

TUBERCULOUS PERITONITIS: EFFECTIVENESS OF ULTRASONOGRAPHY IN DIAGNOSIS AND DIFFERENTIAL DIAGNOSIS

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ÖZET: Peritonitis tüberkülozun nadir görülen bir şeklidir. Bu çalışmada tüberküloz peritonitin ultrasonografik bulgularının değerlendirilmesi amaçlandı. Karın ağrısı, karında şişlik, ateş ve kilo kaybı yakınmalarıyla müracaat eden altı olgu prospektif olarak incelendi. Sonografik incelemede olguların tamamında asit saptandı. Üç olguda homojen anekoik görünüm, iki olguda asit içinde ekojen yıkıntı ürünleri vardı. Yaygın asitli olgularda fibröz septalar ve dört olguda ince inkomplet mobil bantlar saptandı, Üç hastada peritoneal yüzeyde nodülerite izlendi. Olguların üçünde omental kalınlaşmayı teyit eden omental kek bulgusu saptandı. Lokalize veya yaygın asitin, septasyon ve internal ekoların, peritoneal kalınlaşma ve nodüleritenin tespitinin şiddetle tüberküloz peritoniti düşündürüleceği, ultrasonografinin tanıda önemli bir rol oynadığı ve böylece hastaların laparoskopi ve laparotomi gibi daha invaziv yöntemlerden korunabileceği kanısına verildi.

Anahtar kelimeler: Tüberküloz peritonit, tanı, ultrasonografi.

SUMMARY: Peritonitis is a rare form of tuberculosis. The evaluation of the ultrasonographic findings in tuberculous peritonitis was intended in this study. Six cases who referred to the hospital suffering from abdominal pain, abdominal swelling, fever and weight loss were evaluated by ultrasonography prospectively. Ascites was found in all cases by sonographic examination. Homogenous anechoic appearance in three and echogenic debris in the ascites in two cases were present. Fibrous septates were detected in cases with disseminated ascites and fine, incomplete mobile strands in four of cases. Nodularity was observed on the peritoneal surface in three patients. In three cases, omental cake sign which confirms the omental thickening was detected. It is concluded that localized or diffuse ascites, septations and internal echoes, peritoneal thickening and nodularity, may strongly suggest tuberculous peritonitis, and ultrasonography plays an important role in the diagnosis, and prevents further invasive interventions such as peritoneoscopy and laparotomy.

Key words: Tuberculous peritonitis, diagnosis, ultrasonography.

Although tuberculosis (TB) infection is used to be seen in underdeveloped countries, in recent years it tends to be more common in developed countries as a result of the contributing factors such as AIDS, drug abuse, migration from underdeveloped countries and international travels (1,2,3). Peritonitis is a rare form of TB and occurs in less than 4% of the affected patients with TB (4,5). TB peritonitis is the sixth common form of extrapulmonary TB coming after lymphatic, genitourinary, bone - joints, miliary and meningeal forms (1).

The diagnosis of TB is difficult, since the clinical and laboratory findings may mimic other diseases such as peritoneal carcinomatosis, cirrhosis, pyogenic

peritonitis, hemoperitoneum, inflammatory bowel disease and peritoneal mesothelioma (2,5). If accurate diagnosis would be established, it can be cured by medical treatment and the patients can be saved from an unnecessary surgical exploration (2). The evaluation of the ultrasonographic (US) findings in TB peritonitis was intended in this study.

PATIENTS AND METHODS

Six patients who referred to the hospital suffering from abdominal pain, abdominal swelling, fever and weight loss were evaluated prospectively. Five of the patients were male and one was female. The mean age of the patients was 24.6 (21-41) years. Chronic diarrhea in one, anorexia in three and constipation in one patient were present. One of them had previous diagnosis of pulmonary TB.

All patients had chest x-ray and abdominal LIS examinations. US examinations were performed by Siemens Sonoline SL unit using with 3.5 MHz sector

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transducer and Toshiba SSA 270A unit using by 3.75 MHz convex transducer. Four patients had abdominal and two patients thoracal computerized tomographic (CT) examinations. Thoracal CT examinations were performed by injecting intravenous (IV) contrast material and abdominal CT examinations by administrating contrast material orally with and without IV contrast administration respectively.

