

# UTILITY AND OUTCOME OF DIAGNOSTIC LAPAROSCOPY IN UNEXPLAINED ACUTE ABDOMINAL CONDITIONS

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## ABSTRACT

**Background:** Acute abdomen is a surgical emergency and sometimes portrays a challenge as its cause remains unexplained unless explored. Recently, trend of diagnostic laparoscopy in acute abdominal conditions is growing among surgeons due to its benefits of establishing diagnosis and provision of therapy with minimal invasive approach. **Objective:** To assess the diagnostic and therapeutic utility of laparoscopic surgery in unexplained acute abdominal conditions. **Methodology:** Fifty three patients, from 1<sup>st</sup> September 2014 to 30<sup>th</sup> June 2015, with unexplained acute abdominal conditions on clinical and radiological assessments were subjected to diagnostic laparoscopy. Therapeutic laparoscopic surgery was offered to all diagnosed cases. Resected specimens were directed for histopathological analysis to confirm diagnosis. All patients were followed up to 3 months. The data was entered and analyzed by using SPSS version 20. **Results:** Accurate diagnosis was established successfully in all patients. The outcome of diagnostic laparoscopy was: uncomplicated acute appendicitis in 31(58.49%) patients, complicated acute appendicitis in 5(9.43%) patients, acute cholecystitis in 1(1.88%) patients, pancreatic necrosis in 1(1.88%) patients, mesenteric adenitis in 2(3.77%) patients, caecal mass in 2(3.77%) patients, dual pathologies in 5(9.43%) patients, and gynaecological emergencies in 6(11.32%) patients. We did not need to convert to open surgery for diagnostic or therapeutic purpose in any case. No significant intraoperative and postoperative complications were observed. All patients were discharged within 2 days after surgery except three cases. There was no mortality. **Conclusion:** Our initial experience showed that diagnostic laparoscopy in acute abdomen is useful in establishing diagnosis, safe to perform and achieves therapeutic goals in almost all patients. **Keywords:** Diagnostic laparoscopy, Unexplained acute abdomen, Utility

JSZMC 2016;7(2):960-964

## INTRODUCTION

Acute abdomen is the highlight of surgical emergency.<sup>1</sup> An extensive list of differential diagnosis always exists before constructing precise diagnosis in acute abdominal disorders. Women (in the age of child bearing), children and obese patients always remain a trouble in making diagnosis.<sup>2,3</sup> A majority of acute abdomen still lingered undiagnosed even in the presence of high level noninvasive radiological investigations.<sup>4</sup> Acute abdomen in surgical emergency also faces laboratory tests, chest and abdomen radiograph and ultrasonography of abdomen and pelvis.<sup>5</sup> Blood test and serum analysis do not every time provide support to make a fair diagnosis. Low sensitivity and specificity of abdominal radiographs for certain conditions like acute appendicitis make it useless. Ultrasonography being operator dependent limits its worth in emergency.<sup>6</sup> Computed tomography, with or without contrast media, is also many times incorporated in creating diagnosis but has drawbacks of radiation exposure, contrast reactions and high cost and cannot be executed in patients with deranged renal profile.<sup>7,9</sup> All these investigations often together fail to yield certain

diagnosis and this failure of not attaining a firm diagnosis ends up in exploratory laparotomy eventually.

The delay in establishing diagnosis has its own dangers like perforation in acute appendicitis.<sup>10</sup> Sometimes the outcome of exploratory laparotomy is hopeless and this only augments the morbidity and mortality of the patient.<sup>11</sup> This only promotes the incidence of negative laparotomies. Laparoscopy has verified the rewards of minimally access surgery in its therapeutic role for acute abdomen and currently is playing a role in making diagnosis. Diagnostic laparoscopy is a process of scrutinizing the peritoneal cavity by introducing the telescope via anterior abdominal wall.<sup>12</sup> Here, we share our initial experience of the utility and outcome of laparoscopy in diagnosing unexplained acute abdomen in non-trauma patients in a tertiary care unit.

