

Case Report

Ultrasound Findings in Suspected Ascites Referred for Paracentesis

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Abstract

Complications of diagnostic and therapeutic paracentesis include bowel perforation, hemorrhage, and death. At present, medical practitioners identify an area for paracentesis using either physical examination alone or with the addition of ultrasound. The preferable method is still debated within the medical literature. This case series compares photographs of patients with abdominal distension, diagnosed as ascites by physical examination, to the respective ultrasound findings. The ultrasound images show a variety of findings: large volume ascites, bowel loops extending to the abdominal wall (unilaterally or bilaterally), and distended bowel loops due to intestinal obstruction in the absence of substantial ascites. Studies have shown that performing ultrasound before ascites paracentesis procedures improves the procedure success rate and reduces complications. This case series illustrates examples of why ultrasound-assisted paracentesis has a better safety profile and a lower procedure failure rate, compared to physical examination techniques alone.

Keywords: Ascites, guideline, paracentesis, patient safety, ultrasound

INTRODUCTION

The first description of the use of ultrasound to detect ascites was published 50 years ago.^[1] In 1986, portable ultrasound was first recommended to assist in abdominal paracentesis.^[2]

Since then, multiple articles have shown ultrasound-assisted paracentesis to be safer, reduce hospitalization costs, and shorten the length of hospital stay, compared to physical examination techniques.^[2-5] Complications of abdominal paracentesis include bowel perforation, hemorrhage, and death.^[6]

However, some authors still advocate paracentesis should be performed without ultrasound assistance, and guidelines in some countries do not unequivocally recommend and mandate its use routinely, but only, when available.^[7,8]

CASE REPORT

The patients in this case series have all taken part in an ongoing prospective study of paracentesis procedures in a small NHS District General Hospital in the United Kingdom which commenced in January 2013.

The patients had been referred to the “Ascites Assessment and Procedure Service” with abdominal distension due to suspected ascites. All patients underwent a bedside ultrasound with either a Sonoace Pico (Medison) or Antares Acuson X300 (Siemens) ultrasound machine, using 3.5 MHZ curved linear probes.

During this study, photographs of several patients’ abdomen were taken, after obtaining written consent, to be able to compare their clinical appearance with ultrasound findings.

The ultrasound images of patients who were referred for ascites assessment showed a great variety of findings and four examples are shown in Figures 1-7.

The first patient was a middle-aged man with known decompensated alcohol-induced liver disease who presented with marked abdominal distension [photograph displayed in Figure 1]. He was found to have large volume ascites on

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ultrasound [Figure 2]. A safe insertion point was marked, and 12 L of ascites were drained, without complications.

The second example is a young woman with decompensated alcohol-induced liver disease, presenting with severe abdominal distension [photograph displayed in Figure 3]. Ultrasound showed multiple distended bowel loops reaching just below the abdominal wall, deeming paracentesis unsafe to perform on either side [Figure 4].

The third patient was an elderly woman with ascites of unknown etiology, who had undergone multiple prior therapeutic paracentesis procedures. She presented with marked abdominal distension as shown in Figure 5. Ultrasound detected one large distended bowel loop, likely adhering to the abdominal wall in the left flank, because it did not move away from the abdominal wall with change of the patient's position [Figure 6]. It was felt that paracentesis on the left side would be unsafe. Therefore, she underwent an uncomplicated drainage on the opposite side.

Figure 7 shows the ultrasound findings (no patient photograph) of a patient, with ovarian cancer and increasing abdominal

distension, who was referred to assess suitability for therapeutic paracentesis.

The bedside ultrasound showed a very small volume of ascites among multiple distended bowel loops, raising the suspicion of bowel obstruction and deeming paracentesis unsafe.

