

Original Research Article

Laparoscopy in management of surgical causes of acute versus chronic pain abdomen in adults visiting tertiary care hospital in Telangana, India

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ABSTRACT

Background: Pain abdomen accounts for about 14.2% of all emergency hospitalization. Many patients remain undiagnosed even after excluding the common disorders by meticulous investigations. In case of diagnostic uncertainty, laparoscopy may help to avoid unnecessary laparotomy, provide accurate diagnosis. The current study aimed at comparing the role of laparoscopy in management of surgical causes of acute and chronic pain abdomen.

Methods: A prospective study was done in 168 adult patients attending tertiary care hospital, selected by convenience sampling method. After clinical examination and relevant investigation, patients in need of diagnostic and therapeutic laparoscopic management were included in study. Laparoscopic findings and postoperative status of patients, with acute and chronic pain abdomen were compared with relevant statistical tests.

Results: Mean age of patients was 35.8 years. Majority of the patients were females (58.3%). 41.1% and 58.9% patients had acute and chronic pain abdomen, respectively. Though more patients with chronic pain abdomen (58.9%) underwent laparoscopy when compared with acute pain abdomen (41.1%) it was not statistically significant, also post-operative status though found to be better in patients with chronic pain abdomen was not statistically significant.

Conclusions: Though prevalence of laparoscopic intervention and better outcome was found more in patients with chronic abdominal pain in the present study it was not statistically significant.

Keywords: Therapeutic laparoscopy, Diagnostic laparoscopy, Acute pain abdomen, Chronic pain abdomen

INTRODUCTION

Pain abdomen is a symptom caused by a wide variety of disorders ranging from organic to functional. The organic causes of pain abdomen may be inflammation, ulceration, perforation, haemorrhage, malignancies, obstructions or distension of intra-abdominal organs including the retroperitoneal structures. However, some acute medical problems like porphyria, diabetic ketoacidosis and several heart and lungs may also present with pain abdomen.¹ Pain abdomen accounts for about 14.2% of all emergency hospitalization and about 6% of all hospital admissions were due to surgical causes of pain abdomen.²

Acute abdominal pain (AAP) is frequently defined as pain of less than five days duration.³ Acute abdomen is a spectrum of surgical, medical and gynaecological conditions ranging from trivial to life threatening conditions, which require hospital admission, investigations and treatment.⁴ Chronic abdominal pain (CAP) is pain that persists for more than 3 months either continuously or intermittently.⁵

Due to the potential surgical nature of the pain abdomen, an expeditious workup is necessary. The workup proceeds in the usual order of history, physical examination and laboratory and imaging studies.⁶

Biochemical, serological and imaging techniques such as ultrasound sonography (USG), computed tomography (CT) and magnetic resonance imaging (MRI) only provide indirect evidence of underlying disorder, therefore, many of the cases remain inconclusive.⁷

In spite of clinical, laboratory and radiological investigations, when the cause of abdominal pain remains obscure, the surgeon has only one choice left that is, exploratory laparotomy. Most surgeons feel that exploratory laparotomy is a more complete examination and carries little morbidity and mortality.⁸ Minimal access surgery or minimally invasive surgery has grown widely. Diagnostic laparoscopy is invasive and has both diagnostic and therapeutic value.^{9,10}

Due to improvement in instrumentation and greater experience with therapeutic laparoscopy, the procedure is no longer limited to visualization. Operative intervention can be provided at the same instance and formation of adhesions which is an important cause of chronic abdominal pain is less compared to laparotomy.¹¹

Laparoscopy is as much a surgical procedure as exploratory laparotomy and very often, just as informative. Apart from visualizing a large part of the abdominal cavity, a precise targeted biopsy, fine needle aspiration cytology or fluid analysis can also be done. Laparoscopy offers a distinct advantage over USG or CT scan as it is capable of detecting lesions less than 5 mm in size especially peritoneal metastasis, which cannot be detected by these investigations.⁷

In case of diagnostic uncertainty, laparoscopy may help to avoid unnecessary laparotomy, provides accurate diagnosis, helps to plan surgical treatment, improves the outcome in the majority of patients with abdominal pain and allows surgeons to diagnose and treat many abdominal conditions that cannot be properly managed otherwise.¹² Many factors like high diagnostic yield, its applicability and therapeutic management in both elective and emergency setups, reduced hospital stay, low morbidity and expenditure have made this treatment modality most popular.¹³

The current study aimed at comparing the role of laparoscopy in management of surgical causes of acute and chronic pain abdomen.

