Clinics in Surgery

Research Article
Published: 01 Jan, 2020

Evaluation of Laparoscopy in Undiagnosed Acute Abdomen

Naveen KK and Aggarwal VC*

Department of General Surgery, Safdarjung Hospital, India

Abstract

Background: Nearly 35% cases of acute abdomen presenting to the emergency settings remain undiagnosed even after abdomino-pelvic CT. These cases can be managed either by active observation or exploratory laparotomy. Laparoscopy is most effective technique for bridging this gap between clinical evaluation and major surgical exploration. Undiagnosed acute abdomen is defined as acute abdomen of less than 7 days duration for which diagnosis remains uncertain after initial clinical examination and appropriate diagnostic tests. In such cases the clinical findings and radiological findings (if present) are not in synchrony to come to a conclusive diagnosis.

Materials and Methods: The study was conducted in Department of General Surgery, Vardhman Mahavir Medical College and Safdarjung Hospital, New Delhi over a period of 18 months. It was a non-randomized non-controlled interventional study and data was collected for each patient during pre-operative, intra-operative and post-operative period. Sixty patients presenting to the surgical emergency after fulfilling inclusion and exclusion criteria were included in the study. Patients who were undiagnosed and general condition were not improving after a period of active observation of 24 h was subjected to diagnostic laparoscopy. Follow up period was of 3 months.

Results: Incidence of undiagnosed acute abdominal pain despite abdomino-pelvic CT is 13.88%. 41.66% undiagnosed acute abdomen patients had no significant findings on ultrasound. In 13.33% (n=8) patients, there were no significant findings in CT scan. The most common intraoperative finding on diagnostic laparoscopy was appendicitis (23%). Out of the 30 patients subjected to diagnostic laparoscopy, 22 patients (73.33%) were diagnosed and managed by laparoscopy only. Patients who underwent diagnostic laparoscopy had a lower readmission rate of 6.6%, 3.3% and 0% in follow up at 7 days, 1 month and 3 months with p values of 0.004, 0.002 and 0.001 respectively.

Conclusion: Diagnostic laparoscopy has an important role to play in undiagnosed acute abdomen patients both diagnostically as well as therapeutically.

Keywords: Undiagnosed acute abdomen; Diagnostic laparoscopy; Management; VMMC

OPEN ACCESS

Correspondence:
Naveen KK, Department of General Surgery, Safdarjung Hospital, Postal address: Ward 26, New Delhi-110029, India,
E-mail: nk8844@gmail.com

Received Date: *18 Nov 2019*
Accepted Date: *23 Dec 2019*
Published Date: *01 Jan 2020*

Citation:
Naveen KK, Aggarwal VC. Evaluation of Laparoscopy in Undiagnosed Acute Abdomen. Clin Surg. 2020; 5: 2698.

Introduction

Acute abdominal pain represents 1% of hospital admissions and 6% of emergency visits. The most frequent causes of acute abdominal pain in the emergency settings are: undiagnosed acute abdominal pain (35%), appendicitis (17%), intestinal obstruction (15%), urinary tract infections (6%), biliary disease (5%), colonic diverticular disease/diverticulitis (4%) and pancreatitis (2%). Undiagnosed acute abdomen is defined as acute abdominal pain of less than 7 days duration for which diagnosis remains uncertain after initial clinical examination and appropriate diagnostic tests. In such cases the clinical findings and radiological findings (if present) are not in synchrony to come to a conclusive diagnosis. It obliges surgeon to decide promptly whether to operate immediately or to treat conservatively. It is a significant problem in general surgery and accounts for estimated 13% to 40% of emergency surgical admissions. An abdomino-pelvic CT is currently considered as an essential modality before labeling any abdominal pain as undiagnosed abdominal pain. Undiagnosed acute abdomen can be caused by Pelvic Inflammatory Disease (PID), appendicitis, ectopic pregnancy, torsion of adnexa, etc. Patients with undiagnosed acute abdominal pain undergo multiple, often costly, investigations. Laparoscopy is most effective technique for bridging gap between clinical evaluation and major surgical exploration. Diagnostic laparoscopy acts as an aid to come to a final diagnosis. Advantage in terms of safety, reduced morbidity and mortality, decreased postoperative pain and short hospital stay makes it a valuable diagnostic tool. However, role of laparoscopy in the diagnostic arena is not well established especially in acute abdomen. So, this study intends to evaluate the usefulness of laparoscopy in undiagnosed acute abdomen cases where other non-invasive diagnostic avenues including CT were exhausted.

