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Role of Laparoscopic Peritoneal Biopsy in the Diagnosis of Peritoneal Tuberculosis. A Seven-Year Experience

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Rezumat

Rolul biopsiei peritoneale ghidate laparoscopic în diagnosticarea tuberculozei peritoneale – 7 ani de experiență

Diagnosticul tuberculozei peritoneale, în lipsa modificărilor tipice radiologice și de laborator, este un demers dificil. Am investigat prin urmare rolul laparoscopiei diagnostice la pacienții suspecți de tuberculoză peritoneală (PTB). Pacienții internați în spitalul Hamad General Hospital, Qatar, care au fost supuși biopsiei peritoneale ghidate laparoscopic pentru suspiciune de PTB în perioada ianuarie 2004-decembrie 2010 au fost analizați retrospectiv. Factorii evaluați au inclus vârsta pacienților, sexul, simptomele și semnele clinice, modificările pe examenul CT, modificările identificate prin laparoscopie și diagnosticul histopatologic. Un total de 41 de pacienți, 33 de bărbați (80.5%) și 8 femei (19.5%), cu vârsta medie de 31 de ani, au fost supuși biopsiei peritoneale ghidate laparoscopic în vederea confirmării sau infirmării suspiciunii de PTB în perioada de studiu. Durerea abdominală a fost cel mai frecvent întâlnit simptom la prezentare, observat la 33 (80.5%) de pacienți. Examenul CT al abdomenului a descris ascită la 37 de pacienți (90%), noduli intestinali la 22 (54%), îngroșare peritoneală și noduli la 37 (90%) și ganglioni mezenterici măriți la 11 pacienți (27%). Aspectul laparoscopic tipic de tuberculoză peritoneală a fost observat la 38 de pacienți (93%), restul având aspect normal (7%). Rezultatele histopatologice au confirmat inflamația de tip granulomatos la 38 de pacienți (93%). Sensibilitatea și specificitatea aspectului tipic laparoscopic în diagnosticul tuberculozei peritoneale au fost de 100%. Doi pacienți au suferit complicații post-laparoscopie (5%), dar nu s-au înregistrat decese datorate intervenției. Biopsia peritoneală ghidată laparoscopic este o metodă rapidă și sigură de diagnosticare cu precizie a PTB.

Cuvinte cheie: laparoscopie, tuberculoză peritoneală, granulom

Abstract

The diagnosis of asymptomatic abdominal tuberculosis, without characteristic laboratory and radiologic findings, is difficult. We therefore investigated the role of diagnostic laparoscopy in patients with suspected peritoneal tuberculosis (PTB). Patients admitted to Hamad General Hospital, Qatar, who underwent laparoscopic peritoneal biopsy for suspected PTB from January 2004 to December 2010 were retrospectively analysed. Factors assessed included patient age, sex, symptoms, clinical signs, CT scan findings, laparoscopic findings and histopathological diagnosis. A total of 41 patients, 33 males (80.5%) and 8 females (19.5%), of mean age 31 years, underwent laparoscopic peritoneal biopsy for suspected PTB during the study period. Abdominal pain was the most common presenting symptom, observed in 33 (80.5%) patients. Computerized tomography (CT) of the abdomen showed ascites in 37 patients (90%), bowel nodules in 22 (54%), peritoneal thickening and nodules in 37 (90%) and enlarged mesenteric lymph nodes in 11 (27%). The classical gross laparoscopic appearance of peritoneal tuberculosis was observed in 38 patients (93%), whereas laparoscopic findings were normal in 3

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patients (7%). Histopathological results confirmed granulomatous inflammation in 38 patients (93%). The sensitivity and specificity of gross laparoscopic appearance in diagnosing peritoneal TB were both 100%. Two patients experienced complications from laparoscopy (5%), but there were no laparoscopy-related deaths. Laparoscopic peritoneal biopsy is a rapid and safe method of accurately diagnosing PTB.