Paracentesis was applied in four of cases under US guide and the abdominal fluid was withdrawn to be cultured. One patient had laparoscopic biopsy. The diagnosis was confirmed by positive culture results, laparoscopic biopsy and response to anti-tuberculous treatment.

RESULTS

In patients of whom paracentesis was established, the amount of protein and number of cells were high in aspirated ascites fluid. The cell configuration was composed of white blood cells (rich in lymphocytes) and erythrocytes. Culture results of two patients (33.4%) were positive for TB.

Abnormal chest X-ray findings were detected in two (33.4%) patients. One of them (16.7%) released active TB findings radiologically. Pleural collection was detected bilaterally in one and unilaterally in the other patient.

Ascites was found in all cases (100%) by sonographic examination. Minimal ascites in one and wide amount of ascites (diffuse or localized) in other patients were present. Homogenous anechoic appearance (which shows clear ascites) in three (50%) (Figure 1) and echogenic debris within ascites in two (33.4%) cases were present (Figure 2). Fibrous septates were detected in cases with disseminated ascites and fine, incomplete mobile strands in four of cases (66.7%). In three cases (50%), nodularity was observed on the peritoneal surface (Figure 3). Thick walled intestinal loops were present in three cases (50%) and in two patients (33.4%) intestinal loops floating in ascites were detected. In three cases (50%), omental cake sign which indicates omental thickening was detected (Figure 4). In addition to these findings, splenomegaly in one (16.7%) and both splenomegaly and hepatomegaly in one (16.7%) case were detected.

DISCUSSION

The peritoneum is a common site of TB involvement within the abdominal cavity. Peritoneal disease in TB occurs primarily by hematogenous spread but may be secondary to contagious spread from tuberculous lesions of intestine or fallopian tubes (1,2,4-8). Active pulmonary TB is detectable in only 14% of cases. Although the illness can be seen in any age, it is most common between 25 and 45 (1,2).

Most cases have symptoms for several weeks to months at the time of diagnosis. Abdominal swelling is the most common symptom in 82% of cases. Fever is present in

Figure I: Sonograms of the lower abdomen show multiple fine, delicate and mobile strands and thin fibrous septae in abundant ascites

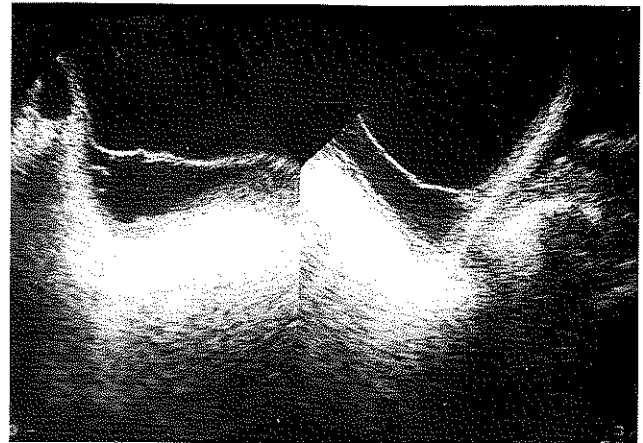
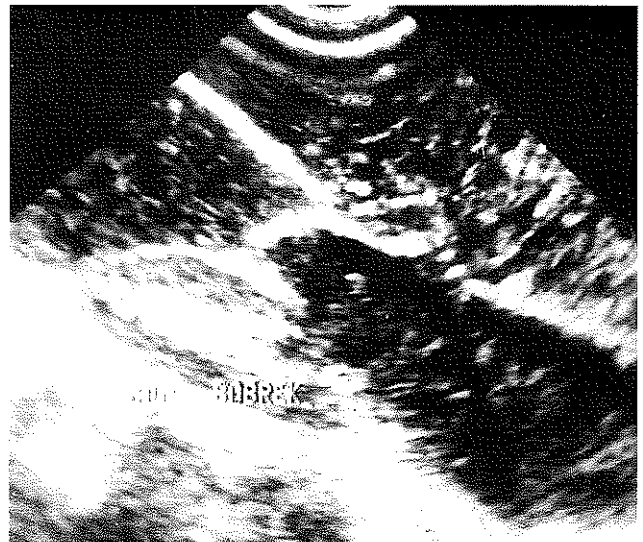


Figure II: Large amount of ascites with fibrotic band and echogen debris is seen on upper abdominal sonographic image.