METHODS

A prospective observational study was done in adult patients, attending surgical department with pain abdomen from February 2019 to December 2020 in a tertiary care teaching hospital in Siddipet district, Telangana. During study period 538 patients presented with pain abdomen. After clinical examination, appropriate relevant investigations like routine laboratory work up, X-ray chest and abdomen was done. USG abdomen and CT abdomen was done when needed to

arrive at a clinical diagnosis. Based on clinical diagnosis 306 patients were managed medically.

Purposive sampling method was used and out of the remaining patients, those with persisting complaints after non operative management and doubtful clinical diagnosis were considered as study population (n=232) for therapeutic laparoscopy and diagnostic laparoscopy.

Inclusion criteria

Patients above 18 years of age of both sex, who gave informed consent were included in the study. Those who were fit for anaesthesia and laparoscopy with no signs of sepsis or shock, no chronic diseases or malignancy were also included in the study.

Exclusion criteria

Patients with contraindication for laparoscopy and pneumoperitoneum like haemodynamically unstable, raised ICT, malignancy, decompensate liver disease and high chest injuries, patients not fit for general anaesthesia, patients with uncorrected coagulopathy, patients with abdominal trauma, female patients with obstetric and gynaecological conditions as source of pain abdomen and patients with psychological disorders were excluded from the study.

Sample size

After obtaining informed consent for laparoscopy with explanation of risk of conversion to open surgery only 168 patients, who fulfilled inclusion and exclusion criteria, participated in the study.

$$\text{Sample size}(n) = \frac{\frac{z^2 \times p(1-p)}{e^2}}{1 + \frac{z^2 \times p(1-p)}{e^2 N}}$$

where,

Z α is the standard normal deviate, which is equal to 1.96 at 95% confidence interval,

p is the prevalence in the population which is 50% when prevalence is unknown; hence p=0.5,

e=absolute precision taken as 4% (<5 is acceptable),

1-p=(1-0.5),

N=population to be studied (total number of patients with surgical cause of pain abdomen for laparoscopy during study period)=232.

$$\text{Sample size}(n) = \frac{\frac{(1.96)^2 \times 0.5(1-0.5)}{(0.04)^2}}{1 + \frac{(1.96)^2 \times 0.5(1-0.5)}{(0.04)^2 \times 232}}$$

Sample size calculated using above formula $n=167.3$ equals to 168.

Data collection

After obtaining institutional ethical committee permission, data collected in a standard proforma on demographic details, history on present illness with type and duration of pain abdomen and other associated symptoms. Past surgical and medical history was obtained. Findings on general and clinical examination, relevant investigations and intraoperative findings of laparoscopy procedure and patient post-operative condition were recorded.

Procedure

After preoperative preparation, laparoscopy was done under general anaesthesia. The Veress needle was passed through the abdominal wall in an area with no scars, most often in the left upper quadrant of the abdomen, a few centimetres below the costal margin. After establishment of the pneumoperitoneum, a standard three trocar techniques were used (10 mm optic via umbilical trocar and two 5 mm lateral trocars). A fourth 5 mm trocar was inserted as needed during the procedure. The whole abdominal cavity was inspected carefully with fine smooth atraumatic graspers. If adhesions were seen, dissection was made close to the abdominal wall to avoid injury to the bowel loops. Apart from adhesiolysis other laparoscopic procedures such as appendectomy, cholecystectomy, hernia repair, repair of perforation, omentum resection and biopsies, bowel resection and anastomosis, removal of ureteric and renal stones, hepatic abscess drainage and intracavitary debridement and drainage for pancreatitis were done. Negative laparoscopic finding was seen in 2.4% of the patients. On table conversion to open laparotomy was done in 1.2% of patients for repair of perforation and resection of gangrenous appendix. Patients were followed till the condition improved and discharged.

Data analysis

Data collected was entered in microsoft excel and analysed using mean, frequencies and percentages by SPSS 20. Chi square test and student t test was used for comparison, $p < 0.05$ was taken as statistically significant.

