The role of laparoscopy in the diagnosis of ascites of unknown etiology

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Objective
We aimed to analyze the effect of diagnostic laparoscopy in the identification of the cause of ascites that had been failed to be known by all other diagnostic procedures.
Patients and methods
This study included 20 patients with an ascites of unknown cause. Before diagnostic laparoscopy, all patients underwent clinical, laboratory, and radiological evaluations; however, all these tools failed to identify the actual cause of this abnormal free fluid collection in the abdominal cavity. Data collection and statistically analysis were done.
Results
The cause of ascites was identified in 18/20 of our patients, with an accuracy of 90%. Overall, 40% of ascites in our study were owing to tuberculosis, whereas malignancy was the cause of ascites in 20% of patients, and liver cirrhosis and peritonitis were the cause in 15% of each.
Conclusion
Laparoscopy can help in the safe and effective diagnosis of cases of ascites of unknown etiology.

Keywords:
ascites, laparoscopy, tuberculous peritonitis

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Introduction

The use of laparoscopic minimally invasive procedures has expanded in the past decades. Examination of the peritoneal cavity through a minimally invasive laparoscopic procedure was first tried by George Kelling in 1901, and it was named as celioscopy [1]. Ascites is a pathological accumulation of a detectable amount of fluid in the peritoneal cavity [2]. Ascites has been graded into three types: grade I: mild (<1.5 l) and only detectable on abdominal ultrasonography (US) or computed tomography (CT), grade II: manifested with flank bulging and shifting dullness, and grade III: visible and can be confirmed with a thrilling test [3]. The most common causes of ascites are liver cirrhosis, pancreatitis, malignancies, tuberculosis, lymphatic (chylous) ascites, and peritoneal or ovarian illnesses [4].

Diagnostic laparoscopy offers a direct vision of the abdominal and pelvic cavities (peritoneum and organs) and may discover the peritoneal and omental deposits of malignancy or tuberculosis [5]. Moreover, ascitic fluid can be aspirated for laboratory examination, and biopsy can be taken from the peritoneum, peritoneal deposits, omentum, as well as solid organs under a direct vision [6]. However, the diagnostic laparoscopy may have a failure rate of ~14% owing to the interference of adhesions of the primary illness or former surgery [7]. On the contrary, laparoscopic techniques are not absolutely risk free. It may be associated with injuries to the bowel, solid organs, or major blood vessels [8].

In this study, we offer our practice with the laparoscopy to identify the causes of unexplained ascites that failed to be established after the possible ordinary laboratory tests as well as after all radiological examinations.

Patients and methods

The present retrospective study was completed at the General Surgery Department, Internal Medicine Department, Pathology Department, and Hepatology, Gastroenterology and Infectious Diseases Department at Benha University Hospital in Egypt and King Saud Hospital in Saudi Arabia between June 2017 and June 2019. The study was approved by the ethical committee. A written

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consent form was signed by each patient for participation in this study. The main complaints of our patients were either abdominal pain, distension, fever, vomiting, weight loss, or changes of the bowel habits.

The patients included in our study were diagnosed through the medical and hepatology and gastroenterology teams as having ascites; however, the cause of this abdominal fluid collection cannot be identified by the medical and hepatology and gastroenterology teams after full general and local abdominal examination as well as doing all available laboratory tests, comprising total protein level, albumin level, the serum ascites albumin gradient, cell count in the ascitic fluid, Gram stain, culture, and cytology, as well as after radiological exams (abdominal US and CT). Then, these patients were shifted to the surgery department and underwent a diagnostic laparoscopy after proper preoperative evaluation.

In this study, we excluded all patients with a clear cardiac, renal, or advanced hepatic disease. Moreover, we excluded patients less than 18 years old and those with American Society of Anesthesiologists score more than III.

Preoperative preparation

All patients received intravenous antibiotics prophylaxis (cefuroxime 1.5 g, 1 h before laparoscopy).