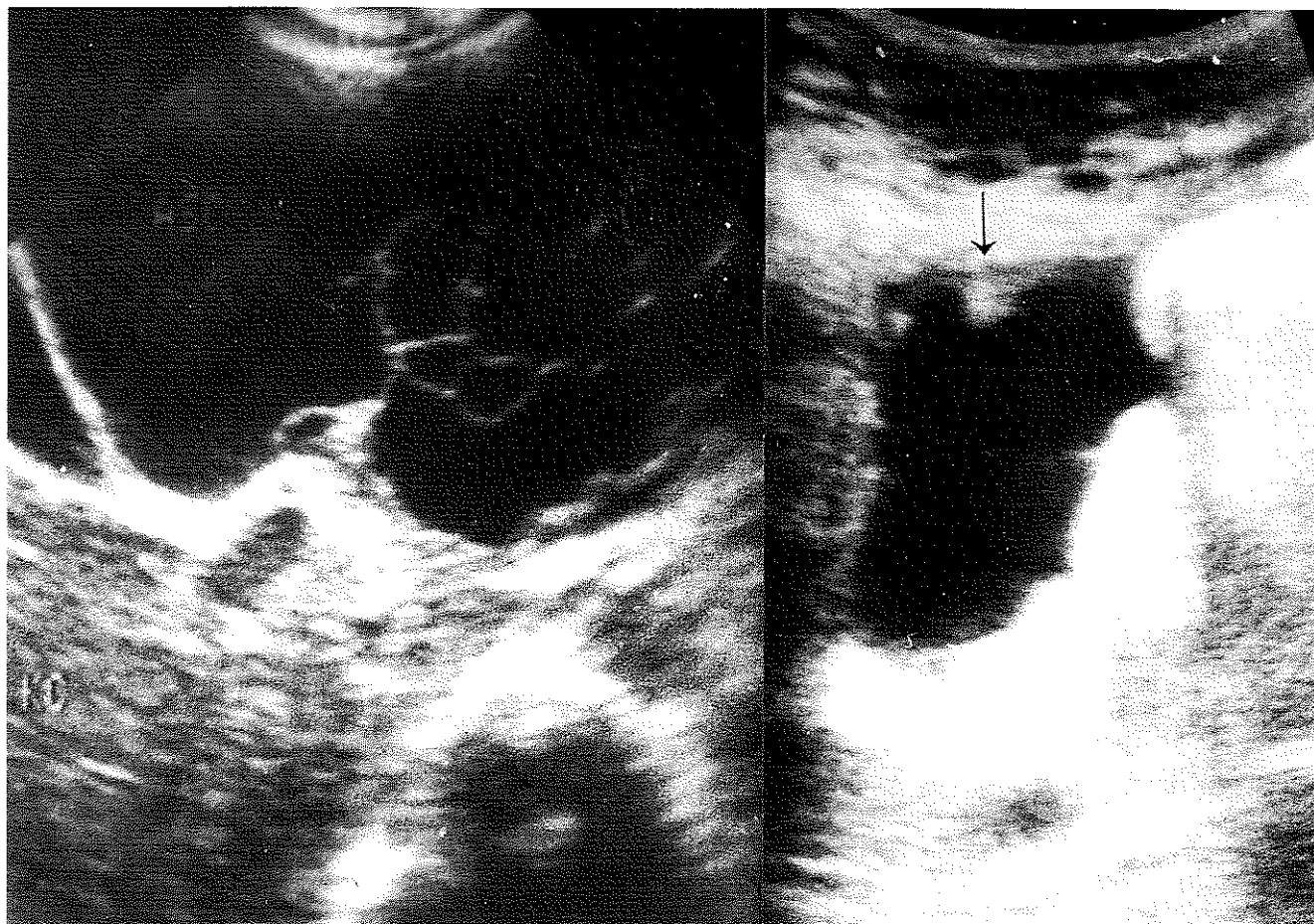


about 74%, weight loss in 62%, chronic abdominal pain in 58%, and diarrhea in 16% of the cases.

