Fat Pad vs. Anterior Subphrenic Abscess:  
A New Real-Time Sign

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Abstract: An echo-poor band of fat is seen between the anterior surface of the left lobe of the liver and the anterior abdominal wall in 25% of patients undergoing an abdominal scan. A similar appearance can be seen in an anterior subphrenic abscess. Normally, with respiration the liver can be seen to slide deeply to this fat band. If the band is due to subphrenic abscess, there is a differential movement due to fixation of the anterior part of the liver. This feature was seen in 4 patients proven to have subphrenic abscesses. This real-time sign is helpful indifferentiating if the band is due to fat or to subphrenic abscess.


The peritoneal fat pad is seen as an echo-poor band between the anterior surface of the liver and the anterior abdominal wall in the epigastrium particularly in obese people. This has to be differentiated from an inflammatory fluid collection in the same area because of their similar appearance. A “real-time” observation to differentiate these two conditions is described here.

MATERIALS AND METHODS

A 60-year-old woman presented with acute pain in right side of her abdomen of two days’ duration. On examination, she was febrile and had guarding of the abdominal muscles in the right upper quadrant. Sonography showed a well-defined, echo-poor band representing the fat pad between liver and anterior abdominal wall. There was “rocking” movement of liver (described later in detail) suggestive of fixation of the anterior part of the liver. This indicated inflammation in this region. Laparotomy confirmed an anterior subphrenic abscess due to appendicular perforation. Subsequently, all the patients coming for an abdominal scan irrespective of the indication were observed prospectively for the presence of an echo-poor band. During the period of 3 years ending April 1988, 5250 patients underwent abdominal sonography for different clinical indications. Of these, the echo-poor band (Figure 1) was well defined in about 25% of patients. The echo-poor band may be due to the normal fat pad or an anterior subphrenic abscess. When this echo-poor band is seen, the movement of the liver in relation to this band was observed while the patient took a deep breath.

FIGURE 1. Longitudinal scan of a normal patient showing the echopoor band of peritoneal fat. (LIV, liver; AO, aorta; asterisk, fat pad.)
RESULTS

Normally, i.e., when the echo-poor band is due to a fat pad, with respiration the liver is seen to slide deep to this echo-poor band (Figure 2). This characteristic was seen in all but 4 of the patients in whom this echo-poor band was seen. If the echo-poor band is due to a subphrenic abscess, the anterior surface of the liver becomes adherent to this region. As a result, the anterior part of liver does not move with respiration while the posterior part of liver with the structures posterior to it move well with respiration (Figure 3) resulting in a rocking type of motion of liver. This feature was seen with real-time sonography in 4 patients. All of the 4 patients had correlative clinical features, and laparotomy confirmed the diagnosis of anterior subphrenic abscess. In 2 patients the cause was appendicitis with perforation, while it was rupture of a liver abscess in the third. In the fourth patient no cause could be found.

DISCUSSION

During abdominal sonography, one often finds an echo-poor band containing a few internal echoes between the anterior abdominal wall and liver in epigastrium (Figure 1). This represents peritoneal fat. It is seen to extend on either side to a variable extent. In obese people it is seen to extend even on the lateral aspect of liver. It also continues around the ligamentum teres. Properitoneal fat of varying thickness is found in different patients and in different locations in the same patient. The appearance of fat on sonography can be either echogenic or echo poor, probably depending on the amount of water and fibrous tissue it contains. It is seen as an echo-poor band with a few internal echoes between

FIGURE 2. Real-time observation in a normal patient where liver slides below the fat. (LIV, liver; GB, gall bladder; RK, right kidney; AW, anterior abdominal wall; FAT, fat pad.)

FIGURE 3. Real-time observation in subphrenic abscess where there is differential movement of anterior and posterior parts of liver. (LIV, liver; GB, gall bladder; RK, right kidney; AW, anterior abdominal wall; ABS, anterior subphrenic abscess.)
The peritoneal recesses are potential spaces providing watersheds and drainage basins for the spread and localization of infections of the peritoneal cavity. Of these, there are five important spaces in relation to the liver – four intraperitoneal and one extraperitoneal (bare area of liver). The intraperitoneal spaces are (1) right anterior intraperitoneal space or right subphrenic space, (2) left anterior intraperitoneal space or left subphrenic space, (3) right posterior intraperitoneal (subhepatic) space, and (4) left posterior intraperitoneal space (the lesser sac). The right subphrenic space lies between the liver and diaphragm, bounded posteriorly by the coronary ligament and right lateral ligament and to the left by the falciform ligament. The left subphrenic space surrounds the left lobe of liver and has freely communicating subphrenic and subhepatic components. It is bounded above by the diaphragm, and behind by the left lateral ligament and left lobe of the liver, the gastrohepatic omentum, and anterior surface of the stomach. To the right is the falciform ligament, and to the left is the spleen, the gastrohepatic omentum, and the diaphragm.

When an echo-poor band is seen, the differentiation of a normal fat pad and a small subphrenic abscess is possible by a real-time sign, which is described here. In the case of normal properitoneal fat, the liver moves in a sliding fashion deep to this echo-poor band when the patient breathes. The movement of liver is more than the right kidney. However, in case of a subphrenic abscess, the anterior surface of liver will be fixed to this abscess. This is similar to fixation of the right dome of the liver with a right subphrenic abscess or an abscess in right lobe of liver. As a result, a differential movement of the anterior and posterior aspects of the liver occurs. The anterior part of the liver and related structures like the gall bladder is fixed and does not move, while the posterior part of the liver and related structures like the right kidney still move well with respiration, resulting in a rocking type of motion of the liver. This sign is very useful in determining the cause of the echo-poor bank, whether it is due to normal fat or subphrenic abscess. It is useful in a small number of cases with very small inflammatory collections in the anterior subphrenic space, which resembles the echo-poor band due to normal fat. If the collection is more, the diagnosis is obvious.

A similar rocking type of motion of the liver could be seen in the case of a tumor of the liver infiltrating the anterior abdominal wall. However, in this instance the tumor itself can be seen and the echo-poor band will be absent because of infiltration.
REFERENCES

