Laparoscopic Management of Acute Adominal Emergencies

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ABSTRACT

Due to uncertain diagnosis alongside life threatening consequences, acute abdominal condition considered as a challenging surgical emergency. Clinico-radiological assessments are sometime not sufficient to give a clear confident diagnosis. Laparoscopy can be used as an efficient diagnostic as well as valuable therapeutic tool. Hence, the current study aims to evaluate the role of minimally access approach in such cases. A 53 patient were included in this prospective study between 2023 and 2025. They were clinically assessed and evaluated by laboratory tests and radiological imaging. Laparoscopy was used within the first 24-48 hours in all involved patients. The 53 patients were 29 males and 24 females. The mean age was 36.39 years. The patients consist of Acute appendicitis (10), appendicular abscess (5), appendicular mass (3), acute cholecystitis (13), Empyema of gall bladder (2), peptic ulcer perforation (2), complicated acute pancreatitis (2), mechanical intestinal obstruction (3), intra-abdominal collection (2), complicated liver hydatid (1), ectopic pregnancy (5), complicated ovarian cyst (2) and pyosalpinx (3). In all of them, a preoperative clinico-radiological diagnoses and intraoperative laparoscopic diagnoses were performed with an accuracy of 88.67% and 100% respectively. Conversion rate was 7.54%. Port site infection, wound infection and respiratory complications were reported in 11.31% of all patients. Most cases 77.35% spent 1-2 days in hospital post-operatively. The usage of laparoscopy in emergency setting is very crucial for avoidance of unnecessary 'explorative' laparotomy and alleviate any unwanted harm to the patient and it is excellent effective therapeutic tool achieving required surgical procedures.

Keywords: Acute abdomen, clinicoradiological diagnoses, diagnostic laparoscopy

INTRODUCTION

Acute abdomen is a life threatening non-traumatic abdominal condition that necessitate an urgent or emergent surgical intervention[1]. In practice of general surgery, the conditions of acute abdominal pain put a great challenge for both surgeon and other medical staff in a view of unclear diagnosis beside serious consequences of these condition[2,3]. Many cases of acute abdomen are presented with complex symptoms that may expose the patient to a great danger hence require a prompt intervention by early diagnosis and treatment[4].

Plane film radiography beside other noninvasive diagnostic procedures such as Ultrasonography, MRI and CT-scanning can be used as tools that may help the surgeon for early diagnosis and go further in management[2]. As usual situation in general surgical practice the well expert personals are not always available around the day to help in performing a dependable diagnostic imaging[4,5]. A generally accepted fact that these investigations carry certain limitations because they are highly operator dependent and sometimes are not already available in the hospital or it is time consuming particularly CT and MRI scanning[2,4].

An under estimation of acute abdominal situations may lead to either delayed surgical intervention that may lead to threatening of patient life or an early abdominal surgical exploration that may be unnecessary and just leading to increasing of patient morbidity or mortality[6,7]. Therefore, and due to an advancing and progressive technical and practical improvement in laparoscopy and its accuracy. It becomes as a reliable and suitable noninvasive diagnostic tool[6,7].

In cases of acute abdomen, laparoscopy can be used to help in early diagnosis of surgical emergencies as well as used as a therapeutic tool in a well expert hands that may result in avoidance of unnecessary open surgical interference with its consequence or used to choose the suitable access before laparotomy[8,9].

Objectives of study:

The current study was designed to evaluate the role of use of laparoscopy as diagnostic and therapeutic tool simultaneously in acute abdominal emergencies and to assess the outcome of early detection and treatment of the acute abdominal emergencies using laparoscopy.