Anorexia, vomiting, constipation may be present as well (1,4,5,10). Mild anemia is seen in 59% of cases. Seventy-one percent of patients have a positive tuberculin skin test. Ascitic fluid in TB peritonitis is exudative (protein more than 2,5 gr/dk) in more than 95% of patients. Fewer than 50 % of cases show abnormal radiographic changes indicating pulmonary TB (1,2,4,5,7,11).

Three types of TB peritonitis are defined, which are wet type, fibrotic-fixed type and dry type. Wet type is seen in 90% of cases and characterized by ascites. This ascites would be free or localized (2,4,5,6,12). There are multiple yellowish white nodules in the parietal and visceral peritoneum with ascites. Thin strands, fibrous septates or debris can be observed in the ascitic fluid. Fibrotic-fixed

Figure III: (a) On the abdominal sonogram, free ascites which contain fibrous septae and thin strands is seen; and (b) in same patient, there is peritoneal thickening and nodularity (arrow)



type is seen in 60% of cases and characterized by big omental mass, matted intestinal loops and mesentery, and sometimes loculated ascites. Ascites might be observed in between the thick intestinal loops (4,12). Dry type is seen in less than 10% of cases and characterized by enlarged mesenteric lymph nodes, peritoneal thickening and dense adhesions (1-4,12,13).

Ascites is the most common sonographic finding in TB peritonitis and especially seen in wet type (1,2). It is the third most common etiologic factor of ascites after cirrhosis and neoplasm. Ninety-seven percent of patients have ascites at the time of presentation. It may have clear or complex appearance. The ascites may spread diffusely (50-65%) or loculate irregularly (1-5,10,12). Loculated ascites probably represents localized or concealed peritoneal inflammation. Thin strands and fibrous septations can be seen in the fluid and echogenic debris may be present in 10-40% of cases (2,4,6,12,13,14). The strands and septates seen within ascites are due to high fibrin content of the exudative ascitic fluid, but are not specific for TB (6). Echogen debris in two (33.4%), fibrous septations in five (83.3%) and incomplete mobile septates in four cases (66.7%) were detected in our cases. Thicker and multiple fibrous septates were seen in patients who

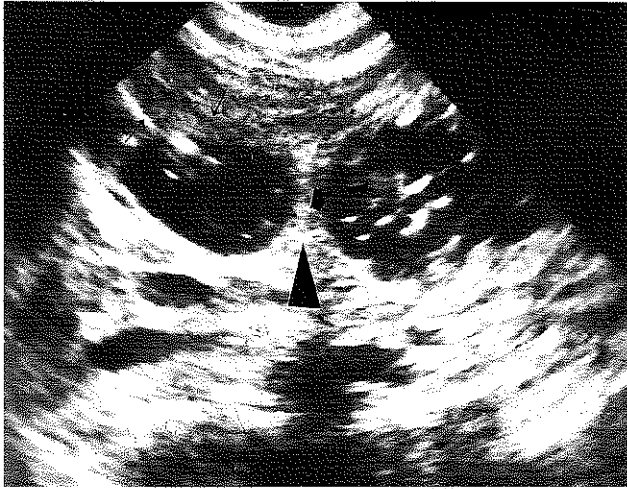
reveals echogenic debris.

The ascites has attenuation values between 25-45 HU at CT. It is reported that CT fails to show multiple, thin interlacing strands and US is the only imaging modality that shows fine strands within ascites fluid (5,7,11). We observed fibrous septates in two cases (33.4%) by CT imaging, but we did not observe the fine strands in any of the cases. As sonography is quite sensitive to peritoneal fluid collection, it can lead to an immediate diagnosis and permits selection of the ideal site for paracentesis (5).

