

“Gut Point”: POCUS Leading to the Detection of Postoperative Intestinal Fistula

Carlos Augusto Metidieri Menegozzo*, Roberto Rasslan, Sérgio Henrique Bastos Damous, Edivaldo Massazo Utiyama

Division of General Surgery and Trauma, Department of Surgery, University of São Paulo, São Paulo, Brazil

Abstract

Postoperative intestinal fistulae is one of the most feared complications. Despite its downsides, computerized tomography is the most widely used radiological exam to evaluate postoperative intestinal complications. Point of Care Ultrasound (POCUS) is a bedside tool that can sometimes expedite diagnosis and treatment, avoiding the potential downsides of a CT scan. We describe a case in which the use of POCUS yielded prompt identification of relevant signs in a patient suspected of having an intestinal fistula. We discuss the sonographic findings and the benefit of expediting definitive treatment, thus potentially lowering the morbidity of the patient.

Keywords: POCUS, ultrasound, postoperative complication, intestinal leakage, intestinal fistula

INTRODUCTION

Gastrointestinal dehiscence is one of the most dreadful postoperative complications faced by patients. Patients with overt clinical findings of gastrointestinal dehiscence should undergo immediate reoperation. However, patients with subtle deterioration of unclear etiology might need a further workup for definitive diagnosis.^[1]

Computerized tomography (CT) is commonly used to evaluate gastrointestinal fistula.^[2] Despite several limitations for widespread use, CT findings might be nonspecific.

Point-of-care ultrasound (POCUS) is increasingly incorporated in surgical assessment. Among its potential applications, it can identify intra-abdominal free fluid and pneumoperitoneum postoperatively and patterns of echogenicity of the fluid may suggest its origin.^[3]

We report critical sonographic findings of postoperative intestinal fistula that may expedite treatment without further imaging investigation.

CASE REPORT

A 70-year-old female patient came to the emergency

department with signs and symptoms of intestinal obstruction, which was confirmed by computerized abdominal tomography. Due to her history of radiotherapy during a gynecological cancer treatment, the surgical team hypothesized radiation enteritis. The patient underwent an exploratory laparotomy with intestinal resection and primary anastomosis.

On the 9th postoperative day, the patient developed acute abdominal pain. Further investigation with a CT scan depicted pneumoperitoneum and free fluid. The surgical team found a perforated gastric ulcer upon laparotomy, treated with sutures and an omental patch. The patient had an uneventful recovery until the 23rd postoperative day of the index operation when she developed mild abdominal pain and an elevation of inflammatory markers. Upon physical evaluation, there was localized abdominal tenderness but no peritoneal signs. The inflammatory biochemical markers were mildly elevated.

POCUS of the abdomen identified free intraperitoneal fluid with echoes and pneumoperitoneum [Videos 1, 2 and Figure 1]. The rhythmic shadowing of the fluid due to the pneumoperitoneum defined a variation of the “gut point,”^[4]

Address for correspondence: Dr. Carlos Augusto Metidieri Menegozzo, Av. Enéas de Carvalho de Aguiar, 255, Cerqueira César, São Paulo, Brazil. E-mail: carlos.menegozzo@hc.fm.usp.br

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better visualized using the linear transducer [Video 3 and Figure 2].

Upon another exploratory laparotomy, we found an ischemic portion of the small bowel comprising the previous anastomosis, which had a puncture opening, and a significant ulceration in the antimesenteric border of the bowel, distal to the previous anastomosis [Video 4]. Due to the critical clinical scenario, we performed a damage control surgery and a second-look procedure after physiologic compensation. However, over the next 48 h, the patient developed multiple organ dysfunctions and eventually died of septic complications.

DISCUSSION

POCUS is still not widely used by surgeons as an extension of the physical examination, especially in the postoperative period. However, as illustrated by this case, POCUS may reduce the need for further testing, expediting the time to definitive treatment and should be the part of the surgical assessment.

Upon the suspicion of an intestinal fistula secondary to anastomotic or suture dehiscence, the evaluation should focus mainly on pneumoperitoneum and free fluid findings. While fluid is better assessed using low-frequency transducers, pneumoperitoneum signs might be better displayed using the linear probe (high-frequency transducer).

Table 1 summarizes the main checkpoints for the evaluation of anastomotic or suture dehiscence. The physician should assess seven windows for the presence of free fluid: Hepatorenal, splenorenal, bilateral subdiaphragmatic and para goiter spaces, and pelvic.^[5] Following the sonographic identification of free fluid, for which sensitivity and specificity are 74% and 98%, respectively,^[6] the physician should also assess the presence of echoes inside the fluid. These hyperechoic images floating inside the liquid, resembling the plankton sign in pleural effusions should concern intraluminal fluid leakage or infectious origin.

