Role Of Laparoscopy In Diagnosis And Management Of Acute Abdomen – In South Indian Population

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Abstract

BACKGROUND

Laparoscopy is being increasingly employed as a diagnostic tool and a therapeutic modality in acute abdomen. The accuracy of diagnosis, the ability to accomplish treatment and other advantages of laparoscopy need to be defined.

OBJECTIVES

To study the role of laparoscopy in diagnosis and management of acute abdomen with respect to the accuracy of diagnostic laparoscopy to identify the cause of acute abdomen, to assess the efficacy of laparoscopy in ascertaining treatment after diagnosis, to assess the ability to avoid unnecessary non-therapeutic laparotomies.

METHODS

A clinical study of 50 cases of acute abdomen was done to study the role of laparoscopy in diagnosis and management of acute abdomen.

RESULTS

Out of the 50 cases studied, 27 (54%) were male and 23 (46%) were female patients, the average age being 30.5 years. Abdominal pain was the universal complaint present in all 50 patients (100%), vomiting was present in 42 (84%), fever in 31 (62%) and abdominal distension in 12 (24%), alteration in bowel habits was noted in 9 (18%) patients and burning micturition in 5 (10%). In our study, 9 (18%) patients had undergone previous surgery. Laparoscopy was diagnostic in 50 patients (100%). Laparoscopy could accomplish treatment in 47 patients (94%). Unnecessary and non-therapeutic laparotomies were avoided in 7 patients (14%). Only 3 patients (6%) had to be subjected to laparotomy (either conversion or re-laparotomy) for appropriate management. Average duration of laparoscopic surgery was 51.9 minutes. Average hospital stay was 9.8 days. Morbidity rate for laparoscopic surgery was 10%. There was no mortality in our study.

CONCLUSIONS

This study establishes the fact that laparoscopy is a very accurate diagnostic tool and effective therapeutic option in patients presenting with acute abdomen. Non-therapeutic laparotomies are avoided in a significant number of patients undergoing diagnostic laparoscopy.

AIMS AND OBJECTIVES

To assess the accuracy of diagnostic laparoscopy to identify the cause of acute abdomen.
To assess the efficacy of laparoscopy in ascertaining treatment after diagnosis.
To assess the ability to avoid unnecessary non-therapeutic laparotomies.

INTRODUCTION

Abdominal pain is the commonest complaint requiring emergency surgical admission. The patient with acute abdomen requires detailed investigations but diagnosis can still remain uncertain. Moreover significant variations are noted in clinical features, laboratory and imaging studies with respect to age, sex and associated co-morbidities; add that one third of patients have non-specific abdominal pain.

These difficulties notwithstanding, the surgeon must make a decision to operate or not. Once the decision for surgery has been made, the surgeon must choose the approach - laparotomy or laparoscopy.

Diagnostic laparoscopy effectively establishes a diagnosis, can be therapeutic and causes less morbidity and mortality than a formal laparotomy. The findings of a diagnostic laparoscopy might change the further course of management to a more limited approach or conservative line of management and help in avoiding unnecessary non-therapeutic laparotomies. Laparoscopy is as much a surgical procedure as an exploratory laparotomy, often just as informative, and to the trained surgeon it affords a better view of the entire peritoneal cavity than the usual exploratory incision. To achieve a high rate of positive diagnosis from laparoscopy requires much more than correct technique; it requires a thorough background of surgery, sound clinical acumen and also knowledge and awareness of abdominal pathology.1-3

In this study, the role of laparoscopy in diagnosis and management of acute abdomen is being evaluated. Diagnostic laparoscopy is rapidly becoming a procedure used by general surgeons with increasing frequency. The indications include abdominal pain (acute and chronic), focal liver diseases, ascites, preoperative evaluation of malignant diseases, etc. 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. Diagnostic laparoscopy should be used with increasing frequency when a tissue diagnosis is needed and for laparoscopic adhesiolysis.4,5

A prospective audit of diagnostic yield and treatment benefit of laparoscopy was undertaken in 220 cases. The procedure was performed electively in 180 patients and as an emergency in 40. The indications for laparoscopy in the elective group were suspected hepatic disease, staging of intraabdominal malignancy and chronic abdominal pain. Emergency laparoscopy was performed in patients with acute abdominal pain. Diagnostic benefit viewed with the indications for the procedures: liver disorders 71%, tumor staging 87%, uncertain diagnosis 74%, acute abdominal pain 100% and chronic abdominal pain 41%. Clinical treatment was significantly improved by laparoscopy in 15 of 21 (71%) patients with liver disease, 10 of 30 (33%) with intraabdominal malignancy, 5 of 19 (26%) with uncertain diagnosis, 32 of 40 (80%) with acute abdominal pain and 15 of 110 (23%) patients with chronic abdominal pain. A wrong assessment of nature or stage of disease was made by laparoscopy in 3 of 220 (1%)6. Elective diagnostic laparoscopy remains superior to conventional radiology because biopsy specimens may be obtained. If the procedure is correctly performed, the diagnostic yield is extremely high and the morbidity and mortality are low.7

