



Laparoscopy as a Diagnostic Tool in Ascites of Unknown Origin: A Retrospective Study Conducted at Kasturba Hospital, Manipal



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Abstract

Background: Laparoscopy as a minimally invasive technique has long played an important role in the evaluation of ascites.

Methods: A retrospective analysis was carried out on the record of 80 patients who underwent laparoscopy after appropriate investigations had failed to reveal the cause of ascites.

Results: Tuberculous peritonitis was reported in 46 (57%), malignancies in 18 (25%), cirrhosis in 4 (5%) and peritonitis of unknown etiology in 8 (10%) of patients. Two (2.5%) patients had complications, an ileal perforation and in other incisional hernia.

Conclusion: Laparoscopy was able to diagnose the pathology in 72 (90%) patients with ascites of unknown origin.

Keywords: Ascites; Diagnostic Laparoscopy

Introduction

Laparoscopy, as a minimally invasive technique has developed rapidly in recent years. Endoscopic examination of peritoneal cavity was first attempted in 1901 by George Kelling who termed it as "Celioscopy" [1,2]. The term 'ascites' refers to the detectable and pathologic collection of fluid in the peritoneal cavity. Subclinical amount of fluid (i.e. <1.5 liter) can be detected using ultrasonography or computed tomography of the abdomen. The important causes of ascites are venous hypertension due to liver cirrhosis, pancreatitis, parasitic infections, tuberculosis, malignancies, lymphomas, chylus ascites, ovarian or peritoneal diseases [3].

Application of diagnostic laparoscopy allows direct visualization of the abdominal-pelvic peritoneum/organs, and may disclose peritoneal deposits of tumor, tuberculosis or disseminated metastatic cancer. Ascitic fluid can be taken for laboratory evaluation as well as biopsy can be taken with direct vision, often adding to the diagnostic accuracy of the procedure [4]. Currently laparoscopy has wide applications and it has made a revolution in gastroenterology, gynecology and urological surgeries [5-7].

This study conducted at Kasturba Hospital, Manipal describes our experience with the diagnostic laparoscopy to determine causes of unexplained ascites that cannot be diagnosed after

conventional laboratory examinations (including ascitic fluid cell count, albumin level, total protein level, Gram stain, culture and cytology) as well as after imaging investigations (including ultrasound and CT scan).

Material and Methods

The patients of either sex in age group of 15-90 years (n=80), with chief complaints of abdominal pain, distension, fever, vomiting, weight loss and altered bowel habits for variable period who presented between 1st August 2000 and 31st July 2014 for the evaluation of ascites, were included in this study. They failed to reveal the cause after appropriate clinical, laboratory and radiological investigations and underwent diagnostic laparoscopy. Those with obvious renal, cardiac or severe liver disease as to cause jaundice were excluded from the study. All patients were evaluated clinically for signs of chronic liver disease, e.g., palmar erythematous, spider naevi, jaundice, presence of splenomegaly, large collateral veins over abdomen/back, engorged jugular veins and for presence of enlarged lymph nodes.

All the necessary blood and radiological investigations were carried out depending upon the available facility. They received antibiotics like oral ofloxacin/norfloxacin and intravenous ceftriaxone/cefotaxime eight hourly in appropriate doses

perioperatively. Diagnostic laparoscopy was performed under standard general anesthesia with endotracheal intubation. With Karl Storz laparoscope, a 30°C 10mm main camera was used with sub-umbilical port. One or two 5mm additional ports were used as per surgeons' preference. A retrospective analysis was done on the data collected from the record of 80 patients.

Results

There were 51% (n=41) females and 49% (n=39) males falling in the age groups shown in Figure 1. The presenting complains in the patients were distension of abdomen, pain in abdomen, fever, vomiting, altered bowel habits and weight loss as depicted in Figure 2. The duration of complaints were less than 15days in 27(33.8%), 16-30days in 24(30%), 31-60 days in 16(20%) and more than 60 days in 13 (16.3%) patients. On per abdominal examination shifting dullness was present in 53 (66.3%) patients, fluid thrilling 10 (12.5%) patients. 12(15%) patients had tenderness and 5(6.3%) patients had shifting dullness with tenderness. The ascites was graded as gross, moderate, mild and flocculated. It was gross in 26(36%), moderate in 15(23%), mild in 27(36%) and flocculated in 4(5%). All the patients underwent one or other radiological investigations.