PATIENTS AND METHOD

This is a prospective study involving 53 patients those were admitted to surgical wards in Basrah Teaching Hospital and Basrah Gastroenterology and Hepatology Hospital from January 2023 to January 2025, all patients were diagnosed and managed as cases of acute abdomen after detailed history and physical examination. Routine laboratory investigations and ECG were done for all patients beside some specific tests according to the clinical condition such as pregnancy test, serum amylase, serum lipase and serum troponin. An erect chest X-ray P/A view, plane erect and supine abdominal X-rays,

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Table 1. The diagnosis of acute abdomen

Acute abdomen diagnosis	Total no.	% of total No.
Acute appendicitis	10	18.86
Appendicular abscess	5	9.43
Appendicular mass	3	5.66
Acute calculous cholecystitis	13	24.52
Empyema of gall bladder	2	3.77
Perforated peptic ulcer	2	3.77
Complicated acute pancreatitis	2	3.77
Adhesive and band intestinal obstruction	3	5.66
Intraperitoneal collection of bile	2	3.77
Complicated liver hydatid cyst	1	1.88
Ectopic pregnancy	5	9.43
Complicated ovarian cyst	2	3.77
Pyosalpinx	3	5.66
Total	53	100

Ultrasonography and CT-scanning were performed for some conditions accordingly.

Exclusion Criteria: The following patients are excluded from the study; patients who were hemodynamically unstable, patients with uncontrolled coagulopathy, patients less than 12 years old, patients with severe sepsis and patients with cardiopulmonary comorbidities made them unfit for general anesthesia and pneumoperitoneum and patient refusal.

Patient Preparation: All patients were assessed for risk of general anesthesia, optimization of general condition by intravenous fluid, antibiotics, nasogastric tube and urinary bladder catheterization once indicated. Detailed explanation of laparoscopic procedure was offered to all patients with possibility of conversion to open procedure and an informed consent was taken from all patients.

Laparoscopic Operative Techneques:

Patient position: Multiple positions according to the procedure e.g. supine Trendelenburg, reverse Trendelenburg and lithotomy position.

Anesthesia: All procedures were done under general anesthesia after exclusion of unfit patients.

Pnuemoperitoneum: Closed method of pneumoperitoneum creation was used in all according to surgeon preference.

Type, number and position of ports: metallic and reusable ports of number 10mm and 5mm were used. Either supra or infra-umbilical 10mm port was used for creation of pneumoperitoneum, other ports were positioned according to operative procedure. After general assessment of intraperitoneal cavity, a specific and precise examination of the targeted anatomical region responsible for the underling pathology of acute abdomen was performed and managed accordingly.

Statistical analysis was performed using SPSS version 27 and Fissure's exact test.

RESULTS

In current study, 53 patients suffering an acute abdominal pain were admitted and dealt with within 24-48 hours of admission by laparoscopy. There were 29 males (54.72%) and 24 females (45.28%). The age was ranged between 16 to 70 years (mean 36.39).

The final diagnosis depending on intraoperative laparoscopic finding are shown in Table 1. Acute appendicitis and its complications like appendicular mass and appendicular abscess as well as gall stone and its complications forms the majority of cases in this study.

Regarding acute appendicitis, there were 10 patients (18.86%) of total number. Five patients of appendicular abscess and 2 patients of appendicular mass.

Regarding acute calculous cholecystitis; there were 13 patients (24.52%) of total number of patients. Empyema of gall bladder were noticed in 2 patients.

Intestinal obstruction due to adhesion and constructing band were seen in 3 patients (5.66%). In this study, there were 2 patients (3.77%) of perforated peptic ulcer, 2 patients with complicated acute pancreatitis (3.77%), two patients with intra-peritoneal bile collection (3.77%) and only one case of complicated (rupture) liver hydatid cyst (1.88%). Other conditions of acute abdomen who were female related such as ectopic pregnancy includes 5 patients (9.43%), complicated ovarian cyst includes 2 patients (3.77%) and pyosalpinx as severe complication of pelvic inflammatory disease includes 3 patients (5.66%) as illustrated in Table 1.