There are multiple tubercles on the peritoneum or serosa of the bowel. Because of their small size they are rarely detected by US examination, and better visualized in the presence of ascites (6). In 3 cases (50%), the small nodules were detected on the peritoneal surface within the ascites. Two of these cases were examined by CT, but the nodules couldn't have been detected.

Complex masses are the manifestations of the fixed-fibrotic type. These masses are formed by adherent loops of bowel and lymph nodes, and may coexist with localized ascites and it can be observed by US (4,6,12). These lesions may sometimes be observed as nodular layer shaped echogenic thickening or omental cake by US. Omental cakes which are thought to be represented granulomatous

Figure IV: Transverse scan of midabdomen showing omental thickening (arrow) and irregularity, fibrotic adhesion (arrow head), ascites and echogen debris.



infiltration of the greater omentum are detected (4,15). All of our cases with omental cake revealed a moderate or large amount of ascites. Detection of omental cake in TB peritonitis suggests severe or advanced disease but is not pathognomonic for peritoneal TB (2,5). Although these findings can be seen by US, the best imaging modality for this type is CT. Hypervascular, enhanced peritoneal surface, mottled low density mass and nodular soft tissue thickening along mesentery and omentum are seen by CT (4,12,13,14).

Inflammation of the mesentery may lead to fixation of the bowel loops. When ascites is present, these fixed

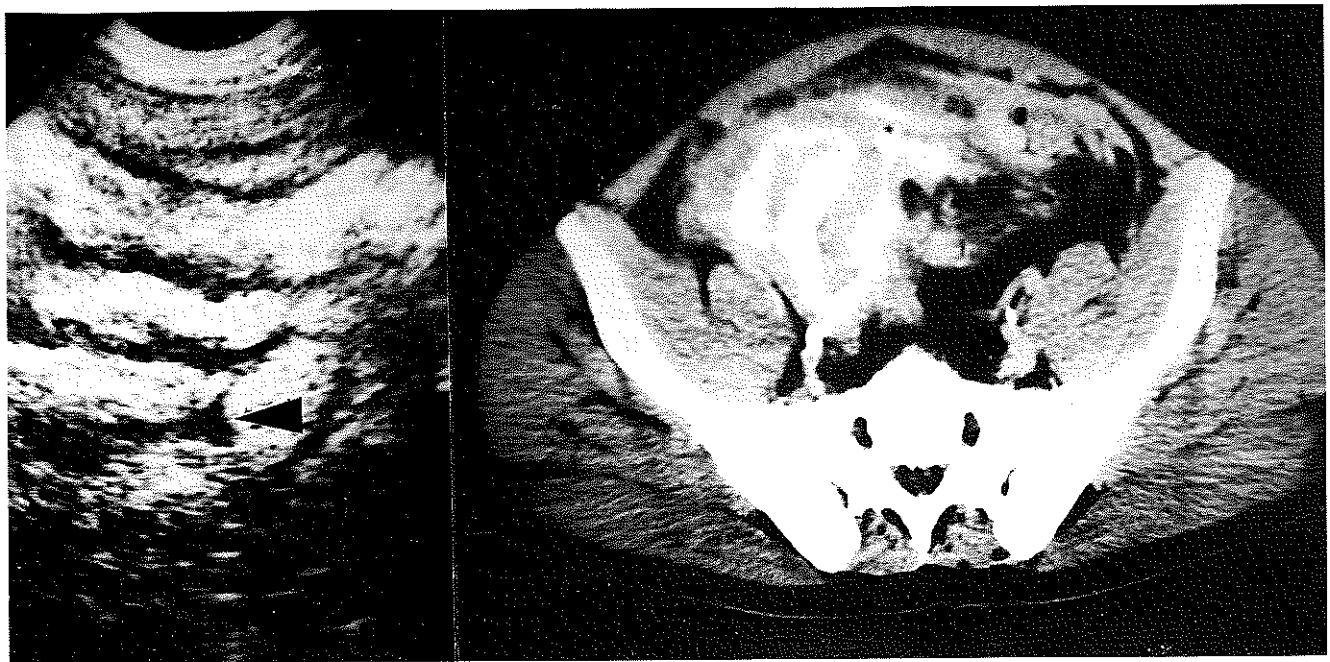
loops of bowel and mesentery stand out as spokes which are radiating out from the mesenteric root. This is analogous to the "stellate" sign described on CT and US. Such an appearance may also be seen in other infiltrating pathologies involving the mesentery such as neoplasia (3,6).