Udwadia et al.8 conducted a study over a period of 18 years reaching to 1990. About 3,200 diagnostic laparoscopies were performed on adults under local anesthesia without mortality. The complication rate was 0.09%, with an 84% diagnosis rate. Combined with laparoscopic ultrasound, laparoscopy is highly accurate in the staging of intra-abdominal malignancies, and it is superior to transcutaneous ultrasonography and computed tomography. Other important applications include the evaluation of patients with chronic abdominal pain.8

The use of laparoscopy has become more common and more effective in the management of acute abdominal pain9. Diagnostic accuracy of laparoscopy varies from 93% to 100%; and laparoscopic techniques accomplish a definitive treatment of the underlying disease in 44% to 73% of cases. In 20% to 38% of patients, laparoscopy revealed either no abnormality or discovered a disease requiring no surgery for proper management, thus avoiding unnecessary burden of non-therapeutic laparotomies. The morbidity rates for laparoscopy range from 0% to 20% and mortality rates range from 0%to 5%.9

The spectrum of usage of laparoscopy is further widened by its application in a case of abdominal trauma. There the diagnostic accuracy was found to be 91%, and laparotomy was found unnecessary in 54% of patients.10 Conditions amenable to therapeutic laparoscopy include appendicitis, perforated peptic ulcer, diverticulitis, acute cholecystitis, small-bowel obstruction, and splenic and hepatic injuries, to name but a few.11 The use of laparoscopy in acute abdomen can lead to accurate recognition of the surgical pathology, alter surgical management and lead to appropriate treatment.12 However, laparoscopy should not delay laparotomy in patients with clear indications for operation.13

MATERIALS AND METHODS

The patients having acute abdominal pain were admitted in the surgery department and the following procedures undertaken viz., history taking, clinical examination, routine examination and special investigations. After initial assessment, they were subjected to laparoscopy.

INCLUSION CRITERIA

All patients presenting with signs and symptoms suggestive of acute abdomen and abdominal trauma.

EXCLUSION CRITERIA

- Uncontrolled coagulopathy
- Hemodynamically unstable patients.
- Patients presenting with chronic abdominal pain.
- Patients having undergone multiple previous laparotomies.
- Patients refusing the invasive technique (diagnostic laparoscopy) for diagnosis.
- Patients presenting with massive intestinal dilatation with abdominal distention

This study contains 50 patients, 27 males and 23 females. The patients were treated as follows. All patients were informed of the risks and benefits of the procedure and also explained about the probability of laparotomy if need arose.

After creating the pneumoperitoneum using a Verres needle or by open method, a 10-mm telescope was placed through the supra/subumbilical port, and another 5-mm port was placed in the upper or lower abdomen to allow manipulation or biopsy of intraabdominal pathology. A thorough evaluation of the peritoneal cavity was made and wherever required biopsy was taken. Subsequently, an accurate diagnosis was made and wherever feasible a therapeutic procedure was also performed by laparoscopy. If the condition did not require any intervention, nothing else was done.

The operative time represented the total time in minutes from insertion of the Verres needle to the skin closure. Hospital stay was determined from the time of admission to the time of discharge. Complications were determined both intraoperatively and postoperatively. Morbidity included SSI (surgical site infection), persistent post operative pain and shoulder pain.

RESULTS

A total of 50 new cases of acute abdomen underwent diagnostic laparoscopy after thorough clinical evaluation and appropriate radiological investigations, irrespective of a certain diagnosis before undergoing laparoscopy.

Table 1

LAPAROSCOPIC DIAGNOSIS

Diagnosis	No. of cases	Percentage
Acute appendicitis with another pathology	7	14.0
Acute appendicitis	18	36.0
Acute calculous cholecystitis	2	4.0
Appendicular mass	3	6.0
Appendicular perforation	1	2.0
Duodenal ulcer perforation	1	2.0
Empyema of the gall bladder	4	8.0
Postoperative adhesions	6	12.0
Splenic abscess	1	2.0
Pancreatic abscess	1	2.0
Peritoneal abscess	1	2.0
Appendicular stump blow	1	2.0
Ruptured liver abscess	1	2.0
Sealed perforation	1	2.0
Splenic hematoma	2	4.0
Total	50	100.0

In this study, 18 cases with the exclusive diagnosis of acute appendicitis are at the forefront and 7 cases had an additional intra-abdominal pathology in addition to acute appendicitis [left hematosalphinx - 1, right fimbrial cyst - 1, pelvic inflammatory disease with right ovarian cyst - 1, right hydrosalphinx - 2, adhesions at previous surgery site with a small para-umbilical hernia - 1, localized peritonitis due to appendicular perforation - 1].