The ascitic fluid was transudative in 4(80%), and exudative in 1(20%) of patients with cirrhosis of liver. Patients with tuberculosis peritonitis had exudative and transudative ascites in 35(76%) and 11(24%) respectively. The ascites in patients with malignant peritonitis was exudative 16(88.8%) and indeterminate in 2(11.1%) (Figure 3). There was considerable overlap in the nature of ascites present in the three groups of patients.

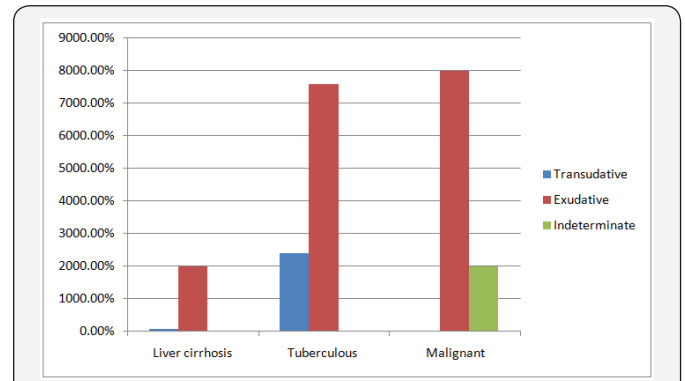


Figure 3: Ascitic fluid analysis.

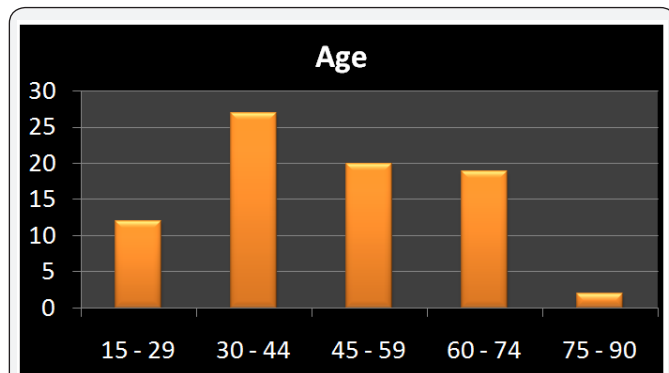


Figure 1: Age distribution of patients.

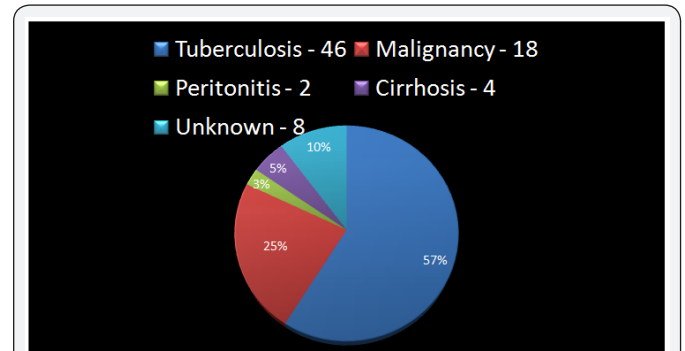


Figure 4: Diagnosis.

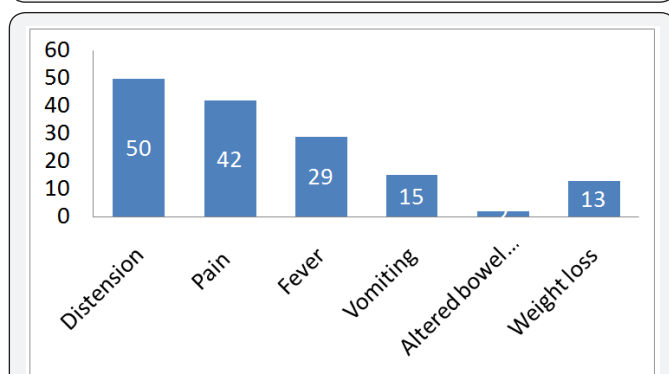


Figure 2: Presenting Complaints.