Another sonographic finding of TB peritonitis is "sliced bread" appearance related to the presence of localized small amount of ascites between bowel loops (3,5). This probably represents the early stage of peritoneal involvement. This sign was detected in a patient (16.7%) with minimal ascites among our cases. CT findings of the same case had similar appearance as well (Figure 5). However, an appearance of sliced bread may appear in any other diseases with low to moderate amount of ascites fluid and adherent small bowel loops regardless of etiology (2,5,6).

About a third of patients with abdominal TB have enlarged lymph nodes with central caseation necrosis and dense adhesions in peripancreatic and mesenteric compartments. Calcifications may be present during caseation and healing period. Central hypoechoic area related to caseous material and echogenities related to calcifications can be seen by US examination (2,6,7). Cold abscesses in the peritoneal cavity are resulted from extensive caseation of large masses of lymph nodes. Although caseation and calcification are common in TB, malignant lymphadenopathy may have a similar appearance. Aspiration of caseous material characterizes these lesions (6). No lymph nodes were detected by US or CT in our cases.

There may be hepatosplenomegaly, pleural effusion and

Figure V: "Sliced bread" appearance; sonographic (a) and pelvic computerized tomographic (b) images show adhesive small bowel loops and minimal acties (arrow head)



ileal wall thickening (2,4,8).

TB peritonitis is mostly diagnosed by observing caseous granulomas in peritoneum, TB positive culture results and sufficient response of the lesions to antituberculous treatment (2). Diagnosis is not reliable depending on culture of ascites fluid and often gives false negative results. Laparoscopic biopsy from tubercles might be helpful to support the diagnosis (3,4,6). In four of our cases, ascitic fluid were aspirated and cultured. Two of them were positive for TB. In one of the cases, laparoscopic biopsy was performed and the result was found positive. Other cases were diagnosed by respond to anti-tuberculous treatment.

It is difficult to distinguish TB peritonitis with clear fluid from ascites due to cirrhosis, congestive hearth failure and chronic renal disease. It is also difficult to distinguish TB peritonitis with fluid containing debris and septate from ascites in metastatic disease such as carcinoma of the ovary, stomach, pancreas, or peritoneal mesothelioma, or pyogenic peritonitis (2,6).

Peritoneal thickening, omental cakes and adhesions can also be detected in patients with peritoneal mesothelioma. However, the ascites is disproportionately small in relation to the degree of tumor dissemination in mesothelioma (5).

There may be adhesive bands in ascites fluid in peritoneal carcinomatosis, but they are thick. The fine, mobile incomplete strands demonstrated in TB ascites do not observe in the ascites fluid of peritoneal carcinomatosis. Although thin delicate septations may also present in pyogenic peritonitis and hemoperitoneum, the sonographic appearance of the ascites fluid in both conditions changes rapidly with time, unlike the ascites of peritoneal TB. When the sonographic findings are insufficient for making the diagnosis, the clinical history and the laboratory analysis of the ascitis fluid might help (5).

In conclusion, localized ascites, septations and internal echoes, peritoneal thickening and nodularity, cold abscesses and conglomerated, caseating, calcified lymph nodes strongly suggest peritoneal TB. Along with an appropriate history and physical examination TB peritonitis should be considered in the differential diagnosis. We believe that sonography plays an important role in the early diagnosis of TB peritonitis and prevents further invasive investigation such as laparoscopy and laparotomy.

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