Materials and Methods

The study was conducted in Department of General Surgery, VMMC and SJH, New Delhi over a period of 18 months. It was a non-randomized non-controlled interventional study and data was collected for each patient during pre-operative, intra-operative and post-operative period. Sixty patients presenting to the surgical emergency after fulfilling inclusion and exclusion criteria were included in the study. Out of this, 30 did not improve on active observation and were subjected to diagnostic laparoscopy. Patient and Patient's attenders were appraised of the study and written, valid and informed consent was taken for diagnostic laparoscopy and conversion to an appropriate procedure, whenever needed. Patients satisfying definition of undiagnosed acute abdomen and age more than 12 years were included. Patients with known diagnosis, known abdominal malignancy, on anti-psychiatric drugs, pregnant females, major comorbidities such as COPD, active infection of anterior abdominal wall near the planned entry or accessory trocar site, clear indication for immediate laparotomy such as frank peritonitis, hemorrhagic shock, evisceration etc, uncorrectable coagulopathy or uncorrectable hypercapnia, history of multiple previous abdominal surgeries, acute intestinal obstruction and hemodynamically unstable patients e.g.: systolic BP<90 mm of hg and urine output <15 ml/h were excluded. During the study period, 432 patients with complaints of acute abdomen satisfying all inclusion and exclusion criteria were enrolled in the study out of which 60 patients remain undiagnosed even after all baseline hematological and radiological investigations (USG, ABDOMINO-PELVIC CT). Undiagnosed patients who improved on active observation were discharged and followed up in outpatient whereas patients who were undiagnosed and general condition was not improving after a period of active observation of 24 h were subjected to diagnostic laparoscopy. Follow up period was of 3 months.

Observation and Results

Incidence of undiagnosed acute abdominal pain despite abdomino-pelvic CT is 13.88%. Majority of the undiagnosed acute abdomen patients belonged to the age group of 21 to 30 (26.66%) and 31 to 40 (41.66%) years. There was female preponderance seen among the undiagnosed acute abdomen patients with 56.66% female and 43.33% male. The most common complaint was pain abdomen (100%) followed by nausea, vomiting and loss of appetite. Fever was also complained by 60% patients. On comparison of localization of pain among undiagnosed acute abdomen patients, majority of patients complained of Right lower abdominal pain (n=19) followed by diffuse abdominal pain (n=18). On evaluation of the Ultrasound abdomen and pelvis findings in undiagnosed acute abdomen patients, majority of patients (41.66%) had no significant findings on ultrasound, whereas 18.33 % patients demonstrated mild free fluid in abdomen. Mesenteric lymphadenitis was the most common CT scan finding (16.66%) and CT was inconclusive in 8 patients (13.33%). Out of 60 undiagnosed acute abdomen patients, 30 patients who did not improve on active observation underwent diagnostic laparoscopy. The most common intraoperative finding on diagnostic laparoscopy was appendicitis (23%) followed by abdominal tuberculosis (10%) and band intestinal obstruction (10%). Other findings included right ovarian mass and ovarian pathology (10%), empyema gallbladder (7%), sigmoid volvulus (7%), carcinoma sigmoid colon (3%), acute calculous cholecystitis (3%), early pelvic inflammatory disease (3%), jejunal intussusception (3%), omental torsion (3%), parietal wall abscess (3%), sealed duodenal perforation (3%) and worms in appendix and terminal ileum (3%) (Table 1). Confirmation of final diagnosis in patients who underwent diagnostic laparoscopy was done with the help of histopathology reports. Only 26.66% cases of laparoscopy were converted to laparotomy, whereas 73.33% cases were diagnosed and managed by laparoscopy only. The mean surgical time was 1.88 ± 0.56 h. Patients undergoing diagnostic laparoscopy had a mean hospital admission of 8.1 ± 0.7 days while patients kept under active observation had an average of 7.87 ± 1.38 days of hospital admission. Patients who underwent diagnostic laparoscopy had a low readmission rate in follow up compared to those who were kept under active observation and then discharged. This was highly significant at 7 days, 1months, and 3 months with p values of 0.004, 0.002 and 0.001 respectively.