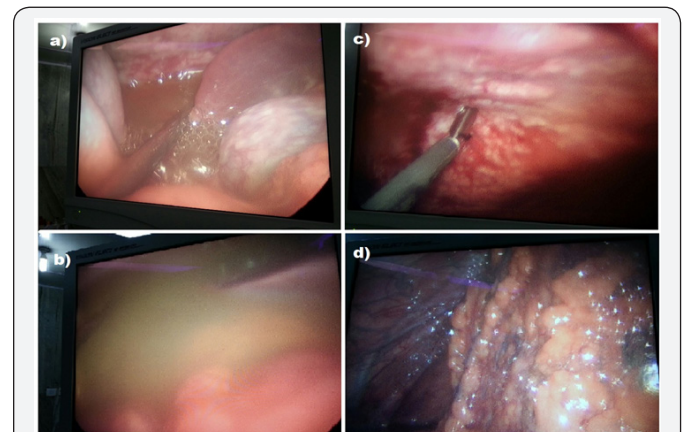


Figure 5: Laparoscopic view.

Ultrasonography of abdomen was done in 42(56%), contrast enhanced computer tomography in 25(36%) and both in 5(9%) of patients preoperatively. On laparoscopic visualization peritoneal infiltrates observed in 25(31.3%), mesenteric infiltration in 14(17.5%) and of peritoneal, mesenteric and omental involvement seen in 32(40%) patients. The utility of routine ascetic fluid examination was reviewed in all patients.

Following laparoscopy the diagnosis was confirmed on peritoneal fluid cytology and biopsy which was taken laparoscopically. Tuberculosis peritonitis was reported in 46(57%) of patients, malignancies in 18(25%), cirrhosis in 4(5%) and peritonitis of unknown etiology in 8(10%) of patients (Figure 4). Out of 18 reported cases of malignancies

the diagnosis was mucinous adenoma in 10(55.6%), serous adenoma in 6(33.3%), and peritoneal mesothelioma in 2(11.1%) cases (Figure 5) depicts the laparoscopic views in a) serous peritonitis, b) infective peritonitis, c) tuberculosis, d) malignant cause. Following laparoscopy on eighty patients the diagnosis was confirmed on peritoneal fluid cytology and biopsy in 72 patients. One patient had complication of laparoscopy as ileal perforation which was diagnosed after 3 days and patient underwent right limited hemicolectomy.

Another patient had late complication of Incisional hernia following laparoscopy, which was diagnosed after 6 months and patient underwent laparoscopic hernia repair. In our study, laparoscopy was able to diagnose in 72 patients out of 80 giving an accuracy of 90 %.

Discussion

Ascitic fluid may accumulate rapidly or gradually depending upon the cause. In many patients, a diagnosis of liver disease might have been established earlier, as ascites develops later when there is decomposition. Thus, it is important to obtain a history of risk factors for liver disease like alcohol consumption, drug abuse, blood transfusions or hepatitis in the past. Sudden development of ascites in a previously stable patient of cirrhosis should raise the suspicion of hepatoma [8,9]. A history of heart failure and pericardial disease should make one suspect cardiac ascites. A history suggestive of malignancy elsewhere e.g. breast, gastrointestinal tract, ovaries or lymphoma may suggest malignant ascites [10].

In India, tuberculosis as a cause of ascites should be suspected if there is history of fever, constitutional symptoms and in the presence of known extra-abdominal tuberculosis [11]. In patients with pancreatic ascites there is usually a history and the same patient may have more than one disease predisposing to ascites. The diagnosis may be obvious in patients with massive ascites, but when only a small to moderate amount of fluid is present, the accuracy of physical assessment is only about 50%, even by experienced gastroenterologists [12]. Flank dullness which is present in about 90% of patients, is the most sensitive physical sign. Shifting dullness on percussion is more specific but less sensitive than flank dullness for detection of ascites. Occasionally massive ovarian or hydatid cysts, bowel obstruction and pregnancy with hydramnios can mimic ascites as they may be associated with fluid thrill.

Analysis of the ascitic fluid is useful in the differential diagnosis of ascites and determining the pathological process [13]. In ascites due to portal hypertension or hypoalbuminaemia, the fluid is clear and straw coloured; turbid ascites may indicate infection. Chylous ascites typically has a milky appearance. Blood stained fluid is usually due to malignancy but may occur with tuberculosis, pancreatitis, hepatic vein thrombosis, recent abdominal punctures or due to a traumatic tap. Dark brown fluid may indicate the presence of bile.

