesiolysis, Jaypeepublishers,2005, 1st edition, vol 1,p.152-177,
- [8] Tehemton EUdwadia, Laparoscopic surgeries in developing countries, Jaypee brothers, 1997.
- [9] Gallegos NC, Hobsley M. Abdominal wall pain: an alternative diagnosis. Br J Surg 1990;77:1167.
- [10] Ajay Kriplani, ParveenVhatia, Arun Prasad, Deepak Govil, H P Garg, Editors, Comprehensive laparoscopic surgery, New Delhi, 2007
- [11] T H Brown , M H Irving, editors, Introduction to minimal access surgery, BMJ publishing group,1999
- [12] Daniel B Jones, Justin S Wu, Nathaniel J Soper, Editors, Laparoscopic Surgeries - principles and procedures, quality medical publishing, USA, 1997
- [13] Conlon K C and Toomey D, Chapter 19- Diagnostic laparoscopy in Fischer J E, Bland K I et al, editors Mastery of surgery, publishers-Lipincott Williams and Wilkins, 2007, 5th edition, Vol 1,p. 251-258
- [14] Karl Miller MD, Edith Mayer MD, Erich Moritz HD: The role of laparoscopy in chronic & recurrent abdominal Pain. Am J. Surg: 1996;172; 353-7.
- [15] Klingensmith ME, Soybel DI, Brooks DC: Laparoscopy for chronic abdominal Pain .SurgEndosc: 1996; 10(11): 1085-7.
- [16] Salky BA, Edey MB: The role of laparoscopy in the diagnosis and treatment of abdominal Pain syndromes;

- SurgEndosc: 1998; 12(7):911-4.
- [17] Lavonius M, et al: Laparoscopy for chronic abdominal Pain. *SurgLaparosc&endosc*: 1999; 9: 42-4.
- [18] Raymond P, Onders MD, Elizabeth A, Mittendorf MD: Utility of laparoscopy in chronic abdominal Pain. *Surg* : 2003; 134(4): 549-54.
- [19] Swank DJ, Swank-Bordewijk SCG, Hop WCJ, et al: Laparoscopic adhesiolysis in patients with chronic abdominal pain: A blinded randomized controlled multi- centre trial. *Lancet* 2003; 361:1247-51.
- [20] Arya PK and Gaur KJBS: Laparoscopy: A tool in diagnosis of lower abdominal pain. *Indian J Surg*: 2004; 66:216-20.
- [21] Krishnan P et al: Laparoscopy in suspected abdominal tuberculosis is useful as an early diagnostic method. *ANZ Journal of Surgery*: 2008; 78: 987-9.
- [22] Nafeh MA, Medhat A, Abdul-Hameed AG, Ahmad YA, Rashwan NM, Strickland GT, Tuberculous peritonitis in Egypt: the value of laparoscopy in diagnosis, *Am J Trop Med Hyg*. 1992 Oct;47(4):470-7.
- [23] S Rai and W M Thomas, Diagnosis of abdominal tuberculosis: the importance of laparoscopy; *J R Soc Med*. 2003 December ; 96 (12) :586-588.
- [24] Gary C Schoenwolf, Steven B Bleyl, Philip R Brauer, Philippa H Francis West, Larsen's Human Embryology, 4th edition, Elsevier Publications, 2009
- [25] Susan Standring, Editor, Grays anatomy, 40th edition, Churchill Livingstone Elsevier, 2008, Chapter 60.
- [26] Henry Gray, Anatomy of the Human Body, 20th edition, Bartelby.com, 2000, Available from <http://education.yahoo.com/reference/gray/subjects/subject/246>.
- [27] Kim E Barret, Susan M Barman, Scott Boitano, Hedwen L Brooks, Ganong's Review of Medical Physiology, 24th edition, McGraw Hill Publication, 2012, Chapter 8.
- [28] Arthur C Guyton, John E Hall, Textbook Of Medical Physiology, 11th edition, Elsevier Publication, 2006, Chapter 48.
- [29] Mark Feldman, Lawrence S Friedman, Lawrence J Brandt, Sleisenger and Fordtran's Gastro intestinal And Liver Diseases – Pathophysiology/ Diagnosis /Management, 9th edition, Saunders Publication, 2010, Chapter 11.