Table 1: Diagnosis based on intra operative findings in the undiagnosed acute abdomen patients who underwent diagnostic laparoscopy.

Diagnosis	No. of patients
Appendicitis	7 (23%)
Band intestinal obstruction	3 (10%)
Ca sigmoid colon	1 (3%)
Acute calculous cholecystitis	1 (3%)
Early pelvic inflammatory disease	1 (3%)
Empyema gall bladder	2 (7%)
Jejunal Intussusception	1 (3%)
Koch's abdomen	3 (10%)
Meckel's diverticulum band obstruction	1 (3%)
Omental torsion	1 (3%)
Parietal wall abscess	1 (3%)
Pelvic inflammatory disease	1 (3%)
Rt ovarian mass and ovarian pathology	3 (10%)
Sealed duodenal perforation	1 (3%)
Sigmoid volvulus	2 (7%)
Worms in appendix and terminal ileum	1 (3%)

Discussion

Incidence of undiagnosed acute abdomen despite abdomino-pelvic CT is 13.88%. Previous studies also reported that undiagnosed acute abdomen accounts for estimated 13% to 40% of emergency surgical admissions [1-5]. In majority of these studies, CT was not considered as mandatory baseline investigation before labeling a patient as undiagnosed acute abdomen. This indicates the estimated burden of undiagnosed acute abdomen in general surgery despite CT.

Majority of the undiagnosed acute abdomen patients belonged to the age group of 21 to 30 years and 31 to 40 years. There was female preponderance seen among the undiagnosed acute abdomen patients with 56.66% female and 43.33% male [6]. The reason for female preponderance can be explained on the basis that most common intraoperative findings on diagnostic laparoscopy were found to be appendicular and tubo-ovarian pathology. In our study, 10% (n=3) cases had tubo-ovarian pathology and 23% (n=7) had appendicular pathology. The most common complaint among undiagnosed acute abdomen patients was pain abdomen (100%). Majority of patients complained of Right lower abdominal pain (n=19) followed by diffuse abdominal pain (n=18). The location of pain is a useful starting point and it guides further evaluation. Right lower abdominal

pain usually indicates appendicular/tubo-ovarian pathology which is one of the commonest causes of undiagnosed acute abdomen. 41.66% undiagnosed acute abdomen patients had no significant findings on ultrasound. The second most common finding observed was mild free fluid in abdomen (18.33%). The fact that ultrasound is observer-dependent is thought to be a major disadvantage. Its accuracy further lowers in specific patient subgroups, such as in obese patients, women, and in highly gaseous abdomen due to interference with the transmission of ultrasonic waves of ultrasound. This suggests that USG abdomen alone is not sufficient in these patients. An abdomino pelvic CT must be done in order to label any acute abdomen as undiagnosed acute abdomen.