Six patients had postoperative adhesions, 4 patients had empyema of the gall bladder, 2 had acute calculous cholecystitis, 3 patients had an appendicular mass and 2 patients had splenic hematoma (Table 1). There were one case each of appendicular perforation, duodenal ulcer perforation, splenic abscess, pancreatic abscess, peritoneal (pelvic) abscess, appendicular stump blow-out, ruptured liver abscess and a case of sealed duodenal perforation.

Table 2

AGE & SEX DISTRIBUTION

	No. of cases	Mean	Minimum	Maximum
Male	27	32.1	9.00	65.00
Female	23	28.6	11.00	54.00
Total	50	30.5	9.00	65.00

Out of the 50 cases studied, 27 were male patients and 23 were female patients, forming 54% and 46% respectively.

Table 3

SYMPTOMATOLOGY

Symptom	Present	Absent	Percentage (%)
Pain	50	0	100
Vomiting	42	8	84
Fever	31	19	62
Abdominal distension	12	38	24
Bowel symptoms	9	41	18
Burning micturation	5	45	10

In the study, 9 patients had undergone previous surgery. Out of the 9 patients, 3 patients had undergone appendicectomy, 2 hysterectomy, 2 for peritonitis secondary to ileal perforation, one tubectomy and one had undergone laparotomy for duodenal ulcer perforation.

Table 4

Clinical Diagnosis	Frequency	Percentage (%)
Acute appendicitis	27	54
Splenic abscess	3	6
Acute cholecystitis	6	12
Blunt abdominal injury (hemoperitoneum)	1	2
Infected pancreatic pseudocyst	1	2
Appendicular mass	1	2
Peritonitis due to hollow viscus perforation	3	6
Postoperative adhesions	6	12
Post-appendicectomy hemorrhage	1	2
Postoperative pelvic abscess	1	2
Total	50	100

One patient with clinical diagnosis of postoperative pelvic abscess was found to have also right subhepatic and right paracolic abscess.

Table 5

RADIOLOGICAL INVESTIGATIONS

Investigations	No. of cases	Percentage (%)
X-ray	23	46
Ultrasonography	31	62
CT-abdomen	2	4

These radiological investigations were done wherever they were applicable and feasible.

Table 6

LAPAROSCOPIC PROCEDURES

Procedure	No. of cases	Percentage
Laparoscopic appendicectomy	19	38.0
Diagnostic laparoscopy	7	14.0
Laparoscopic adhesiolysis	2	6.0
Lap. adhesiolysis with another procedure	2	4.0
Laparoscopic cholecystectomy	6	12.0
Laparoscopic/converted open splenectomy	1	2.0
Lap. appendicectomy with another procedure	7	14.0
Laparoscopic perforation closure	2	4.0
Laparoscopic drainage of peritoneal abscess	2	4.0
Laparoscopic necrosectomy	1	2.0
Lap. adhesiolysis converted to open resection & anastomosis	1	2
Total	50	100.0

Laparoscopic appendicectomy was the most commonly performed procedure comprising 19 (38%) cases. Laparoscopic appendicectomy with another procedure was performed in 7 (14%) cases. These procedures included adhesiolysis, omentoplasty, salpingectomy, excision of fimbrial cyst, right ovarian cystectomy, repair of para-umbilical hernia, peritoneal lavage.

Laparoscopic adhesiolysis was combined with another procedure in 2 (4%) cases in the form of biopsy from a sigmoid growth and left ovarian cystectomy. Laparoscopic cholecystectomy was performed in 6(12%) patients. Laparoscopic closure of duodenal ulcer perforation was done in one (2%) patient and closure of blown-out appendicular stump with omentoplasty was done in one (2%) patient. Laparoscopic necrosectomy was also done in one (2%) patient. Laparoscopic drainage of intraperitoneal abscess was done in one (2%) patient, too. Conversion to laparotomy was contemplated in 2 (4%) patients. One patient underwent laparoscopy converted to open splenectomy and the other

patient underwent laparoscopy converted to open adhesiolysis with resection and end-to-end anastomosis of ileum for stricture of ileum.