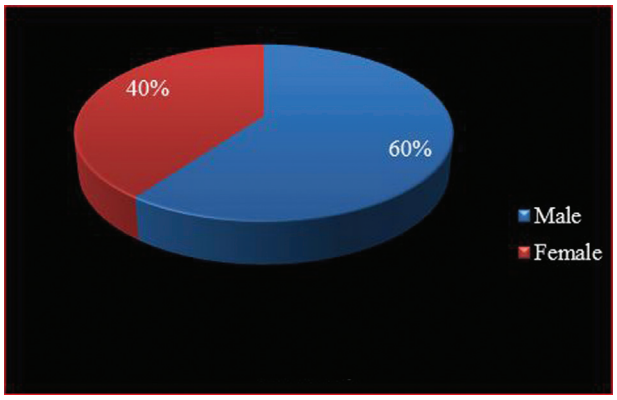
Operations

A total of 15 diagnostic laparoscopy procedures were done under general anesthesia, whereas the remaining five procedures were completed under spinal anesthesia. A 30°, 5-mm camera was used with a supra-umbilical port. One or two 5-mm additional ports were used when needed. The ascitic fluid was visualized directly and aspirated (Fig. 1) for cytology and other laboratory tests. The peritoneum was examined for any nodules or deposits; solid organs and the bowel were examined meticulously. The lesser sac was opened and examined. The greater omentum was examined and multiple biopsies were taken. The mesentery was examined, and if any enlarged lymph node was seen, one was excised for histopathology.

Laboratory

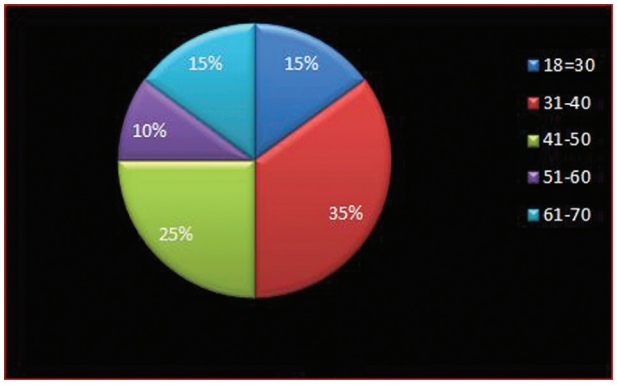
The specimens were received in formalin. Preparation was done through processing, embedding, slicing the blocks by the microtome, and staining of the slides by the routine H&E stain. Then, we examined the slides under the microscope to determine the nature of the specimen. Immunohistochemical study was done in selected cases, depending on the microscopic findings.

Figure 1



Some of the intraoperative findings during the diagnostic laparoscopy for ascites of unknown etiology.

Figure 2



The sex distribution of patients in our study.

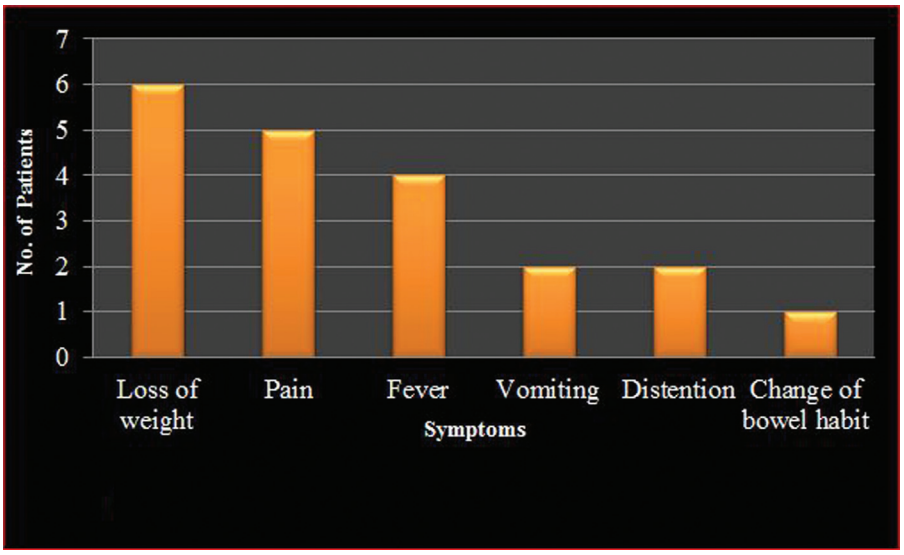
Statistical analysis

The collected data were presented as numbers and ratios. Statistical analysis was conducted using the SPSS (version 15, 2006) for Windows statistical package (version 15 for Windows; SPSS Inc., Chicago, Illinois, USA).