## METHODOLOGY

This cross-sectional study was conducted from 1<sup>st</sup> September 2014 to 30<sup>th</sup> June 2015, 53 patients of all age group and both sexes with acute abdominal pain were selected from accident and emergency department of Sharif Medical City Hospital, Lahore for evaluation of acute abdominal

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pain. The patients were nominated 'unexplained' if the cause of abdominal pain could not be diagnosed even with thorough clinical examination, laboratory and radiological (chest and Plain abdominal X-ray and ultrasonography) investigations. The patients who were hemodynamically unstable, abdominal trauma or those in whom laparoscopy or general anesthesia was contraindicated were excluded. After obtaining written informed consent and clarifying the technique of diagnostic laparoscopy and other treatment modalities, all patients were offered diagnostic laparoscopy by single surgeon, under general anesthesia with endotracheal intubation. We used conventional non roticulating laparoscopic instruments and 0° telescope. Preoperative preparation of patient was done. We created pneumoperitoneum in all patients by closed access method by using veress needle through a semicircular incision given on right side of the umbilicus. The incision length was customized for insertion of two 10 mm sized ports, one for 10mm 0° laparoscope and second port for the working instrument. This second port could be easily used for grasping the tissue and additional working ports could be introduced at some other points as per desire of the surgeons. For patients with diagnosis of uncomplicated acute appendicitis, our preferred technique was single

incision laparoscopic surgery (SILS) by a suture loop (Saad's loop) technique.<sup>13</sup> Rest of pathologies were treated with the same conventional standard techniques. We tried to complete all of the procedure through either of the laparoscopic techniques (conventional/ SILS/ laparoscopic assisted) or open surgery after inaugurating diagnosis. Drains were placed through any of the port incision or separate incision according to desire of the surgeon. The fascial and skin closure was done with prolene 2/0 or 3/0 after accomplishing the task. Histopathological analysis of resected specimens was further concluded the diagnosis. All patients were kept in postoperative area for variable time till monitoring was required. Intravenous fluids, antibiotic and analgesics were recommended according to protocol. Oral diet and mobilization were advised as soon as bowel movements were restored. All patients were discharged within a week. Postoperative follow up was continued up to 3 months for any complications or mortality. Demographic data of patients and intraoperative and postoperative parameters were collected and entered in to SPSS version 20 computer program and analyzed accordingly.

## RESULTS

Diagnostic laparoscopy was successfully

Table I: Pathologies Identified and Treated by Diagnostic Laparoscopy

Pathologies diagnosed		No (%)	Mode of the treatment			
			Laparoscopic technique			Conversion to open surgery
			SILS~	Conventional	Lap. assisted	
Acute appendicitis	Un-Complicated	31 (58.49)	30	1	0	0
	Complicated	5 (9.43)	0	5	0	0
Acute cholecystitis		1 (1.88)	0	1	0	0
Pancreatic necrosis		1 (1.88)	0	1	0	0
Mesenteric adenitis		2 (3.77)	1	1	0	0
Right iliac fossa gut mass	Tuberculosis	1 (1.88)	0	0	1	0
	Malignancy	1 (1.88)	0	0	1	0
Dual pathologies	Acute appendicitis + acute cholecystitis	2 (3.77)	0	2	0	0
	Acute appendicitis + ruptured ovarian cyst	3 (5.66)	1	2	0	0
Gynecological	Ruptured ectopic pregnancy	1 (1.88)	0	1	0	0
	Left ovarian cyst	4 (7.54)	1	2	1	0
	Uterine perforation	1 (1.88)	0	1	0	0
Negative laparoscopy		0 (0)	0	0	0	0

~ Single incision laparoscopic surgery

Table II: Distribution of detected pathologies according to site of abdominal pain