After CT, 60% of cases had different findings as compared with ultrasonography. The CT scan was better in detecting dilatation of gut loops and retroperitoneal/mesenteric lymphadenopathy. In 13.33% (n=8) patients, no provisional diagnosis could be made even after an abdomino pelvic CT scan as there were no significant findings in the CT scan. Though the accuracy of clinical diagnosis in cases of acute abdomen after CT was performed is around 93% yet there are certain conditions which may remain undiagnosed even after abdomino-pelvic CT such as appendicular pathology, tubo-ovarian pathology, band intestinal obstruction, PID, diverticulitis, sigmoid volvulus, omental torsion, Koch's abdomen etc. These pathologies should be particularly kept in mind in cases of acute abdominal pain with negative radiological investigations as they remain hidden even after thorough search for diagnosis.

Out of 25 patients who showed no findings on USG, Abdomino-pelvic CT could pick up findings in 18 patients. Though a definitive diagnosis could not be made even after CT, 7 out of these 18 patients did not improve on conservative management and were subjected to diagnostic laparoscopy. CT findings in these patients helped in deciding the approach and port placements while performing diagnostic laparoscopy. For e.g.: In one case, there was normal study on USG but mild free fluid in pelvis on CT. Final diagnosis on DL was early PID. The most common intraoperative finding on DL was appendicitis (n=7) [7-9]. The reason for this discrepancy in CT findings from the diagnosis on DL could be radiologists generally rely on a typical constellation of CT findings to diagnose appendicitis. These include distention of the appendix, inflammatory changes in the periappendiceal fat, focal cecal wall thickening, and an appendicolith. These CT findings are absent in a significant number of appendicitis patients. Also patient's body habits play a statistically significant role in the radiologists' ability to diagnose appendicitis. These CT findings may be much more difficult to visualize in patients with a lean body habits. Appendicitis with its secondary inflammatory changes in the right lower quadrant may cause reactive dilatation of the small bowel. This small-bowel dilatation may be significant enough to mimic a small-bowel obstruction.

The second most common pathologies diagnosed on DL in our study were abdominal tuberculosis (10%), B and intestinal obstruction (10%) and right ovarian mass and ovarian pathology (10%) with three cases each. In three cases of abdominal tuberculosis, abdominal CT revealed mesenteric lymphadenopathy in all three patients. The patients were kept under active observation but their general condition was not improving so DL was done. On DL, the findings were mesenteric lymphadenopathy with peritoneal tubercles in all three cases suggesting increased likelihood of Koch's abdomen. However the cause for mesenteric lymphadenopathy was unclear for which tissue biopsy was taken. On the basis of histopathology reports, these patients were diagnosed as abdominal kochs and ATT was given. Thereby negative laparotomy was prevented in such cases due to intervention by laparoscopy. Peritoneal tubercles are usually not visualized on CT but they can be visualized on DL. In three cases when abdomen CT suggested dilated small bowel loops but the cause for this obstruction was not clear on CT. Laparoscopy was useful both diagnostically as well as therapeutically in these cases. On DL, these cases were diagnosed as a case of band intestinal obstruction. Two cases subjected to diagnostic laparoscopy were diagnosed as a case of right ovarian hemorrhagic cyst and right ovarian mass respectively thereby indicating high diagnostic accuracy of DL in tubo-ovarian pathologies. The reason for inconclusive CT findings could be that simple, mildly complex cysts and small ovarian masses can be missed on CT. In our study the diagnostic accuracy of laparoscopy was found to be 96.66%. In one case where CT suggested duodenal diverticula but it was diagnosed as a case of sigmoid volvulus on DL, these duodenal diverticula were not visualized on DL. The likely explanation is that patient had pathology at sites inaccessible to DL i.e. retroperitoneum.