Table 2. Comparison between preoperative clinicoradiological diagnosis and intraoperative laparoscopic diagnosis

Acute abdomen	Preoperative diagnosis	% of total no. 53	Laparoscopic finding	% of total no. 53	p-value	Significance
Acute appendicitis	12	22.64	10	18.86	0.811	NS
Appendicular mass	2	3.77	3	5.66	1	NS
Appendicular abscess	5	9.43	5	9.43	1	NS
Acute calculous cholecystitis	15	28.3	13	24.52	0.826	NS
Empyema of gall bladder	0	0	2	3.77	0.495	NS
Perforated peptic ulcer	1	1.88	2	3.77	1	NS
Complicated acute pancreatitis	3	5.66	2	3.77	1	NS
Adhesive or band intestinal obstruction	3	5.66	3	5.66	1	NS
Complicated liver hydatid cyst	1	1.88	1	1.88	1	NS
Intraperitoneal bile collection	2	3.77	2	3.77	1	NS
Ectopic pregnancy	6	11.32	5	9.43	1	NS
Complicated ovarian cyst	1	1.88	2	3.77	1	NS
pyosalpinx	2	3.77	3	5.66	1	NS
Total	53	100	53	100	p-value	Significance

Table 3. The laparoscopic diagnosis and management

Laparoscopic diagnosis	No. of cases	Type of operations	No.	Percentage of Total
Acute appendicitis	10	Laparoscopic Appendicectomy	9	16.98
		Conversion to open +drain	1	1.88
Appendicular mass	3	Laparoscopic Appendicectomy + Pelvic drain	3	5.66
Appendicular abscess	5	Laparoscopic Drainage+ drain	5	9.43
Acute calculous cholecystitis	13	Laparoscopic Cholecystectomy	7	13.2
		Laparoscopic Cholecystectomy+Drain	2	3.77
		Laparascopic cholecystolithotomy +Cholecystostomy +drain	3	5.66
		Open cholecystectomy with tube drain	1	1.88
Empyema of gall bladder	2	Laparoscopic Cholecystectomy	1	1.88
		Laparoscopic Cholecystectomy+drain	1	1.88
Perforated peptic ulcer	2	Laparoscopic Graham patch, drainage and tube drains.	2	3.77
Complicated acute pancreatitis	2	Laparoscopic drainage and debridement, lavage and two drains	1	1.88
		Conversion to open surgery with tube drains	1	1.88
Adhesive or band intestinal obstruction	3	Laparoscopic adhesiolysis+drain	1	1.88
		Laparoscopic band release	1	1.88
		Conversion to open + Tube drain	1	1.88
Complicated (rupture) liver hydatid cyst	1	Laparoscopic liver hydatid endocystectomy with tube drains.	1	1.88
Intraperitoneal bile collection	2	Laparoscopic drainage +tube drains	2	3.77
Ectopic Pregnancy	5	Laparoscopic drainage of haemoperitoneum, salpingectomy with pelvic drain	5	9.43
Complicated ovarian cyst	2	Laparoscopic Oophorectomy + salpingo-oophorectomy + pelvic tube drain	2	3.77
pyodrosalpinx	3	Laparoscopic drainage	3	5.66

Table 2 demonstrates the comparison between the preoperative clinicoradiological diagnosis and intraoperative laparoscopic diagnosis. In this table; out of 12 patients preoperatively diagnosed as acute appendicitis, there were only 10 cases were really laparoscopically diagnosed as acute appendicitis, the other 2 patients; one was appendicular mass and the other was a case of pelvic pyosalpinx. Regarding the 15 patients preoperatively diagnosed as acute cholecystitis, 2 patients were found as empyema of gall bladder. Six patients were preoperatively diagnosed as ectopic pregnancy, one of them was found as ruptured ovarian cyst. Three patients were preoperatively diagnosed as complicated acute pancreatitis, one of them was laparoscopically diagnosed as perforated duodenal ulcer intraoperatively. Other conditions of acute abdomen were found compatible with both preoperative and intraoperative laparoscopical diagnosis.

Based on above data, there were 6 uncertain preoperative diagnoses out of total number 53 cases representing 88.67% as an accuracy rate in comparison to 100% accuracy rate of intraoperative laparoscopic diagnosis. For all individual diagnosis, there is no significant statistical differences between preoperative clinico-radiological diagnosis and intraoperative laparoscopic diagnosis (p-value > 0.05) using Fisher's Exact statistical test.