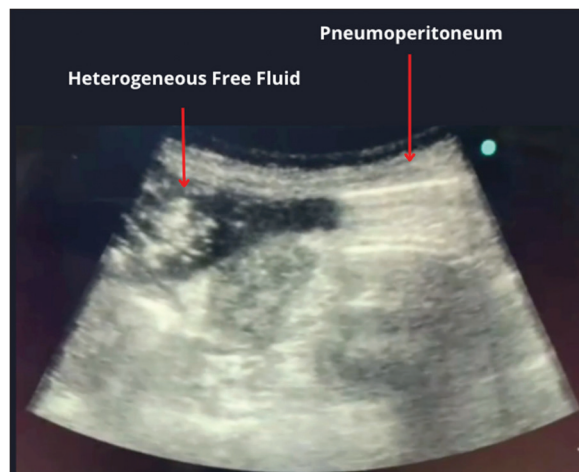


Figure 1: The pneumoperitoneum can be visualized by the peritoneal enhancement associated with the posterior reverberation artifact, while the free fluid is depicted by a anechoic image with hyperechoic “floating” images

The main findings of pneumoperitoneum are the absence of peritoneal sliding, enhanced peritoneal stripe sign (EPSS), and the presence of posterior reverberation (ring-down artifact).^[5] EPSS may yield a sensitivity of 100% and specificity of 99% for pneumoperitoneum.^[7] Similarly to the lung point sign for pneumothorax, pneumoperitoneum may produce a pathognomonic sign called “gut point.”^[4] We report a modified gut point sign in which the pneumoperitoneum is combined with a heterogeneous free fluid with multiple echoic images inside.

Most studies analyzing intestinal leakage focus on colorectal surgery, and CT scans are the most widely used noninvasive imaging tests in the postoperative period for suspected intestinal fistula.^[2] However, there are several caveats regarding this imaging modality in the postoperative period. First, as demonstrated in a systematic review, the sensitivity of a CT scan is 68% for intestinal fistula, meaning that the high false-negative rate makes a CT scan a poor test to rule out that complication.^[8] Nevertheless, a CT scan plays a significant role in identifying other potential postoperative complications. Second, normal image findings during the early postoperative period, such as pneumoperitoneum and intraabdominal free fluid, may contribute to higher false-negative rates of anastomotic leakage.^[9] As illustrated in our case’s image findings [Figures 1-3] and in the literature regarding sonographic findings of pleural effusions, ultrasound may provide additional insights about the nature of the intracavitary

Table 1: Main checkpoints for sonographic diagnosis of postoperative anastomotic or suture leakage

What to look for	Where	Main findings
Pneumoperitoneum	Upper abdomen in supine position Right upper quadrant in left-sided decubitus	Absence of peritoneal sliding EPSS, posterior reverberation (ring-down artifact)
Free fluid	Subdiaphragmatic, right and left upper quadrants, para goiter spaces, and pelvis	Hyperechoic images floating inside the fluid-modified gut point

EPSS: Enhanced peritoneal stripe sign

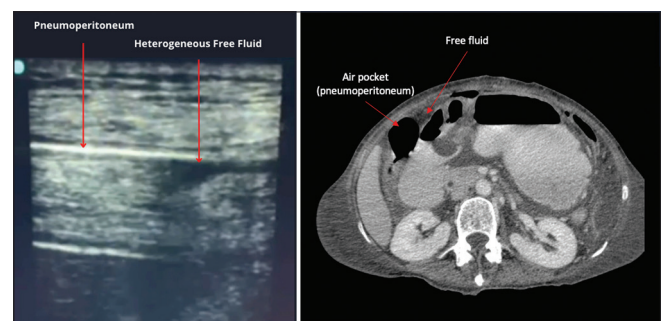


Figure 2: The modified Gut Point can be visualized by the movement of free gas (pneumoperitoneum) over the heterogeneous free fluid, both of which are superficial to the underlying viscera. The computerized tomography scan image displays the same findings visualized with the ultrasound probe

fluid by analyzing the presence of floating echoes.^[10] While the evaluation of the nature of the intraperitoneal fluid is lacking in the literature, the ability of POCUS to provide additional information about the nature of pleural effusions is explored. Although CT scans may provide the same insights, the findings tend to be more subtle. In contrast, echoes or septations are easily seen on ultrasound due to the striking echogenic contrast. Third, the image results may mislead the surgical team, leading to a significant delay in reintervention.^[11] Finally, ionizing radiation, costs, patient transport, and availability limit its broader use.

Such caveats should encourage the surgical team to rely on micro and microhemodynamic information, biochemical results (e.g., C reactive protein), and essential physical exam findings. We encourage the incorporation of POCUS during the routine assessment of postoperative patients after intestinal suture and anastomosis. Unfortunately, no large studies evaluate ultrasound's role in detecting intestinal leakages or its diagnostic accuracy. However, ultrasound is cheaper, faster, available at the bedside, and may yield a better evaluation of the quality of the cavitory fluid by detecting mobile echoes and septations, leading to prompt findings concerning postoperative complications.

There are some limitations to the ultrasound assessment. First, it is operator dependent. It is also important to note that pneumoperitoneum, intestinal dilation, and free intrabdominal fluid might be normal findings depending on the type of surgery and on which postoperative day the patient is evaluated.^[9] Furthermore, ultrasound is limited in assessing deeper areas or those surrounded by bone or intestinal loops. Moreover, intraluminal gas might be misinterpreted as pneumoperitoneum. Hence, we do not disregard the need

for a CT scan to investigate postoperative complications. However, POCUS may provide the necessary information for decision-making more rapidly, with lower costs and without radiation, and should be incorporated into the routine evaluation during the postoperative period.

Declaration of patient consent

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

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Conflicts of interest

There are no conflicts of interest.

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Figure 3: A computerized tomography scan image illustrating the similarity between a uncomplicated pleural effusion and the intrabdominal enteric fluid