- [30] Li Ern Chen, Robert K Minkes, Laparoscopic Surgeries - principles and procedures, Quality medical publishing, USA, 1997, Chapter 14.
- [31] Lauder TD, Moses FM. Recurrent abdominal pain from abdominal adhesions in an endurance triathlete, *Med Sci Sports Exerc*. 1995 May;27(5):623-5.
- [32] G C Vander Velpen, S M Shimi, A Cuschieri, Diagnostic yield and management benefit of laparoscopy: a prospective audit, *Gut* 1994; 35: 1617-1621.
- [33] Keltz MD, Peck L, Liu S, Kim AH, Arici A, Olive DL. Large bowel-to-pelvic sidewall adhesions associated with chronic pelvic pain. *J Am AssocGynecolLaparosc*. 1995 Nov;3(1):55-9.
- [34] Jonathan M. Sackier, George Berci, Margaret Paz-Partlow, Elective diagnostic laparoscopy ,*The American Journal of Surgery*, Volume 161, Issue 3, March 1991, Pages 326–331.
- [35] J.H.N. Wolfe , A.R. Behn , B.T. Jackson, Tuberculous peritonitis and role of diagnostic laparoscopy, *The Lancet*, Volume 313, Issue 8121, Pages 852 - 853, 21 April 1979, doi:10.1016/S0140-6736(79)91266-2.
- [36] Udwardia TE. Diagnostic laparoscopy. *SurgEndosc*. 2004 Jan;18(1):6-10. Epub 2003 Sep 10.
- [37] Alexander G. Nagy, David James, Diagnostic laparoscopy ,*The American Journal of Surgery*Volume 157, Issue 5, May 1989, Pages 490–493.
- [38] Al-Akeely MH. The impact of elective diagnostic laparoscopy in chronic abdominal disorders. *Saudi J Gastroenterol*. 2006 Jan-Mar;12(1):27-30.
- [39] Thanapongsathron W, Kanjanabut B, Vaniyapong T, Thaworncharoen S. Chronic right lower quadrant abdominal pain: laparoscopic approach. *J Med Assoc Thai*. 2005 Jun;88Suppl 1:S42-7.
- [40] Gouda M El-labban and Emad N Hokkam, The efficacy of laparoscopy in the diagnosis and management of chronic abdominal pain. *J minim Access Surg* 2010 Oct – Dec; 6 (4): 95-99.
- [41] Kinnarehashwinkumarbaria role of laparoscopy in diagnosis and management of chronic Abdominal pain *Indian j.sci.res*. 4(1) : 65-68, 2013.
- [42] VafaShayani, Claudine Siegert, and Philip Favia. The Role of Laparoscopic Adhesiolysis in the Treatment of Patients with Chronic Abdominal Pain or Recurrent Bowel Obstruction, *JLSLS*; 2002: Apr- Jun; 6 (2): 111-114.
- [43] Dunker MS, Bemelman WA, Vijn A, et al: Long-term outcomes and quality of life after laparoscopic adhesiolysis for chronic abdominal pain. *J Am AssocGynecolLaparosc*2004; 11:36-41.
- [44] Connor TJ, Garcha IS, Ramshaw BJ, Mitchell CW, Wilson JP, Mason EM et al. Diagnostic laparoscopy for suspected appendicitis, *Am Surg*. 1995 Feb;61(2):187- 9.
- [45] Schrenk P, Woisetschläger R, Wayand WU, Rieger R, Sulzbacher H. Diagnostic laparoscopy: a survey of 92 patients. *Am J Surg*. 1994 Oct;168(4):348-51.
- [46] Andreollo NA, Coelho NetoJde S, Lopes LR, Brandalise NA, Leonardi LS. Laparoscopy in the diagnosis of intra-abdominal diseases. Analysis of 168 cases. *Rev Assoc Med Bras*. 1999 Jan-Mar; 45(1):34-8.
- [47] Chao K, Farrell S, Kerdemelidis P, Tulloh B. Diagnostic laparoscopy for chronic right iliac fossa pain: a pilot study. *Aust N Z J Surg*. 1997 Nov;67(11):789-91