Results

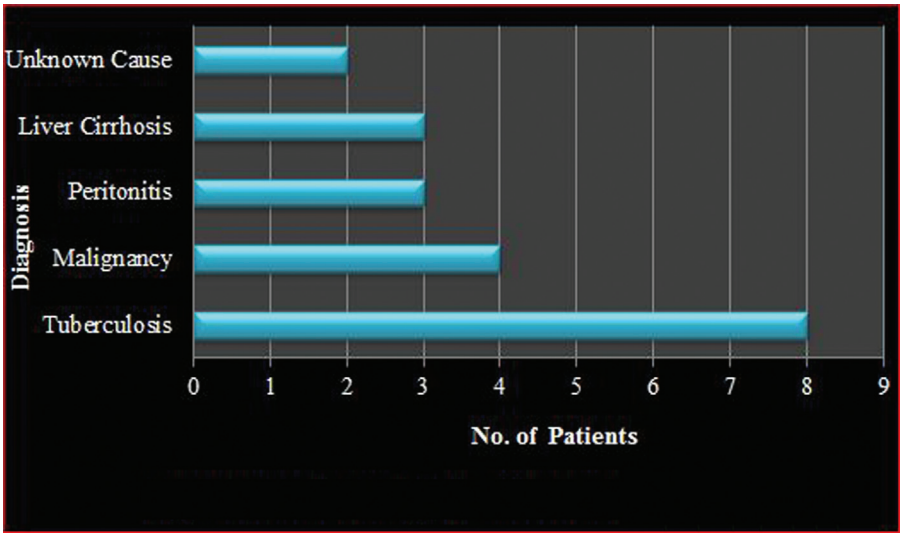
The total number of patients in this study was 20. There were 12 (60%) males and eight (40%) females, as shown in Fig. 2. Our patients were of different age groups, as summarized in Fig. 3. The main presenting symptoms of the patients in our study were weight loss, abdominal pain, fever, vomiting, abdominal distension, and change of bowel habit, as illustrated in Fig. 4. The length of patients' complaints varies from 17 days to 3 months. Perioperative abdominal

Figure 3



The age distribution of the patients.

Figure 4



The main presenting symptoms of patients in our study.

examination revealed no findings in 10% of patients, tenderness in 35%, and positive tests for ascites in 65%. Ascites was classified as grade I [mild (<1.5 l) and only detected on abdominal US or CT] in 35% of patients, grade II (diagnosed with a shifting dullness test) in 50% of cases, and grade III (visible and established with a thrilling test) in 15% of patients. All patients underwent an abdominal US; however, only three patients did not undergo an abdominal CT owing to renal impairment (Table 1).

Intraoperative direct visualization of the abdominal cavity revealed mesenteric infiltration in 35%, peritoneal infiltrates in 30%, and omentum involvement in 20% of our patients (Table 1).

The serum ascites albumin gradient was high (>1.1 g/dl) in 11 (55%) cases and low (<1.1 g/dl) in nine (45%) patients (Table 1).

The final diagnosis after laparoscopy was established by the biopsy and the fluid cytology that was extracted laparoscopically, revealing tuberculosis in eight (40%) (Fig. 5a), malignancies in four (20%) (Fig. 5b), peritonitis (inflammatory) in three (15%), liver cirrhosis in three (15%) and the cause was unknown in two (10%) of patients (Fig. 6). One patient had bleeding as a complication of diagnostic laparoscopy. Blood came out through the abdominal drain over 4 days with a total amount of 900 ml; however, this bleeding was managed conservatively. Another

patient had a port-site hernia, which was detected 5 months after laparoscopy. The accuracy of laparoscopy in the diagnosis of ascites of unknown cause in this study was 90% (18 of 20 patients).

Discussion

Ascites is an accumulation of fluids inside the abdominal cavity. It is not per se a disease; however, it is a sequela of an illness [9]. The cause of the ascites can be a local peritoneal or systemic disease [10]. Identification of the nature of the ascetic fluid can guide us for the diagnosis of the unknown disease [11]. The nature of the ascetic fluids can be completed through clinical, laboratory, or radiological tools [10]. The clinical details are very important for the diagnosis of ascites. A detailed medical history, as well as general and local abdominal examination, can prove or exclude the common causes of ascites such as liver, renal, cardiac, and nutritional causes [9]. In certain geographical areas where some diseases are endemic, such as hepatic cirrhosis owing to viral hepatitis in Egypt and tuberculosis in India, we should concentrate on history to exclude these diseases [12]. Gradual painless accumulation of the ascitic fluid is indicative of a chronic benign condition; however, recent rapid accumulation of ascites and weight loss are indicators of a malignant condition [13].