Key words: laparoscopy, peritoneal tuberculosis, granuloma

Introduction

Tuberculosis (TB) is an infectious disease caused by Mycobacterium tuberculosis, with frequencies of 10-15% in human immunodeficiency virus (HIV)-negative patients and >50% in HIV-positive patients, and an overall mortality rate of 6% (1-3). Most patients with TB are in Asia (59%) and Africa (26%) (3). Tuberculosis remains a common health problem in Qatar, with an incidence rate of 50/100,000, and an average of 250 new patients diagnosed annually (4).

The abdominal form of TB is the sixth most frequent type of extrapulmonary TB, after lymphatic, genitourinary, osteoarticular, miliary and meningeal TB (5). Abdominal TB can infect any part of the gastrointestinal tract, including the peritoneum and pancreatobiliary system (6). Peritoneal tuberculosis (PTB), which affects 4% of all patients with tuberculosis (7), is challenging to diagnose due to its often-muted clinical presentation. Although the triad of fever, ascites and abdominal pain is present in 70% of patients (8), diagnosis is more difficult in patients who lack typical symptoms and laboratory and radiologic findings (9). We have retrospectively assessed the role of diagnostic laparoscopy in patients with suspected PTB.

Patients and Methods

This was a retrospective analysis of all patients with suspected PTB who underwent diagnostic laparoscopy from January 2004 to December 2010 at Hamad General Hospital, Qatar. Patients diagnosed with pulmonary TB and those whose diagnosis of PTB was confirmed through CT-guided aspiration were excluded from this study. Data analysed included patient age, sex, symptoms, clinical signs, CT scan findings, laparoscopic findings and histopathological diagnosis. All complications of laparoscopy were reported.

Surgical note

All patients underwent laparoscopy under general anesthesia with endotracheal intubation in the supine position, using Hasson's technique. A small vertical incision of about 1 cm was made above the umbilicus. After dissection of subcutaneous tissue, the peritoneum was opened with a pair of scissors under direct vision and a blunt prop (a special long white rod) was introduced as a guide to ensure its presence inside the peritoneal cavity. A 10 ml port was inserted over this probe and fixed by tying a thread over it. A 10 ml camera was used to gently explore the abdomen and introduce a 5 ml port at the level of the umbilicus, either on the left or right side of the lateral abdominal wall, according to the severity of the adhesion. A sigmoidoscopy biopsy forceps was used to obtain a peritoneal biopsy sample from an obvious tubercle nodule (*Fig. 1*). A sample of the aspirated ascitic fluid was sent for microbiologic (Zeihl-Nelsen staining) and cytological examination. At the end, the umbilical port was closed using a J needle vicryl 2/0 and the skin was closed.

Results

During the study period, 41 patients, 33 males (80.5%) and 8 females (19.5%), of mean age 31 years (range 21-72 years) underwent laparoscopic peritoneal biopsy for suspected PTB. Abdominal pain was the most frequent presenting symptom, in 33 (81%) patients, followed by fever in 29 (71%), weight loss in 23 (56%) and diarrhea in 13 (32%)(*Table 1*). Ascites was the most frequent clinical sign (90%), followed by abdominal tenderness (61%) and a palpable abdominal mass (15%) (*Table 2*).

CT scans of the abdomen showed ascites in 37 patients (90%), peritoneal thickening and nodules in 37 (90%), bowel nodules in 22 (54%), and enlarged mesenteric lymph nodes in 11 (27%) (*Table 3*). Forty of the 41 patients underwent elective laparoscopy, whereas one patient underwent emergency laparoscopy for initial suspicion of acute appendicitis, but both the laparoscopic and histopathologic findings confirmed PTB. Two patients required conversion to laparotomy. One had extensive adhesions with no window for insertion of the camera, requiring laparotomy to obtain the biopsy sample. The second patient had a mass in the center of the abdomen, later found to be enlarged mesenteric lymph nodes.