Table 3 shows different procedures of surgical interventions; all patients of acute appendicitis exposed to laparoscopic appendicectomy except one patient of severely inflamed retrocaecal appendix was converted to open appendicectomy with pelvic drain. Patients with appendicular abscess and mass were treated laparoscopically by drainage and appendicectomy with pelvic drain respectively. Patients with acute cholecystitis were treated by various procedures, 7 patients were treated by laparoscopic cholecystectomy, 2 patients were gangrenous gall bladder treated with laparoscopic cholecystectomy and subhepatic drain, 3 patients were treated by cholecystolithotomy with cholecystostomy tube and sub hepatic drain. Only one patient was converted to open cholecystectomy with sub-hepatic tube drain. Two patients of empyema of gall bladder were successfully treated with laparoscopic cholecystectomy and sub-hepatic drain for one of them.

The two patients of perforated duodenal ulcer were successfully treated by laparoscopic Graham patch and two tube drains one pelvic and one subhepatic. Two patients of complicated acute pancreatitis were treated by drainage, debridement, lavage and tube drains using laparoscopy for one of them and by laparotomy (conversion) for other one. Two out of three patients of intestinal obstruction were laparoscopically treated by adhesiolysis and pelvic drain for one of them and by band release for other one, however, the third patient of band intestinal obstruction was converted to open surgery with band release and pelvic drain. One patient of complicated liver hydatid cyst (rupture) was successfully treated by laparoscopic liver hydatid endocystectomy with intracystic and subhepatic drain. Intraperitoneal bile collections (pelvic, subhepatic and subphrenic) which resulted from other surgical interventions were treated by suction of collection with placement of tube drains. Patients of ectopic pregnancies were treated by laparoscopic salpingectomy with tube drain. Patients of complicated ovarian cysts were treated by laparoscopic oophorectomy and salpingo-oophorectomy with pelvic tube drain. Patients with pyosalpinx were all treated by laparoscopic drainage. In current work, 4 patients out of 53 total number were converted to open surgical operation indicating that the conversion rate was 7.54.

Out of 53 patients involved in current study, postoperative complications were noticed in 6 patients (11.31%). Port site infections were reported in three patients after cholecystectomy, appendicectomy and appendicular abscess one for each. Atelectasis was seen in two patients, one of them after laparoscopic cholecystectomy for acute calculus cholecystitis and the other one for patient after laparoscopic

Table 4. Postoperative complications

Complication	No.	%
Port site infection	3	5.66
Atelectasis	2	3.77
Wound infection	1	1.88
Major vascular injury	0	0
Bowel injury	0	0
Subcutaneous emphysema	0	0
Port site hernia	0	0
Total	6	11.31

adehesiolysis. Wound infection was seen in one patient of retrocaecal appendix converted to open surgery as shown in Table 4.

Postoperative hospital stay was ranged from 1-5 days. Majority of patients 41 patients (77.35%) spent 1-2 days in hospital, 23 patients (43.39%) spent one day and 18 patients (33.96%) spent 2 days for hospital admission postoperatively. Whereas,5 patients (9.43%) and 5other patients (9.43%) spent 3 and 4 days respectively. Lastly, 2 patients spent 5 days (3.77%) as shown in Table 5.

DISCUSSION

Laparoscopic surgery in the emergency setting has been considerably increased due to advanced technology and increased surgical experience[10]. In the current prospective study, a 53 patients of non-traumatic acute abdomen were admitted and dealt with by clinicoradiological assessment and managed by laparoscopy for diagnostic and therapeutic purposes. Regarding the sex distribution, 53 patients (29 males and 24 females) showing that the acute abdominal conditions were nearly similarly distributed among men and women which is similar to other study[11]. Laparoscopic surgical intervention was done within 24-48 hours which is similar to other studies[10,12]. The mean age was 36.39 years which is similar to study done by Almulhim[13], in which the mean age is 40 years.

In the present study, out of 12 patients that preoperatively diagnosed as acute appendicitis, only 10 patients (83.33%) were laparoscopicaly proved as acute appendicitis, this is similar to study done by Banday et al[10] who notice that 13 out of 15 patients of acute appendicitis are laparoscopically diagnosed. This also comes in accord with other studies like Lime et al[14] 78% and Scott and Rosin[15] 72% of patients are laparoscopically proved.