RESULTS

After preoperative preparation of 168 patients, laparoscopy was done for therapeutic and diagnostic interventions. Range and mean age of study participants was 18-68 years and 35.8 years, respectively.

As shown in Table 1, Majority of the patients were females (58.3%). According to education status many were graduates (38.1%), followed by secondary school (24.4%), primary school (19%) and post-graduates

(18.5%). With respect to characteristics of pain abdomen, 69 (41.1%) and 99 (58.9%) patients had acute and chronic pain abdomen respectively. As per site of pain, majority had pain in right lower quadrant (41.1%), followed by right upper quadrant (25%), left lower quadrant (14.9%), left upper quadrant (10.7%) and generalised pain (8.3%). Fever (40.5%) was the most common symptom associated with pain, other symptoms like vomiting and altered bowel habits were seen in 15.5% and 6% of the patients, respectively. Other associated symptoms included chills, rigors, loss of appetite, belching, hiccups.

On general examination signs of pallor, jaundice and pedal oedema were seen in 8.4%, 1.2% and 1.8% of patients, respectively. Tachycardia was seen in 37.7% of patients. Per abdomen examination showed abdominal distension in 1.2%, cough reflex in 1.8% localised tenderness and rebound tenderness in 96.4% and 24.5% respectively.

According to lab investigations as shown in Table 2 anaemia, hyperbilirubinaemia and leucocytosis was seen in 8.3%, 1.8% and 35.1% of patients respectively. X-ray findings in 1.2% of patients showed air under diaphragm which was a sign of perforated viscus and 3.6% showed Air fluid level which was a sign of obstructive bowel disease. USG abdomen findings showed appendicitis, cholecystitis, pancreatitis, dilated bowel loops, free fluid, hepatic abscess and renal/ureteric calculi in 26.8%, 17.3%, 4.8%, 3%, 7.7%, 3.6% and 4.2% respectively. CT abdomen showed adhesions due to previous surgeries, hernia and pancreatitis in 14.3%, 6.5% and 3.6% respectively.

Therapeutic laparoscopy was done in 33.3% and 45.2% of patients with acute and chronic pain abdomen, respectively. Of which 2 (1.2%) laparoscopy surgeries were converted to open laparotomy to remove pancreatic stone in a patient with acute pain abdomen and gangrenous appendix in a patient with chronic pain abdomen (Table 3).

Diagnostic laparoscopy was done in 7.7% and 13.7% of patients with acute and chronic pain abdomen. 4 (2.4%) patients gave negative laparoscopic findings or were undiagnosed, of which 1 and 3 patients had acute (0.6%) and chronic (1.8%) pain abdomen respectively (Table 3).

Laparoscopic appendectomy (29.8%), adhesiolysis (11.9%), urolithiasis management (6%), omental biopsy of TB abdomen (1.2%), cholecystectomy (18.4%), hernia repair (6.5%), repair of perforation (2.4%), wedge resection of meckels diverticulum and other diverticulitis and anastomosis (2.4%) and bowel resection and anastomosis (4.2%), drainage of hepatic abscess (4.7%) was done (Table 3).

In the present study 33.3% and 45.2% of patients with acute pain abdomen and chronic pain abdomen

underwent therapeutic laparoscopy. 7.2% and 11.9% of patients with acute pain abdomen and chronic pain abdomen underwent diagnostic laparoscopy. Undiagnosed were 0.6% with acute pain abdomen and 1.8% with chronic pain abdomen. Table 4 shows that role of laparoscopy to be more in patients with chronic pain abdomen compared with acute pain abdomen which was not statistically significant.

Post-operative complication like bleeding and infection was seen in 9.5% and 4.8% of patients, respectively. No complications were associated with pneumoperitoneum. The mean duration of hospital stay was 3.8 days with range of 2-9 days. Post-operative symptomatic relief was achieved in 95.2% of patients (Table 5).

Table1: Demographic details and presenting complaints of study participants (n=168).