Conventionally low protein ascites with total protein concentration of less than 2.5 g/dl is called transudative ascites and usually occurs with portal hypertension or hypoalbuminaemia. An ascites with total protein concentration of more than 2.5 g/dl is called exudative ascites. And is usually associated with tuberculosis, malignancy, pancreatitis, myxoedema, etc. The serum-ascites albumin gradient (SAAG) has been found to be superior to the ascites total protein concentration for the differential diagnosis of ascites. The gradient is calculated by subtracting the ascitic fluid albumin level from the serum level obtained on the same day.

Runyon BA et al. [14] described the types of ascites according to the level of serum-ascites albumin gradient [14]. A low gradient of <1.1g/dl gradient is found in peritoneal tuberculosis, carcinomatosis, biliary ascites and bowel obstruction whereas gradient of more than 1.1 g/dl indicates presence of portal hypertension due to liver pathologies with an accuracy of 97 percent. The SAAG also correlates directly with portal pressure [15].

In our study on clinical examination and radiological studies we graded the ascites (gross, moderate, mild, flocculated) and followed the conventional method of ascitic fluid protein estimation and found 154(87.5%) had high protein (> 2.5 g/dL) ascites. The purpose of this subdivision is to narrow the differential diagnosis of the causes of ascites. However, not infrequently diseases that are believed to cause exclusively exudative ascites may present with transudates and vice versa [8,9]. Culture of the ascitic fluid for bacteria should be obtained routinely in patients with cirrhotic ascites, in whom spontaneous bacterial peritonitis (SBP) can occur. For optimal results, 10 ml of ascitic fluid should be inoculated at the bedside into a blood culture bottle [16]. Gram staining is useful in detecting secondary peritonitis due to gut perforation but is only about 10 percent sensitive in detecting bacteria early in SBP [17].

In tuberculous peritonitis, the smear for acid-fast bacilli (AFB) is rarely positive and culture is positive only in about 50% of cases [18]. Ascitic fluid glucose can drop significantly in severe infections like secondary peritonitis or late stage of SBP. Low glucose can also be found in malignant ascites. Measurement of ascitic fluid amylase is useful when there is suspicion of pancreatic ascites. Chylous ascites may show Sudan staining fat globules on microscopic examination and increased triglyceride content by chemical examination. Triglyceride levels are low in pseudo-chylous ascites which can occur due to the presence of large number of degenerating malignant or inflammatory cells. Rarely, fluid may be mucinous in character suggesting pseudomyxoma peritonei [13].

In our study, adenosine deaminase activity (ADA) was raised in all cases of tuberculosis. However, it was also raised in 2 patients with malignancy, adding to the confusion. In other studies, it is found that ADA might be normal in patients suffering from tuberculosis with liver cirrhosis and might be high in bacterial

peritonitis [19,20]. Radiologic studies are useful in detecting small amount of ascitic fluid as well as helpful in assessing the etiology of ascites [21]. Abdominal sonography may detect as little as 100 ml of intraperitoneal fluid [22]. Although sonography is more cost-effective than computed tomography (CT), but CT detects even smaller amounts of ascitic fluid.

Doppler sonography can detect thrombosis of the portal or hepatic veins. In patients with tuberculous peritonitis, thickening of mesentery and bowel wall, matting of bowel & Han CL et al. [30].

loops and presence of mesenteric lymph nodes may provide a clue [23]. In patients with small amount of ascites, adhesions from previous surgery or where ascites is compartmentalized, sonography can be an invaluable guide for localizing a safe and useful site for paracentesis. CT may provide information that may be difficult to obtain on ultrasonography. In patients with carcinomatosis or inflammatory peritonitis, a contrast enhanced CT scan may demonstrate enhancement of the peritoneal lining.

