

Ascites: Ultrasound guidance or blind paracentesis?

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The classic site for paracentesis in generalized ascites is in the left lower quadrant of the abdomen at a position equivalent to McBurney's point. Its use has an average success rate of 58%, depending on the amount of liquid. To assess the efficacy of paracentesis at this site and to establish the ideal site for blind puncture, we studied 27 consecutive patients with ascites detected by abdominal ultrasonography. The amount of ascites was graded from 1 to 4. Free fluid had accumulated mostly in the perihepatic region, then around the bladder and in the right paracolic gutter, and finally in the left flank. In six of the eight patients in whom fluid was found in the left or right flank, air-filled bowel loops were observed between the abdominal wall and the fluid, in the expected path of a blind puncture. These findings suggest that the safety and efficacy of paracentesis would be greatly improved by ultrasonographic guidance.

L'examen clinique décèle l'ascite, en moyenne, 58 fois sur 100; le chiffre varie selon l'importance de l'épanchement. Dans une ascite généralisée, il est classique de pratiquer la paracentèse à la région inférieure gauche de l'abdomen à un point correspondant symétriquement à celui de McBurney. Afin de mieux connaître l'efficacité d'une telle paracentèse et de découvrir l'endroit idéal de la ponction à l'aveuglette, nous avons étudié 27 malades consécutifs présentant une ascite démontrée par l'ultrasonographie. L'importance de l'épanchement est cotée de 1 à 4. Lorsqu'il n'est pas cloisonné, il siège surtout, en ordre décroissant, autour du foie, autour de la vessie et dans la gouttière paracolique droite, et au flanc gauche. Chez six des huit malades chez qui l'épanchement siège au flanc gauche ou droit, il y a interposition d'une anse intestinale remplie d'air entre le liquide d'ascite et l'endroit de la paroi où la ponction à l'aveuglette aurait été faite. On peut croire que l'ultrasonographie permettra d'améliorer la sécurité et l'efficacité de la paracentèse.

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Abdominal paracentesis can be performed as either a diagnostic or a therapeutic maneuver. It has been used for more than a century and has been described as innocuous.¹ Complications have been reported but are rare; they include mesenteric hematoma and bowel perforation, which is especially likely to occur in patients with intestinal obstruction, when the intraluminal pressure is increased.^{2,3}

Paracentesis is usually done after percussion of the abdomen reveals shifting dullness. The usual site of puncture is in the flank, most often the left, at a position equivalent to McBurney's point. The right flank can be used if splenomegaly is present.⁴

With real-time ultrasonography we studied prospectively the efficacy of paracentesis at the usual site of puncture for the removal of ascitic fluid and tried to establish an ideal site for blind puncture.

Patients and methods

During a 2-month period in 1985 all patients at hôpital Saint-Luc, Montreal, who underwent abdominal ultrasonography were screened for free intraperitoneal fluid. Approximately 1200 abdominal ultrasound examinations were performed.

The patients were examined while they were supine with a real-time sector scanner having a 3.5-MHz transducer. The entire abdomen and the entire pelvis were scanned in multiple planes to detect ascites and loops of bowel. Special attention was given to the left and right flanks, the usual sites of paracentesis.

The amount of ascites in the four quadrants of the abdomen was graded from 1 to 4 by two observers as follows: grade 1, minimal fluid; grade 2, fluid layer less than 3 cm thick; grade 3, fluid layer 3 to 5 cm thick; and grade 4 (gross ascites), fluid layer more than 5 cm thick. The ideal site for paracentesis, or the site of easiest access to the fluid without puncture of intervening bowel loops, was determined.

Results

The 27 patients (17 men and 10 women) found to have ascites were aged 23 to 86 years.

The causes of the ascites included cirrhosis (in 11 patients), abdominal or pelvic neoplasia (in 8) and other entities (in 8).

In 17 of the 20 patients with grade 1 or 2 ascites no fluid was present at the usual sites of paracentesis. In the other three patients there was some fluid behind overlying air-filled bowel loops. Thus, the usual "blind" puncture for detecting ascites would have failed in 17 and could have led to bowel puncture in the other 3.

In two of the four patients with grade 3 ascites and all three of the patients with grade 4 ascites there was free fluid at the usual sites of puncture, but in the three patients with grade 4 ascites there were air-filled bowel loops between the abdominal wall and the fluid.

In grade 1 ascites the free fluid tended to accumulate first in the perihepatic region and then around the bladder (Table I); a full bladder seemed to prevent the accumulation of fluid in the perivesical space. In grades 2 to 4 ascites the greatest amount of fluid was found in the right paracolic gutter, the perivesical area and the perihepatic region (Table I).

Discussion

Physical examination is not very accurate in the diagnosis of ascites, having an average success rate of 58% according to Cattau and colleagues.⁵ A false-positive physical diagnosis of ascites may lead to useless paracentesis. With a true-positive physical diagnosis paracentesis may also be inconclusive. In generalized ascites classic paracentesis becomes fruitful only when the volume of fluid exceeds 300 ml. However, its success rate is only 44% when the volume is 300 ml and 78% when it is 500 ml.³ With quantities of free peritoneal fluid smaller than 50 ml, classic paracentesis is never successful.³

The demonstration of ascites has been greatly facilitated by the advent of real-time ultrasonography and its ability to search in many anatomic planes. As little as 10 ml of free fluid can now be detected.^{6,7} Hashimoto and associates⁸ were able to detect sonographically 12 to 14 ml of fluid in fetuses aged 18 to 20 weeks during intrauterine transfusions. Dinkel and coworkers⁷ injected various quantities of fluid into the peritoneal cavity of

pigs and were able to detect as little as 5 to 10 ml around the urinary bladder with ultrasonography.

There is disagreement in the literature about the pattern of spread of intraperitoneal fluid.⁹⁻¹¹ In our patients very small quantities were usually seen first around the liver tip and then in the perivesical area. The sites of early accumulation of fluid probably depend not only on gravity but also on the site of origin, the presence or absence of peritoneal adhesions and anatomic variants.⁹ As ascites increases, fluid accumulates in the paracolic gutters, mainly the right one. In severe ascites, free peritoneal fluid is consistently present at the classic site of paracentesis in the left lower quadrant but is often covered by distended bowel loops.

This study did not establish an ideal site for blind puncture, the distribution of ascites being too variable, especially when the amount of fluid was small or moderate. The classic site in the left lower quadrant does not seem appropriate, since it depends on there being a large quantity of fluid and since the fluid is often masked by air-filled bowel loops.

We conclude that abdominal paracentesis is best performed with real-time ultrasound guidance so that not only can the greatest accumulation of fluid be accurately located but also the best puncture site and needle direction can be determined.

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Table I — Sites of greatest amount of free fluid in 27 patients with ascites

Site of greatest amount of fluid	Grade of ascites			
	1 (n = 16)	2 (n = 4)	3 (n = 4)	4 (n = 3)
Perihepatic	11	1	2	1
Perisplenic	—	—	—	1
Right paracolic gutter	—	2	1	1
Perivesical	5	1	1	—
Left paracolic gutter	—	—	—	—