Demographic details and presenting complaints		Frequency (n=168)	Percentage (%)
Sex	Male	70	41.7
	Female	98	58.3
Marital status	Married	132	78.6
	Single	36	21.4
Education	Primary school	32	19
	Secondary school	41	24.4
	Graduate	64	38.1
	Post-graduate	31	18.5
Duration of pain	Acute	69	41.1
	Chronic	99	58.9
Site of pain	Right lower quadrant	69	41.1
	Right upper quadrant	42	25
	Left lower quadrant	25	14.9
	Left upper quadrant	18	10.7
	Generalised pain	14	8.3
Associated symptoms	Fever	68	40.5
	Vomiting	26	15.5
	Altered bowel habits	10	6
	Abdominal swelling	6	3.6
	Others	5	3

Table 2: Laboratory and radiological findings (n=168).

Laboratory findings		Frequency (n=168)	Percentage (%)
Laboratory	Normal	92	54.8
	Anaemia	14	8.3
	Leucocytosis	59	35.1
	Hyperbilirubinaemia	3	1.8
X-ray findings	Normal	54	32.1
	Air under diaphragm	2	1.2
	Air fluid level	6	3.6
	Not done	106	63.1
USG findings	Normal	35	20.8
	Appendicitis	45	26.8
	Cholecystitis	29	17.3
	Pancreatitis	8	4.8
	Dilated bowel loops	5	3
	Free fluid	13	7.7
	Hepatic abscess	6	3.6
	Renal/ureteric calculi	5	4.2
Not done	22	13.1	
CT abdomen findings	Normal	11	6.6
	Adhesions	24	14.3

Continued.

Laboratory findings	Frequency (n=168)	Percentage (%)
Pancreatitis	6	3.6
Hernia	11	6.5
Not done	116	69

Table 3: Laparoscopic interventions.

	Acute pain abdomen (69/41.1%)		Chronic pain abdomen (99/58.9%)		Total (168/100) (%)
	Therapeutic laparoscopy (56/33.3)	Diagnostic laparoscopy (13/7.7)	Therapeutic laparoscopy (76 (45.2)	Diagnostic laparoscopy (23 (13.7)	
Appendicitis	25 (14.9)	2 (1.2)	20 (11.9)	3 (1.8)	50 (29.8)
Adhesions	0 (0)	0 (0)	16 (9.5)	4 (2.4)	20 (11.9)
Urolithiasis	5 (3)	2 (1.2)	2 (1.2)	1 (0.6)	10 (6)
Tb abdomen	0 (0%)	0 (0)	0 (0)	2 (1.2)	2 (1.2)
Cholecystitis	12 (7.1)	1 (0.6)	17 (10.1)	1 (0.6)	31 (18.4)
Diverticulitis	0 (0)	1 (0.6)	0 (0)	3 (1.7)	4 (2.4)
Hernia	4 (2.4)	0 (0)	6 (3.6)	1 (0.6)	11 (6.5)
Pancreatitis	5 (3)	1 (0.6)	7 (4.2)	4 (2.4)	17 (10.1)
Obstructive bowel disease	1 (0.6)	2 (1.2)	4 (2.4)	0 (0)	7 (4.2)
Perforated ulcer	2 (1.2)	2 (1.2)	0 (0)	0 (0)	4 (2.4)
Hepatic abscess	2 (1.2)	1 (0.6)	4 (2.4)	1 (0.6)	8 (4.7)
Undiagnosed	0 (0)	1 (0.6)	0 (0)	3 (1.8)	4 (2.4)

Table 4: Laparoscopy in acute versus chronic pain abdomen.

	Acute pain abdomen 69 (41.1%)	Chronic pain abdomen 99 (58.9%)	Total 168 (100%)	X ² ; p value
Therapeutic laparoscopy for preoperative diagnosis	56 (33.3)	76 (45.2)	132 (78.5)	$\chi^2 = 0.6953$; p value= 0.7; not significant
Diagnostic laparoscopy for inconclusive diagnosis	12(7.2)	20 (11.9)	32 (19.1)	
Undiagnosed after laparoscopy	1 (0.6)	3 (1.8)	4 (2.4)	

Table 5: Post-operative findings in acute versus chronic pain abdomen.