Figure 1. *Laparoscopic findings in a patient with PTB.*

Table 1. *Presenting symptoms in patients with peritoneal TB*

Symptom	Patients	Percentage
Abdominal pain	33	81%
Fever	29	71%
Weight loss	23	56%
Diarrhea	13	32%

Table 2. *Presenting signs in patients with peritoneal TB*

Sign	Patients	Percentage
Ascites	37	90%
Abdominaltenderness	25	61%
Palpableabdominal mass	6	15%

Laparoscopy showed classical findings of PTB in 38 patients (93%), including a thickened and hyperemic peritoneum with ascites, and whitish nodules scattered over the parietal peritoneum (*Fig. 2*). In 3 patients (7%), the laparos-copic findings were unremarkable.

Histopathological results confirmed granulomatous inflammation in 38 patients (93%). Zeihl-Nelsen staining of the pathologic specimens showed acid fast bacilli (AFB) in 15 samples (37%). The 3 (7%) patients with normal laparoscopic findings also had unremarkable histopathological findings (*Table 4*). Two patients developed procedure-related complications. One developed a colonic perforation on the first postoperative day, requiring transverse colectomy, and the second developed an anterior abdominal wall collection after laparoscopy and was treated conservatively. There were no laparoscopy-related deaths.

Table 3. *Abdominal CT findings in patients with peritoneal TB*

CT image	Patients	Percentage
Ascites	37	90%
Peritoneal thickening and nodule	37	90%
Bowel nodules	22	54%
Enlarged mesenteric lymph nodes	11	27%

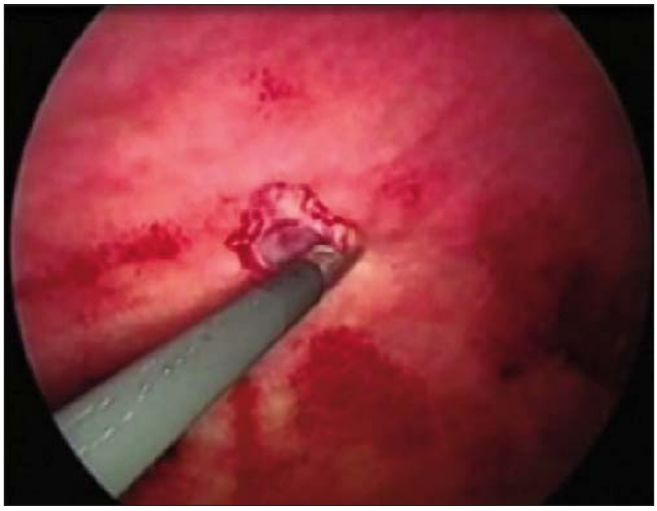

Figure 2. *Obtaining a peritoneal biopsy using a sigmoidoscopy biopsy forceps*

Table 4. *Histopathological findings in patients with peritoneal TB*

Histopathological results	Patients	Percentage
Granuloma	25	61%
Caseating granuloma	13	32%
AFB	15	37%
Normal	3	7%

Discussion

The incidence of TB infection has risen significantly in recent years due to factors such as poor socio-economic status, misdiagnosis or improper treatment and the HIV pandemic (10). The abdominal form is seen in 25% of patients affected with pulmonary TB (11). Patients affected with PTB have been found to range in age from 18 to 46 years, with a female predominance (12). In contrast, we found that 81% of our patients with PTB were males. This is not surprising in a country like Qatar, where males constitute the vast majority of the expatriate labor force.

PTB presents with nonspecific symptoms and signs, including abdominal masses, ascites, and weight loss. The frequency of each symptom varies but ascites remains the most frequent, as observed in our study. Ascitic fluid in patients with PTB is a straw-colored exudate with a high protein concentration (>25 g/L), high specific gravity (1.016–1.020), positive Rivalta test, and predominance of lymphocytes (13).

There are no specific biological parameters for PTB. The most frequently reported disorders are moderate hyperleukocytosis and inflammatory syndrome (14). About 40-85% of patients are skin test positive, but this does not contribute to the diagnosis (14).