Site of abdominal pain	Pathologies traced	No. (%)
Generalized pain (n= 11 )	Ruptured ectopic pregnancy	1 (1.88)
	Uterine perforation	1(1.88)
	Mesenteric adenitis	2 (3.77)
	Acute appendicitis with peritonitis	5 (9.43)
	Acute appendicitis with acute cholecystitis	2 (3.77)
Upper abdomen pain (n=3)	Acute cholecystitis	1 (1.88)
	Subhepatic appendicitis	1 (1.88)
	Pancreatic necrosis	1 (1.88)
Right Lower abdomen± pelvic pain (n=38)	Acute uncomplicated appendicitis	29 (54.71)
	Right ovarian cyst	3 (5.66)
	Left ovarian cyst	4 (7.54)
	RIF gut related mass	2 (3.77)
Left Lower abdomen± pelvic pain (n=1)	Acute uncomplicated appendicitis	1 (1.88)

accomplished in 53 cases of acute non trauma abdomen. Mean of ages of all patients in this study was  $53.8 \pm 15.7$  years. There were 21 males (39.62%) and 32(60.37%) females. Out of 53 patients, 26 (49.05%) had comorbid conditions: 17(65.38%) with controlled diabetes mellitus, 9 (34.61%) with controlled hypertension.

Only one patient had previous history of surgery. 11(20.75%) patients were presented with generalized abdominal pain, 39(73.58%) with lower abdominal pain and 3(5.66%) with upper abdominal pain. After diagnosing pathologies in all patients by diagnostic laparoscopy (Table I), all patients underwent therapeutic surgery. Distribution of pathologies according to site of pain is shown in Table II.

Table III: Outcome of diagnostic laparoscopy and offered laparoscopic treatment

Parameters	No (%)
Failure to progress diagnostic laparoscopy	0 (0)
Mean visual analogue scale in first 12 hours	$1.31 \pm 0.758$
Any Intraoperative injury	0 (0)
Wound infection	2 (3.77)
Mean removal of drain (days)	$1.07 \pm 0.582$
Re-do surgery	0 (0)
Mortality	0 (0)
Mean ICU stay (hours)	$18.45 \pm 8.958$
Mean hospital stay (days)	$1.851 \pm 1.282$

Out of 5 (9.43%) patients, diagnosed with complicated appendicitis, 3 (60%) had generalized peritonitis and 2 (40%) has perforated

appendicitis. In our study, SILS was the performed in 33 (62.26%) patients, conventional laparoscopic surgery in 17 (32.07%) patients, and laparoscopic assisted surgeries in 3 (5.66% patients. None of these required exploratory laparotomy for establishing diagnosis and open surgical approach to deal with pathology. Outcome of diagnostic laparoscopy and treatment offered is shown in Table III.

## DISCUSSION

Being most common surgical emergency, acute abdomen is always stand as a test for the general surgeon in term of spotting the cause of it; as it sometimes becomes a Pandora box when leading investigation fail to rule out the cause. Surgical emergencies were dealt with open approach over many decades, and in case of incorrect or doubtful diagnosis, the management plan transformed to midline exploratory laparotomy rather than specified incision for a preoperative well established diagnosed pathology. Sometimes a second incision has to be made or extension of already made incision has to ensure to tackle with exact pathology. Inappropriate or uncertain diagnosis also amplified the incidence of negative laparotomies. In cases of generalized peritonitis, a long midline incision is always mandatory for adequate peritoneal lavage. These lengthy skin incisions also add up the patient's morbidity and patients have to tolerate this added trauma in return of curative treatment of his/her pathology. In order to overcome the errors in diagnosis and surplus surgical trauma, laparoscopy has been introduced in emergency setup because of its incredible outcome.<sup>14</sup>

Uncomplicated acute appendicitis was the most



common pathology, either alone (66.03%) or in combination of other pathologies (9.43%). We found diagnostic laparoscopy a very helpful tool for making decision of acute appendicitis particularly in women. Previously, the rate of misdiagnosis of acute appendicitis is 10% in male patients and 40% in female patients.<sup>15</sup> Over open surgery, laparoscopy had also shown many advantages. The main advantage is to survey the whole abdominal cavity.