Variables		Acute pain abdomen (69/41.1%)	Chronic pain abdomen (99/58.9%)	Total (168/100%)		
Post-operative complication	None	60 (35.7)	84 (50.0)	144 (85.7)	$X^2=0.1476$; p value=0.9288	Not significant
	Bleeding	6 (3.6)	10 (5.9)	16 (9.5)		
	Infection	3 (1.8)	5 (3)	8 (4.8)		
Post-operative hospital stay (in days)	Mean±SD (range)	3.6±1.5 (2-7)	3.9±1.7 (2-9)	3.8 (2-9)	t=1.1801; p=0.2397	Not significant
Post-operative symptomatic relief	Present	67 (39.9)	93 (55.3)	160 (95.2)	$X^2=0.8964$; p=0.3437	Not significant
	Absent	2 (1.2)	6 (3.6)	8 (4.8)		

Though the mean duration of post-operative stay in the hospital was slightly more in patients with chronic pain

abdomen it was not statistically significant. Also post-operative complications and post-operative symptomatic

relief was more in patients with chronic pain abdomen which was also not statistically significant (Table 5).

DISCUSSION

Laparoscopy is most effective technique for bridging gap between clinical evaluation and major surgical exploration. The overall diagnostic rate is 99% for acute abdominal pain, 70% for chronic pain syndrome, 95% for focal liver disorders, 95% for abdominal masses, 95% for ascites and 80% for retroperitoneal disease.^{8,14}

In the current study mean age of study participants was 35.8 years which was higher when compared with study by Bellad et al. Thawait et al and Bahram et al where the overall mean age of presentation was 36.67, 30.5 and 23 years, respectively.¹⁵⁻¹⁷

In this study majority were females (53.8%) which was similar to study by Rao et al patients with acute and chronic pain abdomen were 41.1%, 58.9% whereas in a study by Rao et al it was 79% and 21% cases, respectively.¹⁸

As per site of pain, majority had pain in right lower quadrant (69 out of 168; 41.1%) which is less when compared with study by Bahram et al (53 out of 58).¹⁷

Fever (40.5%) and abdominal tenderness (96.4%) in this study was less compared with study by Thakur et al where fever and abdominal tenderness was 239 (45.6%) and 524 (100%) respectively.²

Causes of acute pain abdomen in current study were appendicitis (16.1%), cholecystitis (7.7%), pancreatitis (3.6%), which was lower when compared with study by Rao et al acute appendicitis 22%, acute cholecystitis 9%, acute pancreatitis 5%, whereas hepatic abscess (1.8%) and obstructed bowel disease (1.8%) was high, it was 1% and 1% respectively in Rao et al study.¹⁸ Also appendicitis was 32% which was very high in study by Thawait et al and Subramaniam et al. 79% diverticulitis was 0.6% in current study which was very low, compared with study by Bahram et al it was 5% (shown in Table 6).^{16,17,19}

Causes of chronic abdomen in current study was chronic appendicitis (23/13.7%) which was low compared with study by Brahman et al (23.75%) and Schrenk et al (32.25%).^{17,20} Adhesions (11.9%) in this study when compared with Brahman et al (22.5%) it was more and Rao et al (9%) it was less (shown in Table 6).^{17,18}

Renal/ureteric stones (3/1.8%), in this study were very less compared with Thakur et al 74 (14.2%).² TB abdomen (1/1.2%) was less in this study when compared with Brahman et al (5%) and Rao et al (3%).^{17,18} Cholecystitis (18/10.7%), diverticulitis (3/1.7%) was less and hernia (7/4.2%) was more in this study compared to

study by Brahman et al, 4 (5%) and 2 (2.5%) respectively (shown in Table 6).¹⁷

Undiagnosed were 1 (0.6%) and 3 (1.2%) patients of AAP and CAP, respectively. Laparoscopy conversion rate was 0.6% and 0.6% in patients with AAP and CAP in this study and 0 (0%) in study by Rathod et al (shown in Table 6).¹⁹

This study shows more patients with chronic pain abdomen underwent laparoscopy compared with AAP, which was not statistically significant. Though the mean duration of post-operative complications and post-operative symptomatic relief was more in patients with CAP compared with AAP, it was not statistically significant.