Only diagnostic laparoscopy was done in 7 (14%) patients without performing any therapeutic laparoscopic procedure. In three patients with appendicular mass, we did not find the need for any surgical intervention.

One case of blunt abdominal injury who underwent laparoscopy revealed edematous pancreas and splenic hematoma with mild hemoperitoneum. Suctioning of the hemoperitoneum was done and no active bleeding was noted, hence no intervention was attempted; the patient was monitored after the procedure and recovered satisfactorily.

One case with clinical diagnosis of peritonitis secondary to hollow viscus perforation was found to have a sealed-off duodenal ulcer perforation; thorough suctioning of the peritoneal cavity was done, and the patient recovered satisfactorily.

One patient with clinical diagnosis of splenic abscess was found to have a splenic tear with multiple clots and no active bleeding, hence no extra surgical exercise was attempted.

One patient with clinical diagnosis of peritonitis secondary to hollow viscus perforation was found to have peritonitis secondary to ruptured solitary large liver abscess, thorough suctioning and peritoneal lavage were given and a drain was placed. The patient recovered satisfactorily.

The mean hospital stay was 9.8 days. The minimum hospital stay was of 2 days for a case of acute appendicitis, while the maximum stay of 42 days was for the patient with sigmoid growth who had to undergo re-laparotomy.

The mean duration of the procedure was 51.9 minutes, the minimum duration being 20 minutes for a case of laparoscopic appendicectomy. The maximum duration of 150 minutes was required for the patient who underwent conversion to laparotomy for resection and anastomosis of stricturous ileal segment.

Morbidity was observed in 5 (10%) of cases. Two patients developed surgical site infection, one patient a pleural effusion in the postoperative period, one patient developed prolonged paralytic ileus and one patient had right shoulder pain after undergoing the laparoscopic procedure. Out of the 5 patients, 3 patients were the ones who required conversion to laparotomy or a planned relaparotomy at a later date. No mortalities were noted in the 50 patients under this study.

DISCUSSION

Acute abdomen continues to be the commonest complaint for emergency surgical admission and demands a large portion of the general surgeons' workload. We found that laparoscopy was of great diagnostic value and a therapeutic procedure was feasible in significant number of patients. Moreover, observation on laparoscopy changed the further course of management in several cases and avoided unnecessary non-therapeutic laparotomies in a significant proportion of patients.

Beauchamp et al. reported that the diagnostic accuracy of laparoscopy varies from 93% to 100%; in 20% to 38% of patients, laparoscopy revealed either no abnormality or discovered a disease requiring no surgery for proper management, thus avoiding an unnecessary burden of non-therapeutic laparotomies.26 Nagy et al. found the diagnostic accuracy to be 91%, and laparotomy was found unnecessary in 54% of patients.28 Agresta et al. studied a total of 935 patients. A definitive diagnosis was accomplished in 85.7% (96 patients) of cases, and 90.6% (87) of these patients were treated successfully by laparoscopy.14 Laparoscopic appendicectomy with another procedures was performed in 7 (14%) of cases. These procedures included adhesiolysis, omentoplasty, salpingectomy, excision of fimbrial cyst, right ovarian cystectomy, repair of para-umbilical hernia, and peritoneal lavage. Laparoscopic adhesiolysis was combined with another procedure in 2 (4%) cases in the form of biopsy from a sigmoid growth and left ovarian cystectomy. In the study by Chung et al. the accuracy of laparoscopic diagnosis was the same as for laparotomy. The 62% of patients who were managed totally laparoscopically required shorter hospitalization than the case-matched controls treated by open operation.38

AVOIDANCE OF NON-THERAPEUTIC LAPAROTOMY

Only diagnostic laparoscopy was done in 7 (14%) patients without performing any therapeutic laparoscopic procedure. In three patients with appendicular mass we did not find the need for any surgical intervention, the rest of the intraperitoneal organs were found normal, the patients were managed conservatively and advised interval appendicectomy.

One case of blunt abdominal injury who underwent laparoscopy revealed edematous pancreas and splenic hematoma with mild hemoperitoneum. Suctioning of

hemoperitoneum was done and no active bleeding was noted, hence no intervention was attempted; the patient was monitored after the procedure and recovered satisfactorily.

One case with clinical diagnosis of peritonitis secondary to hollow viscus perforation was found to have a sealed-off duodenal ulcer perforation, thorough suctioning of the peritoneal cavity was done, and the patient recovered satisfactorily.

One patient with clinical diagnosis of splenic abscess was found to have a splenic tear with multiple clots and no active bleeding, hence no extra surgical exercise was attempted.