Conclusion

In these 6 cases where DL was diagnostic, negative laparotomy was prevented due to early intervention with laparoscopy and in remaining 16 cases open laparotomy was avoided due to DL. 6% to 926.66% cases of laparoscopy were converted to laparotomy, whereas 73.33% cases were diagnosed and managed by laparoscopy only. As in these 8 cases, there was high chance of iatrogenic injury to the bowel due to Intra-abdominal adhesions; hence keeping in mind the safety of the patient these cases were converted from laparoscopy to open laparotomy. This also explains the comparatively higher conversion rates as compared to the studies done before as the number of such cases was higher in our study. The Mean duration of surgery was 1.88 ± 0.56 h. The duration of surgery was more in cases where laparoscopy was converted to laparotomy (2.25 ± 0.34 h) as compared to the cases which were managed by laparoscopy only (1.75 ± 0.54 h). This is similar to various other studies. This result was expected because the cases which were converted to laparotomy were complicated cases and the presence of Intra-abdominal adhesions in these cases further prolonged the duration of surgery. No Mortality was seen in the study group. There was no significant post operative complications noted in the DL group. However 2 patients (6.66%) where laparoscopy was converted to laparotomy had surgical site infections and it was managed successfully with oral antibiotics and daily dressing. Readmission rates in follow up were lower for patients who underwent diagnostic laparoscopy compared to those kept under active observation and then discharged. Readmissions can result in social as well as financial burden on the patients due to frequent visits to the hospital.

Incorporation of diagnostic laparoscopy along with biopsy, improves the management of undiagnosed acute abdomen patients, by making a definite diagnosis, access for immediate treatment, reducing hospital stay and readmission rates and eventually having cost benefits. It is a safe and effective tool and can establish the etiology and allows for appropriate interventions in such cases. However, laparoscopy requires infrastructure and trained manpower which may not be available everywhere. To conclude, Diagnostic laparoscopy has an important role to play in undiagnosed acute abdomen patients both diagnostically as well as therapeutically. It may be considered as important operative investigation for undiagnosed

acute abdomen. However there is a need for further evaluation by taking a larger sample size of patients and a more multidisciplinary approach involving surgery, urology, gynecology, pediatrics, etc. Also further studies are recommended including both traumatic and non-traumatic causes of undiagnosed acute abdomen to understand the role of diagnostic laparoscopy in such cases.

References

1. Cuesta M, Peet DVD, Veenhof A. Laparoscopic management of acute abdomen. In: Johnson CD, Taylor I, editors. Recent advances in surgery. 31st ed. Portland: Royal Society of Medicine Press. 2008:27-43.
2. Ng CS, Watson CJ, Palmer CR, See TC, Beharry NA, Housden BA, et al. Evaluation of early abdomino-pelvic computed tomography in patients with acute abdominal pain of unknown cause: a prospective randomised study . BMJ. 2002;325(7377):1387.
3. Sala E, Beadsmoore C, Gibbons D, Shaw A, Gaskarth M, Groot-Wassink T, et al. Unexpected changes in clinical diagnosis: early abdomino-pelvic CT compared with clinical evaluation. Abdom Imaging. 2009;34(6):783-7.
4. Tsushima Y, Yamada S, Aoki J, Motojima T, Endo K. Effect of contrast-enhanced computed tomography on diagnosis and management of acute abdomen in adults. Clin Radiol. 2002;57(6):507-13.
5. Morino M, Pellegrino L, Castagna E, Farinella E, Mao P. Acute Nonspecific Abdominal Pain A Randomized, Controlled Trial Comparing Early Laparoscopy Versus Clinical Observation. Ann Surg. 2006;244(6):881-6.
6. Golash V, Willson PD. Early laparoscopy as a routine procedure in the management of acute abdominal pain: a review of 1,320 patients. Surg Endosc. 2005;19(7):882-5.
7. Al-Mulhim AS, Nasser MA, Abdullah MM, Ali AM, Kaman L. Emergency laparoscopy for acute abdominal conditions: a prospective study. J Laparoendosc Adv Surg Tech A. 2008;18(4):599-602.
8. Al-Mulhim AA. Emergency general surgical admissions. Prospective institutional experience in non-traumatic acute abdomen: implications for education, training and service. Saudi Med J. 2006;27(11):1674-9.
9. Thawait A, Dwivedi S, Bhatt M, Bakshish K, Mittal A. Role of Early Laparoscopy in Diagnosis of Acute Abdominal Pain. Int J Contemporary Med Res. 2017;4:1568-74.