Imaging techniques, including chest X-ray, ultrasound, and CT, are very limited in the diagnosis of PTB because no pathognomonic radiological signs are associated with its diagnosis. The features of PTB, including ascites, irregular abdominal masses, and omentum involvement, are also detected in other diseases, such as primary malignant tumors, lymphoma, and peritonitis (15). CT findings specific to PTB have been reported to include peritoneal thickening, ascites with fine septations, and omental caking (16). In our personal experience, however, these radiological findings were not sufficient for a diagnosis.

The absence of radiographic findings does not exclude extrapulmonary TB, as evidence of disease outside the

abdomen is often not present and chest X-rays are normal in 50% of these patients (6). Ultrasonography can be very useful for detecting peritoneal involvement, whereas barium studies generally do not detect tuberculous peritonitis (17).

M. tuberculosison smears and cultures of peritoneal fluid is usually insufficient for a diagnosis (18). Adenosine deaminase activity in ascitic fluid may be diagnostic for peritoneal TB, but its usefulness remains unclear (19). Polymerase chain reaction tests for M. tuberculosis in biopsy tissue and culture may be diagnostically useful in patients with ascites, allowing more rapid diagnosis and treatment (20). However, despite the presence of caseating granulomas, culture of the tubercles may be negative (21). Laparoscopic or laparotomic examination of the peritoneum can be used to substantiate a diagnosis. Findings in these patients include: (1) thickened, hyperemic peritoneum with ascites and whitish granular nodules (5 mm) scattered over the peritoneum; (2) thickened and hyperemic peritoneum with ascites and adhesions; and (3) markedly thickened parietal peritoneum with possibly yellowish nodules and cheesy material, along with multiple thickened adhesions (i.e., the fibro-adhesive type) (22).

Classical gross laparoscopic peritoneal findings were observed in 93% of our patient cases. Microbiological evidence and/or the histological appearance of granulomas, with or without caseation, can determine the diagnosis (23). Indeed, we found that all 38 patients with gross laparoscopic findings suggestive of PTB had histopathological findings consistent with PTB. Our finding, that 36% of patients were positive for AFB on Zeihl-Nelsen staining, was higher than the rates previously reported (3-25%) (13,24).

Laparoscopy under general anesthesia permits the observation of the entire peritoneal space and provides tissue samples in targeted areas for histological diagnosis. This procedure can reveal findings diagnostic for PTB, including exudative ascites, miliary peritoneal nodules, adhesions, and peritoneal congestion (25). The laparoscopic evaluation of undiagnosed ascites can establish a diagnosis in 80-95% of patients (24).

Laparoscopic results are considered operator-dependent, although this method may be unlimited for an indication of PTB (10). A biopsy can be taken whenever deemed necessary, particularly if macroscopic aspects are inconclusive (26). Laparoscopy, however, may be contraindicated in patients with fibroadhesive forms of PTB because of a high risk of perforation and the lack of provided information. Complications due to laparoscopy have been reported in 2.6% to 6.5% of patients (24), with the most frequent complications including bleeding, infection and bowel perforation with mortality rate of 0.04% (25). We observed a complication rate of 4.8% with no laparoscopy-related mortality. Our experience suggests that laparoscopy can be safely performed in all patients, regardless of macroscopic aspect, allowing the retrieval of important elements for the diagnosis of doubtful abdominal tuberculosis.

In addition, laparoscopy can result in a more rapid diagnosis of PTB (10). Rather than relying on conventional microbiological assays, which may take up to 4–6 weeks, a visual diagnosis during laparoscopy followed by histopathological verification, which takes about 5 days in our hospital, allows a much more rapid diagnosis.

The limitations of this study are those inherent to retrospective studies. One of the major limitations is the lack of TB culture results on biopsy specimens. Indeed, these types of biopsy specimens are rarely sent for TB culture. Although the presence of caseating granulomatous inflammation in a patient with a history suggestive of TB is usually sufficient to diagnose PTB, culture of M. tuberculosis is important for assaying drug susceptibility.

Conclusion

Laparoscopic peritoneal biopsy provides a quick and accurate diagnosis of PTB. Careful performance of this procedure can avoid related morbidity.

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