This was helpful in detecting the double pathologies, like acute appendicitis & cholecystitis or acute Appendicitis & right or left ovarian cysts. The other advantage is to inspect the abdomen in case of normal appendix. Previously, a study described that chance to encounter a normal appendix in case of acute appendicitis is 20 – 35%,<sup>16</sup> and in case of finding normal appendix, the abdominal inspection with grid iron incision is limited. Moreover, the laparoscopic appendectomy has proven benefits over the open surgery in case of acute appendicitis like, less pain, early recovery, early mobilization and early discharge from hospital. The two patients diagnosed with gut related right iliac fossa mass on diagnostic laparoscopy, underwent laparoscopic assisted right hemicolectomy and pathologies later confirmed on biopsy of resected specimen, intestinal tuberculous and caecal carcinoma. Pancreatic necrosectomy was performed in one patient who showed tremendous recovery after diagnostic and therapeutic laparoscopy.

Child bearing age females when come with pain in right iliac fossa pain, there is always some confusion in making diagnosis.<sup>17,18</sup> With the aid of diagnostic laparoscopy in emergency, this confusion of diagnosis can be solved easily on time. Gynecological conditions like ruptured ectopic pregnancy, ruptured ovarian cyst and uterine perforation in septic abortion, (history of Dai handling), were also detected and managed accordingly in laparoscopy.

As it efficiently institute diagnosis in all patients, the accuracy of diagnostic laparoscopy in our study is 100%. None of the patient underwent negative laparoscopy. Practically, it is very difficult to establish the conclusion of acute appendicitis among females of child bearing age. The chances of misdiagnosing reach 30 -50% which may result in false negative exploration rate

of 40%.<sup>19</sup> So, the diagnostic laparoscopy had shown a proven benefit in our series with 100% diagnostic accuracy and the advantage of dealing the pathology with minimal invasive technique.

We also found three interesting pathologies. A patient who presented with right upper abdominal pain, the source of pain was the tip of retrocecal, paracolic subhepatic appendix. In another case with right sided lower abdominal pain, the pathology was left sided hemorrhagic ovarian cyst and acute appendicitis with intraperitoneal long caecum, approaching left iliac fossa, was noticed in patient with left sided lower abdominal pain. Ultrasonography reports were absolutely normal in both of these cases. This experience teaches us more faith in diagnostic laparoscopy as compared to open surgery. All these patients underwent therapeutic laparoscopy fruitfully at the same time without any conversion to open approach. In acute cholecystitis, laparoscopy for diagnostic purpose can be performed at any time but timings for therapeutic laparoscopy are specified.<sup>20-22</sup>

All patients were discharged earlier than the routine with open surgery; this is because of minimally access surgery. Minor wound complications were seen in two patients only that were managed by removing skin stitches, regular dressings and antibiotics. However wound infections are frequently witnessed in laparotomies for peritonitis and acute appendicitis, even when skin incision was left open after suturing rectus sheath in order to avoid infection, in such laparotomies the skin wound is approximated later, this also raises the morbidity of the patient.<sup>23</sup>

Diagnostic laparoscopy plays a vital role in making diagnosis early in acute abdomen without wasting money and time, and deteriorating patient.<sup>24</sup> It avoids delay in diagnosis that usually fallouts in postponed recovery and even mortality, as seen in some cases of acute appendicitis.<sup>25</sup>

As it can proceed to therapeutic actions at the same time, so it is cost effective for the patient and being minimally access surgery, it escapes wound complications, prevents intraperitoneal adhesion formation, stimulates early return of bowel functions and promotes early mobilization as compared to open surgery. It lessens the number of negative laparotomies then in turn again excites the recovery of the patient.<sup>26</sup> Small sample size, lack of all pathologies of acute abdomen and single center, which is not well equipped for advance laparoscopy

facilities, are the limitations of this study. To type recommendations for the practice of diagnostic laparoscopy in acute abdomen, a large population and multicenter study is required.

## CONCLUSION

It is concluded that the practice of laparoscopy for evaluation of acute abdomen in stable, non trauma patients not only assists in establishing definitive diagnosis but also instantaneously available for a therapeutic purpose too; this puts stunning constructive effect on the recovery of the patient.

### Conflict of interest:

There is no conflict of interest among all authors.

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