CONCLUSION

Patients with AAP (41.1%) and CAP (58.9%) underwent laparoscopic intervention of which 1 (0.6%) and 3 (1.8%) had negative laparoscopic finding or were undiagnosed respectively and conversion rate was 2 (1.2%). Less conversion rate and less negative laparoscopic finding could be due to improved surgeon's laparoscopic skill. Though prevalence of laparoscopic intervention and better outcome was found more in patients with chronic abdominal pain in the present study it was not statistically significant.

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REFERENCES

1. Mohan V. Sitaram and Simon Paterson Brown. In: William NS, ed. History and examination of the abdomen. Bailey and Love's Short Practice of Surgery 27th ed. London: CRC press; 2018: 1016-21.
2. Thakur JK, Kumar R. Epidemiology of acute abdominal pain: a cross-sectional study in a tertiary care hospital of Eastern India. Int Surg J. 2019;6(2):345-8.
3. Dang C, Aguilera P, Dang A, Salem L. Acute abdominal pain. Four classifications can guide assessment and management. Geriatrics. 2002;57(3):30-42.
4. Prasad H, Rodrigues G, Shenoy R. Role of ultrasonography in nontraumatic acute abdomen. Int J Radiol. 2007;5(2):1-4.
5. MSD Manual Professional Version. Chronic abdominal pain and recurrent abdominal pain, 2020.

Available at: <https://www.msmanuals.com/en-in/professional/gastrointestinal-disorders/symptoms-of-gastrointestinal-disorders/chronic-abdominal-pain-and-recurrent-abdominal-pain>. Accessed on 1 March 2021.

6. Lavu J, Golla S. Clinical profile and management of acute abdomen in a tertiary care hospital. *IJSS J Surg.* 2020;6(5):10-13.
7. Husain M, Sachan PK, Khan S, Lama L, Khan RN. Role of diagnostic laparoscopy in chronic and recurrent abdominal pain. *Trop Gastroenterol* 2014;34(3):170-3.
8. Nagy AG, James D. Diagnostic laparoscopy. *Am J Surg.* 1989;157(5):490-3.
9. Berci G. Elective and emergent laparoscopy. *World J Surg.* 1993;17(1):8-15.
10. Easter DW, Cuschieri A, Nathanson LK, Lavelle-Jones M. The utility of diagnostic laparoscopy for abdominal disorders. Audit of 120 patients. *Arch Surg.* 1992;127(4):379-83.
11. Rathod A, Agrawal A, Mehera B. Role of laparoscopy in chronic and recurrent abdominal pain-rural area experience. *Indian J Surg.* 2015;77(3):1018-22.
12. Tulaskar N, Nichkaode P, Dasgupta S, Choudhary A, Zamad R. Evaluation of role of laparoscopy in chronic abdominal pain. *Int J Biol Med Res.* 2013;4:3230-3.
13. Rubbia A, Faryal GA. Role of diagnostic laparoscopy in patients with acute or chronic nonspecific abdominal pain. *World J Laparosc Surg.* 2015;8:7-12.
14. Udwardia TE. Diagnostic laparoscopy, laparoscopic surgery in developing countries. *BJS.* 1997;15-43.
15. Bellad AP, Murgod AA. Role of diagnostic laparoscopy in chronic abdominal pain with uncertain diagnosis: A 1-year cross-sectional study. *World J Laparosc Surg.* 2019;12(1):9-14.
16. Thawait A, Dwivedi S, Bhatt M, Bakhshish K, Mittal A. Role of early laparoscopy in diagnosis of acute abdominal pain. *Int J Contemp Med Res.* 2017;4(7):1568-74.
17. Bahram M, Ahmed M. Diagnostic and therapeutic value of diagnostic laparoscopy in patient with chronic abdominal pain. *Emerg Med.* 2015;5:292.
18. Rao GN, Suresh BK, Lakshmi KC. Role of diagnostic laparoscopy in cases of acute and chronic abdominal pain. *J Evid Based Med Health.* 2019;6(42):2729-33.
19. Subramaniam R. Diagnostic laparoscopy in acute abdominal pain. *Int Surg J.* 2019;6:1104-7.
20. Schrenk P, Woisetschlager R, Wayand WU, Rieger R, Sulzbacher H. Diagnostic laparoscopy: a survey of 92 patients. *Am J Surg.* 1994;168(4):348-51.

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