Table 1: Information about similar studies done by Luck NH et al. [29]

Study by Luck NH et al. [29] Role of laparoscopy in the diagnosis of low serum ascites albumin gradient	Han CM et al. [30] Diagnostic laparoscopy in ascites of unknown origin: Chang Gung Memorial Hospital 20-year experience	Kasturba Hospital, Manipal
Cirrhosis of liver - 4 (12%)	Cirrhosis - 19(10.8%)	Cirrhosis- 4 (5.6%);
Malignant lesion - 7 (21.2%)	Carcinoma to sisperitonie in 99(56.2%)	Malignant lesion - 18(25%)
Granulomatous inflammation - 20(60.6%)	Tuberculous peritonitis in 31 cases (17.6%)	Tuberculosis- 40 (55.6%)
Budd-Chiare syndrome in -1(3%)	Miscellaneous causes in 27 (15.4%)	Peritonitis-2 (2. 8%)
		Unknown-8 (11.2%)

Similar results with peritoneal abnormalities have recently been reported for magnetic resonance imaging using gadolinium [24]. In patients with pancreatic ascites alone or associated with liver cirrhosis, endoscopic retrograde pancreatography with fluoroscopy can demonstrate leakage of pancreatic juice from the pancreatic duct. In patients with cirrhosis and large hydrothorax, scintigraphy with Technetium sulfur colloidorradiolabelled albumin can be used to diagnose the intraperitoneal origin of the thoracic fluid. The causes of ascites of unknown origin appear to vary considerably with geographic area and ethnic origin. With the availability of new imaging techniques, the need for laparoscopy in determining the cause of ascites has decreased.

However, if the diagnosis remains unclear, laparoscopy with direct visualization of the peritoneum may be indicated. Typical peritoneal tubercles are found in most patients with tuberculous peritonitis and peritoneal biopsies detect the disease in 74% of cases [25]. Detection of early primary peritoneal diseases like lesothelioma and mesothelioma by laparoscopy are well reported in literature [26,27]. Laparoscopy has an important role in diagnosing ascites of unknown origin may be cirrhotic or carcinoma peritoneie and indicative in preoperative assessment in staging of gastric, pancreatic or liver cancer. It also plays useful role as therapeutic in hemorrhagic pancreatitis, Chylous ascites and in catheter placement for dialysis. One laparoscopic study from the United States revealed that about 60% of 51 cases with undiagnosed ascites were shown to have chronic liver disease or intra-abdominal malignancy [9]. Another study from Africa indicated that 40% of 92cases with undiagnosed ascites proved to have tuberculous peritonitis [26]. In a retrospective study in 18 patients with abdominal tuberculosis by Tarcoveanu E et al. [28] concluded that diagnostic laparoscopy can be essential and helpful in the management strategy. We have compared our results with the studies done by Luck et al. [29] on diagnostic laparoscopy in 32 patients with low serum ascites albumin gradient and with Han CM et al. [30] at Chang Gung Memorial

Hospital reported 176 diagnostic laparoscopies in patients with unknown cause of ascites as given in Table 1.

Incidence of tuberculous ascites was higher in our study as compared to the study by Luck NH et al. [29] and Han CM et al. [30] whereas incidence of carcinoma to sis peritonie was highest in study by Han CM et al. [30]. In our study in patients with more than one cause of ascites, laparoscopy was particularly helpful. In one patient with known liver cirrhosis, laparoscopy and biopsy showed ascites to be due to tuberculosis. Another patient with papillary serous cystadenoma, ascites was due to tuberculosis and in one patient it was observed to have liver cirrhosis with serous cyst adenocarcinoma of ovary. Out of 8 unknown cases, 1 patient was later diagnosed of having systemic lupus erythematosus. In 4 patients, laparoscopy was not possible due to dense adhesions and in 3 patients, because remained obscure. One complication was encountered during the laparoscopy. Spontaneous bacterial peritonitis is an important complication in patients with ascites and following diagnostic laparoscopy.

However with adequate prophylaxis with antibiotics in preoperative period the risk of morbidity and mortality can be minimized. No fatality observed in our study due to bacterial peritonitis. The findings in our study indicate that abdominal laparoscopy is a safe, quick and inexpensive diagnostic tool particularly when appropriate and adequate tissue is taken for pathological examination. On Laparoscopy accurate diagnosis of the cause of ascites was possible in 90 % of the patients.

Conclusion

To conclude, laparoscopy is a valuable means of assessing the peritoneal cavity in patients with un-explained ascites when the primary cause remains unclear. With a careful and standardized technique of entry, complications are rare, the diagnosis can be accurately made with selective biopsy specimens and appropriate treatment can then be instituted without delay.

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