One patient with clinical diagnosis of peritonitis secondary to hollow viscus perforation was found to have peritonitis secondary to ruptured solitary large liver abscess, thorough suctioning and peritoneal lavage was given and a drain was placed. The patient recovered satisfactorily.

Beauchamp et al. reported that in 20% to 38% of patients, laparoscopy revealed either no abnormality or discovered a disease requiring no surgery for proper management, thus avoiding the unnecessary burden of non-therapeutic laparotomies.26

NEED FOR LAPAROTOMY

Totally, 3 (6%) patients required laparotomy. Two of them underwent conversion on the table while the other required a planned re-laparatomy at a later date.

One patient with multiple splenic abscesses who was planned for laparoscopic drainage of abscess underwent conversion to laparotomy and eventually ended up with open splenectomy since there was no salvageable splenic tissue left after drainage of abscesses, and there was a considerable amount of hemorrhage.

Another patient with a clinical diagnosis of subacute intestinal obstruction secondary to postoperative adhesions was planned for laparoscopic adhesiolysis, at laparoscopy an ileal stricture of significant length was noted which required a resection and anastomosis of ileum, hence formal laparotomy and resection of the stricturous ileal segment and end-to-end anastomosis was performed.

The one patient who required a re-laparotomy was initially diagnosed clinically to have subacute intestinal obstruction secondary to postoperative adhesions and was planned for laparoscopic adhesiolysis. At laparoscopy, a growth was noted in the sigmoid colon (which was missed by CT scan) and biopsy was obtained from the growth which was found to be adenocarcinoma on histopathological examination. Appropriate planned surgery was performed at a later date.

HOSPITAL STAY

The mean hospital stay was 9.8 days. The minimum hospital stay was 2 days for a case of acute appendicitis, while the maximum stay of 42 days was for the patient with the sigmoid growth who had to undergo re-laparotomy. In the study by Sözüer et al. involving 56 patients, the median postoperative hospital stay was one day in the diagnostic laparoscopy group.15

In the study by Chung et al., the 62% of patients who were managed totally laparoscopically required shorter hospitalization than the case-matched controls treated by open operation.16

Majewski et al. reported that the hospital stay in the diagnostic laparoscopy group was shorter (median, 5 days vs 6 days in controls, $p<0.0003$), as was the effective treatment time (median, 5 days vs 6 days, $p<0.0012$). Therapeutic delay occurred in 16% of the control group cases, doubling the morbidity rate, increasing mortality by 50%, and prolonging hospital stay (median, 9 days vs 6 days, $p>0.3$, NS).17

DURATION OF SURGERY

The minimum duration including diagnostic laparoscopy and completion of the laparoscopic procedure stating from first skin incision to last skin suture was 20 minutes for a case of laparoscopic appendicectomy. The maximum duration of 150 minutes was required for the patient who underwent conversion to laparotomy for resection and anastomosis of a stricturous ileal segment. The mean duration was 51.9 minutes.

MORBIDITY

Morbidity was observed in 5 (10%) of cases. Two patients developed surgical site infection, one patient developed pleural effusion in the postoperative period, one patient developed prolonged paralytic ileus, and one patient had right shoulder pain after undergoing a laparoscopic procedure. Beauchamp et al. reported morbidity rates for laparoscopy ranging from 0% to20% and mortality rates from 0% to 5%.9

Agresta et al. studied a total of 935 patients. Major complications ranged as high as 5.3% with a postoperative

mortality of 1.7%.34 In the study by Chung et al., morbidity was not increased by laparoscopy in patients who required conversion to open operation.38 No mortalities were noted in the 50 patients under this study.

Beauchamp et al. reported morbidity rates for laparoscopy ranging from 0%to20% and mortality rates from 0% to 5%.9

CONCLUSION

Laparoscopy is an effective method for the diagnosis and treatment of surgical pathologies in patients in whom the diagnosis cannot be made with physical examination and non-invasive imaging methods. Laparoscopy is very safe, quick and effective as a major diagnostic tool in acute abdomen. The spectrum of usage of laparoscopy is further widened by its application in the case of abdominal trauma. The improvement in surgical decision-making for patients with abdominal pain but an uncertain diagnosis using a diagnostic laparoscopy has now been shown to decrease both negative and non-therapeutic laparotomy rates. Laparoscopy was diagnostic in 50 patients (100%). Laparoscopy could accomplish treatment in 47 patients (94%). Unnecessary and non-therapeutic laparotomies were avoided in 7 patients (14%). Only 3 patients (6%) had to be subjected to laparotomy (either conversion or re-laparotomy) for appropriate management.

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