Table 1 Perioperative patients' data

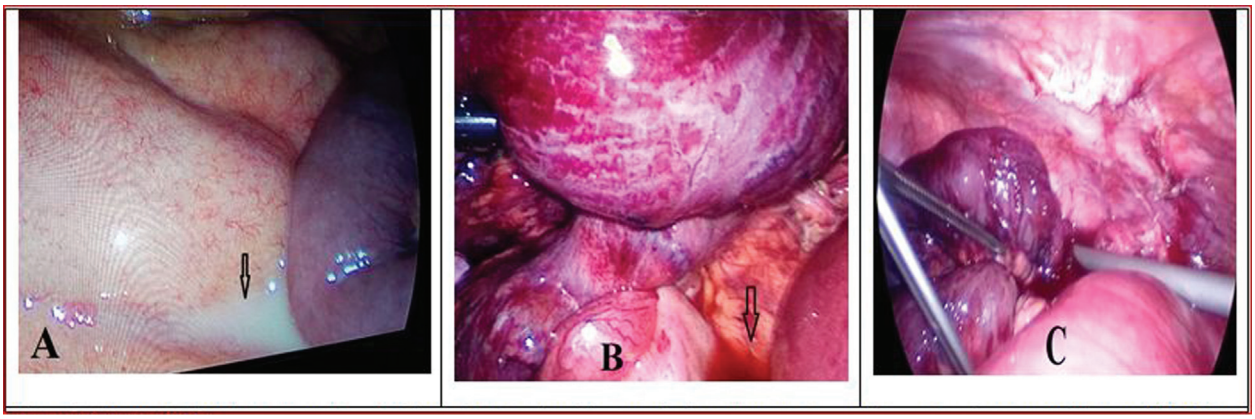
Data	Strata	*N* (%)
Abdominal examination[a]	Free	2 (10)
	Tenderness	7 (35)
	Shifting dullness	10 (50)
	Fluid thrilling	3 (15)
Grade of ascites	Grade I (mild)	7 (35)
	Grade II (moderate)	10 (50)
	Grade III (marked)	3 (15)
Radiological tests	US	20 (100)
	CT	17 (85)
Operative findings[b]	Peritoneal infiltrates	6 (30)
	Mesenteric infiltration	7 (35)
	Omental involvement	4 (20)
The serum ascites albumin gradient	High gradient (SAAG>1.1 g/dl)	11 (55)
	Low gradient (SAAG<1.1 g/dl)	9 (45)
Postoperative complications	Bleeding	1 (5)
	Port-site hernia	1 (5)
	Port-site infection	1 (5)
Final diagnosis	Positive (accuracy)	18 (90)
	Negative	2 (10)

CT, computed tomography; SAAG, serum ascites albumin gradient; US, ultrasonography. [a]Some cases had more than one clinical findings. [b]Some cases had more than one operative findings.

Routine laboratory tests as well as chemical examination of the ascetic fluids usually help reach the diagnosis of the original cause of ascites in most cases. However, in a few cases, the laboratory examination fails to answer the question about this disease [12]. The radiological tools are the last noninvasive tools that can help us with the diagnosis of the cause of ascites; however, they have limitations in some cases. At this time, when all these diagnostic methods fail to reach the actual cause of ascites, diagnostic laparoscopy with direct visualization of the peritoneal cavity as well as taking a direct sample from the fluid and biopsy from the peritoneum, omentum, and/or the solid organs is mandatory to solve this problem and distinguish the origin of ascites [14,15].