Regarding acute cholecystitis, 15 patients were preoperative clinico-radiologically proved, all patients were laparoscopically proved that the gallbladder was involved, but in different forms of pathology which is similar to Trowbridge et al[16] who report that gall bladder diseases are surely diagnosed depending on clinicoradiological assessment. In the present study although the main pathology was the involvement of gall bladder, the diagnostic laparoscopy had a superior advantage in which it can differentiate variable types of involvement such as acute cholecystitis, empyema of gall bladder or gangrenous gall bladder.

Peptic ulcer perforation repair was performed in 2 patients by laparoscopic graham patch with intra-peritoneal drains. Similar study performed by Ram and Chandana[8] in which 25 patients presented as acute abdomen, 3 patients (12%) are perforated peptic ulcer which are laparoscopically managed, and study by Jamma and Jadhav[1], in which 2 patients of perforated peptic ulcer which are laparoscopically managed.

In the present study, 2 patients of complicated acute pancreatitis were managed, one of them was treated laparoscopically and other one by conversion to open surgery where necrotizing pancreatitis and hemorrhagic free intraperitoneal fluid was found. Laparoscopic necrosectomy, debridement and lavage was reported for the first time in 1996 by Gagner[17]. On other hand, Parekh D[18] uses laparoscopic assisted approach in acute necrotizing pancreatitis.

Three patients of intestinal obstruction (5.33%) in the present study were preoperatively diagnosed and laparoscopically managed, one of them was converted to open surgery, this is similar to study by Ram and Chandana[8]. In which, three patients out of 25 patients of acute abdomen are adhesive intestinal obstruction treated by laparoscopic adhesiolysis.

Regarding gynecological emergencies, 10 patients out of 24 female patients presented as acute abdomen as follow: 2 patients were complicated ovarian cyst, 3 patients were pyosalpinx and 5 patients were ectopic pregnancy (20.83%), this is similar to other previous studies[10,19].

The diagnostic accuracy of laparoscopy in our study was 100% in comparison to preoperative clinicoradiological diagnosis which was 88.67%, this is noticed in Jamma and Jadhav[1] who report that the diagnostic accuracy of clinicoradiological and laparoscopic diagnosis is 76.7% and 100% respectively in their series. Banday et al [10] reporting that the diagnostic accuracy of clinicoradiological and laparosocopical diagnosis is 70% and 94.6% respectively.

Out of 53 patients of acute abdomen that were laparoscopically managed only 4 patients (7.54%) were converted to open surgical procedure, in comparison with other studies out of 37 patients of acute abdomen, only 3 patients (8.10%) converted to open surgery[10].

In our study, post-operative complications were reported in 6 patients (11.31%), In Jamma and Jadhav[1] study, complications occur in 4 (13 .3%) patients out of 30 patients laparoscopically managed and these are perforation of bowel, port site infection and two cases of surgical emphysema. In study done by Waclawiczek et al[20], there are 172 patients of acute abdomen with complication rate (11%). Other study[9] reports port site infection in 6.7% of patients.

Post-operative hospital stay was 1-2 days in majority of patients (41 patients, 77.35%), 5 patients (9.43%) spent three days, other 5 patients (9.43%) spent 4 days and 2 patients (3.77%) spent 5 days in hospital post operatively, in comparison with Ram and Chandana[8] study of a 25 patients of acute abdomen, 13 patients (52%) spend 1-2 days, 3 patients (12%) take 3 days, 4 patients (16%) spend 4 days and rest of patients spend 5 days and more in hospital. However, in Eljacki et al[9] study, there is nearly similar hospital stay to current study which is 80% of patients spend 1-2 days' hospital stay.

CONCLUSION

It is concluded that the usage of laparoscopy in emergency setting is necessary due to its ability to conform and resolve of some uncertain clinicoradiological diagnoses. It is safe tool in expert hands that has an effective diagnostic and excellent therapeutic roles of valuable outcome resulting in avoidance of unnecessary open surgical operations and their possible complications.

Table 5. Total hospital stay

Days of hospital admission	No of patient	%
1	23	43.39
2	18	33.96
3	5	9.43
4	5	9.43
5	2	3.77

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