DISCUSSION

In this case series, photographs of patients with marked abdominal distension, diagnosed as ascites by clinical examination, are compared to their respective ultrasound findings. Several publications suggest, that performing ultrasound, before paracentesis procedures in adults, reduces complications and improves the number of successful drain insertions, compared to a “blind” technique using physical examination only.^[2-5]

Physical examination techniques used to detect ascites in patients with abdominal distension include the “anatomical landmark technique,” “percussion wave palpation,” and eliciting “flank dullness” and “shifting dullness.”^[9,10] The



Figure 1: Patient 1: Decompensated liver cirrhosis – abdominal photograph: Distended abdomen

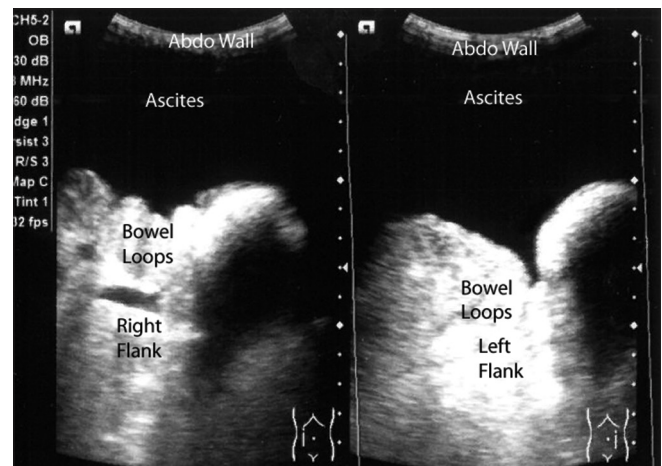


Figure 2: Patient 1: Ultrasound findings – large ascites, equally distributed in abdomen, safe for paracentesis



Figure 3: Patient 2: Decompensated liver cirrhosis – abdominal photograph: Severely distended abdomen

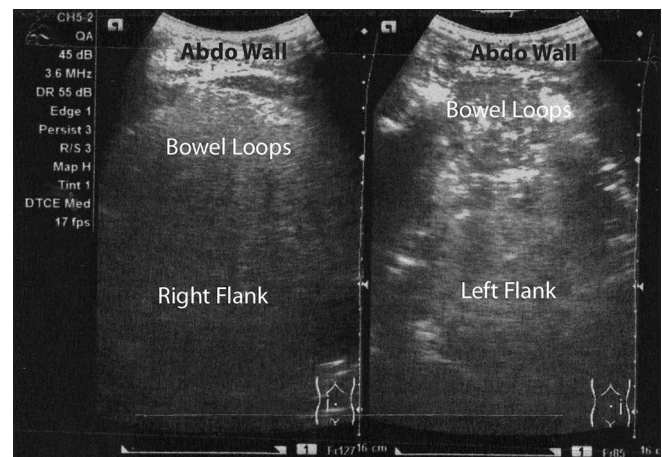


Figure 4: Patient 2: Ultrasound findings – multiple distended bowel loops reaching below abdominal wall – unsafe for paracentesis on both sides



Figure 5: Patient 3: Ascites of unknown origin – abdominal photograph: Severely distended abdomen

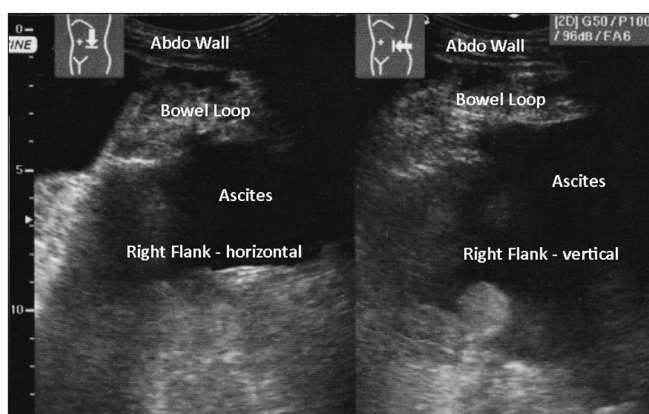


Figure 6: Patient 3: Ultrasound findings – one large distended bowel loop, likely adhering to the abdominal wall in the left flank – unsafe for paracentesis on the left side