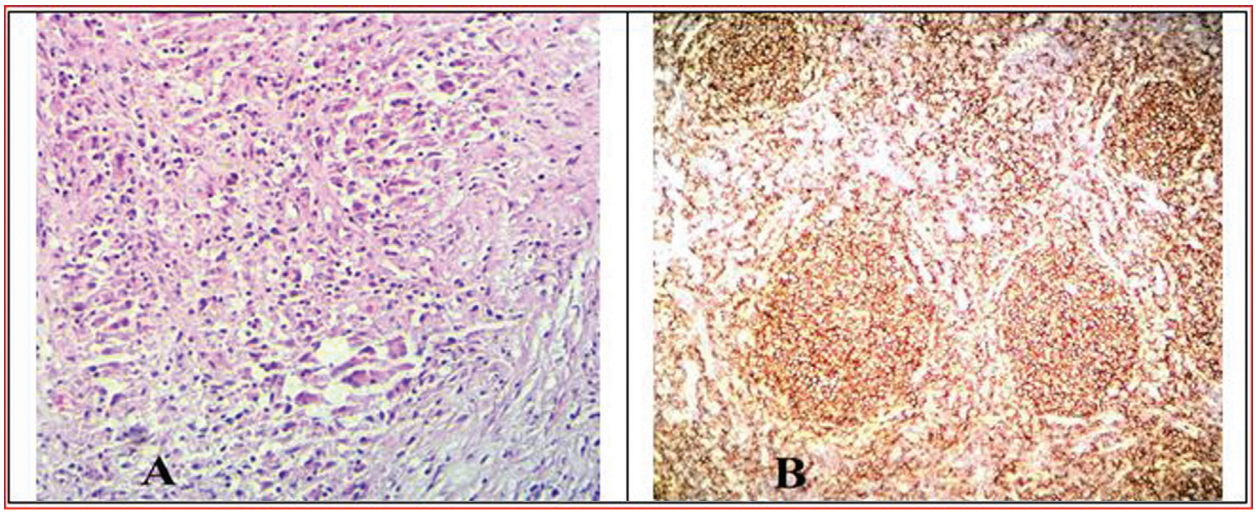
In this study, peritoneal tubercles are seen in some patients with tuberculous peritonitis, and laparoscopic

Figure 5



The final histopathological results for some of the extracted laparoscopic biopsy for diagnosis of ascites of unknown etiology.

Figure 6



The final diagnosis of patients in our study.

biopsies confirmed the diagnosis in most cases. Diagnosis of local peritoneal diseases through laparoscopy is a well-documented subject in many types of research. In the era of laparoscopy, it has an important role in the diagnosis, staging, as well as treatment of the majority of peritoneal and other abdominal illnesses [16]. May be owing to a geographical variation, the most common cause of ascites of unknown etiology varies from one study to another. For example, one study from Africa revealed that ~40% of 92 cases with ascites of unknown cause were finally verified to have tuberculous peritonitis [14]. On the contrary, another study from the USA showed that 60% of 51 cases were owing to intra-abdominal malignancy and chronic hepatic disease [2]. Tarcoveanu *et al.* [17] in their study concluded that diagnostic laparoscopy can be crucial and supportive in the management strategy of un-diagnosed ascites. The incidence of tuberculous ascites in our study was nearly similar to the results of the study done by Chetan *et al.* [18]. However, these findings were higher as compared with the study of Luck *et al.* [19] and Han *et al.* [20], whereas the incidence of malignant ascites was highest in the two studies. A good positive subject in our study is that the laparoscopy can distinguish the cause of ascites in patients who had double pathologies. In one patient who was alcoholic with well-known hepatic cirrhosis, the diagnostic laparoscopy and biopsy revealed ascites to be owing to carcinoma of the ovary.The complications of diagnostic laparoscopy in this study were limited and not serious. Bleeding came out of the drain in one patient after omentum and mesenteric lymph node biopsy; however, this bleeding stopped spontaneously after 4 days with conservative management. Another patient experienced mild postoperative (PO) port-site infection with little discharge and erythema. A third patient manifested with a port-site hernia 8 months postoperatively and was managed surgically. In a similar study done by Chetan *et al.* [18], the procedure was complicated with a case of bacterial peritonitis after diagnostic laparoscopy. However, they recommended sufficient antibiotic prophylaxis in the preoperative period to minimize the risk of PO infections.

Conclusion

Our results show that the diagnostic laparoscopy for cases of un-diagnosed ascites is a rapid and beneficial tool economically. Moreover, it minimizes the time of hospital stay and can be done safely with good preparation, that is, preoperative and intraoperative antiseptic precautions.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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