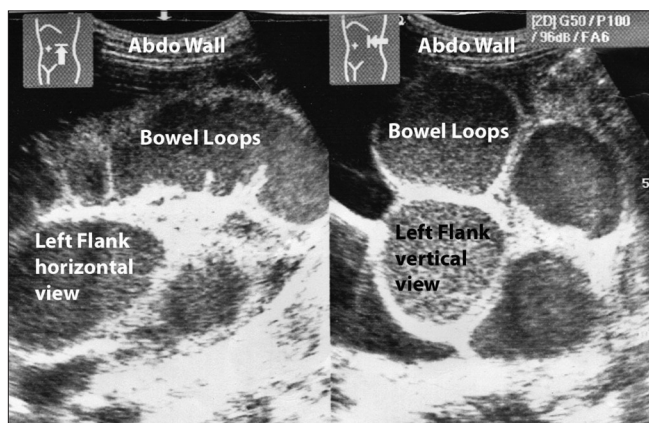


Figure 7: Patient 4: Ultrasound findings only (no patient photograph) – multiple distended bowel loops reaching below abdominal wall, no ascites – suspicion of bowel obstruction – paracentesis contraindicated

accuracy of these methods (sensitivity and specificity) has been found to vary between 58% and 80%.^[9,10] Therefore, it is not surprising, that in a prospective randomized study ($n = 100$), the failure rate was 39% in patients,

who underwent paracentesis attempts without ultrasound assistance.^[3]

This case series highlights situations where abdominal loops have rendered paracentesis unsafe on one or both sides of the abdomen. It should, however, be noted, that all intra-abdominal organs can hinder paracentesis attempts, and stomach, liver, spleen, bladder, and kidneys can all be identified by ultrasound to avoid organ injury. Other pathological findings mimicking ascites can also be identified, e.g., large ovarian cysts. The authors have detected the latter finding once in a cohort of more than 600 patients (no imaging included).

In our study, we have, however, not identified a patient, where, due to an abnormal enlargement of intra-abdominal organs, it was unsafe to perform a procedure and therefore have not been able to include such an imaging example.

One of the potentially life-threatening complications of paracentesis is a severe hemorrhage.^[4-6]

In a large study ($n = 69,859$), the risk of bleeding complications with ultrasound guidance was 0.27%, compared to 1.25% without.^[4] Of those with significant hemorrhage, mortality was 12.9%, of those without 3.7%.^[4] The use of color flow Doppler and power Doppler has been described to reduce this complication.^[4,5] However, in the latter article and other studies, it is not always clear, if a Doppler of abdominal wall vessels was systematically performed.^[2-5]

In our prospective study of paracentesis procedures, from which the case studies of this article are taken, Doppler of abdominal wall vessels was not routinely performed, and imaging examples for this method, where this changes a management decision, would need to be demonstrated in a future article.

Interestingly, there is no recommendation in the current literature about what distance to the nearest intra-abdominal structure is regarded as safe to perform a procedure.^[1-6] This issue is not even mentioned in most of the literature or national guidelines.^[1-6,8]

It remains, therefore, to be a matter of future research to determine, if intra-abdominal distance measurements would further enhance the safety of the procedures, or if clinical judgment, through visual estimate, is equally safe.

Our case series shows examples of images of patients, where paracentesis could have caused bowel perforations, if only assessed clinically and thereby illustrates visually, why ultrasound-assisted paracentesis has been shown to offer a better safety profile and higher successful insertion rate, than performed with physical examination techniques alone.^[2-4]

The authors advocate implementing guidelines for gastroenterology and oncology services in all health-care systems making the use of ultrasound before abdominal paracentesis in adult patients mandatory, as suggested by the Society of Hospital Medicine in the United States in 2019.^[10]

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Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patients have given their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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