

Sinais Secundários de Obstrução Intestinal causada por Hérnia Para-Umbilical detetados por Ecografia de Triagem

Secondary Signs of Intestinal Obstruction caused by Para-Umbilical Hernia through Screening Ultrasound

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Resumo

A ecografia de triagem pode desempenhar um papel importante nos serviços de emergência, oferecendo um método rápido e preciso para detetar sinais claros de obstrução intestinal, como íleo paralítico ou obstrução mecânica. Os aparelhos de ecografia são portáteis, produzem imagens em tempo real e não emitem radiação, o que os torna ideais para serviços de saúde de emergência periféricos, especialmente em contextos onde existem limitações técnicas e humanas.

A triagem ecográfica, quando realizada por profissionais devidamente capacitados, como os técnicos superiores de diagnóstico e terapêutica em Radiologia, com formação universitária nas componentes teórica e prática em ultrassonografia, permite a execução de exames protocolados rápidos que auxiliam a decisão clínica médica em contextos pré-hospitalares.

Este artigo descreve o caso de uma paciente com sintomas sugestivos de obstrução intestinal e uma hérnia periumbilical patente, atendida num Serviço de Urgência Básica. Para uma avaliação clínica mais precisa, foi adotada uma abordagem combinada, utilizando radiografia abdominal e a ecografia. Os achados confirmaram a presença de obstrução intestinal e um provável encarceramento da hérnia, o que levou à sua imediata transferência para um hospital de referência.

O uso da ecografia como ferramenta de triagem não visa fornecer diagnósticos definitivos, nem deve ser interpretado pelas especialidades médicas como uma intrusão no seu

Abstract

Screening ultrasound plays a crucial role in emergency services, offering a rapid and accurate method for detecting definitive signs of intestinal obstruction, such as paralytic ileus or mechanical blockage. Its portability, real-time imaging capabilities, and lack of radiation make it ideally suited for peripheral emergency health services with limited technical and human resources.

Ultrasound triage, when performed by qualified professionals such as radiology diagnostic and therapeutic technicians with a university-level education and both theoretical and practical training in ultrasonography, allows for the rapid execution of protocol-based exams that support clinical decision-making in pre-hospital settings.

This article presents the case of a female patient with symptoms suggestive of intestinal obstruction and a patent para-umbilical hernia, attended at a Basic Emergency Service (BES). To achieve an accurate clinical evaluation, a combined approach using abdominal radiography and ultrasound was employed. The findings suggested the presence of an intestinal obstruction and a likely incarceration of the hernia, leading to her immediate referral to the reference hospital.

Screening ultrasound is not intended to provide definitive diagnoses, and it should not be seen by medical specialists as an intrusion into their clinical domain. This distinction is clearly outlined in international literature.

domínio clínico, conforme amplamente descrito na literatura internacional. A sua utilidade tem levado a um número crescente de instituições de saúde, a nível mundial, a adotá-la como ferramenta de triagem primária, sendo esta uma prática consolidada em diversos protocolos de emergência e comprovadamente eficaz na preservação de vidas.

Palavras-chave: Hérnia Umbilical Serviços de Emergência Médica, Obstrução Intestinal, Triagem, Ultrassonografia.

Consequently, an increasing number of global health institutions are adopting its use as a primary screening tool; a practice firmly established in clinical interactional protocols that has proven to lifesaving.

Keywords- Emergency Medical Services, Intestinal Obstruction, Triage, Ultrasonography, Umbilical Hernia.

Introduction

Intestinal obstruction is a clinical condition characterized by a partial or complete blockage of the bowel, preventing the normal passage of intestinal contents. It can result from various causes, including adhesions, tumours, volvulus, and hernias (1,2). Clinically, patients often present with abdominal pain, distension, nausea, vomiting, and an absence of bowel movements or gas passage. If not promptly diagnosed and treated, obstruction can lead to bowel ischemia, perforation, and peritonitis(3).

Ultrasound plays an important role in the early detection of intestinal obstruction, offering real-time visualization of bowel dynamics(4,5). Key sonographic findings include dilated small bowel loops (>2.5 cm), the presence of free fluid between loops, increased echogenicity of intestinal structures, and the back-and-forth movement of intraluminal contents, known as the "to-and-fro" sign(6–9). These findings help in guiding clinical management alone or with other means like abdominal radiography.

Hernias, particularly when incarcerated, are a significant cause of bowel obstruction. Incarcerated hernias occur when a segment of bowel becomes trapped within the hernial sac, leading to obstruction and a risk of strangulation. Sonographic signs of incarceration include thickening of the hernial sac, the presence of hyperechoic fat, fluid accumulation within the sac, and dilated bowel loops inside the hernia.

Additionally, bowel wall thickening, edema, and the absence of peristalsis suggest progression toward strangulation(10–12). While plain abdominal radiography may show indirect signs of obstruction, such as air-fluid levels and dilated bowel loops, it cannot directly visualize the hernia or assess its contents.

Ultrasound provides essential additional information, allowing for the identification of herniated bowel segments, evaluation of their vascular supply, and detection of secondary signs of compromised bowel viability. The integration of ultrasound with radiography enhances diagnostic accuracy and speeds up clinical decision-making, particularly in resource-limited emergency settings. However, the gold standard for diagnosing bowel obstruction and incarcerated hernias remains computed tomography (CT).

CT imaging offers superior anatomical detail, enabling precise localization of the obstruction, assessment of bowel viability including detection of intestinal ischemia, and identification of complications such as strangulation or perforation. Nevertheless, in situations where CT is unavailable, the combination of radiography and ultrasound serves as a valuable alternative, allowing for timely intervention and appropriate patient triage. By employing ultrasound as a screening tool, clinicians can rapidly identify signs of bowel obstruction and assess for hernia incarceration, ultimately improving patient outcomes through early diagnosis and targeted management.

Case Discussion

A 64-year-old female patient presented to a BES with complaints of abdominal pain that had persisted for the last four days and the onset of vomiting the previous night. The patient had sought care at the BES twice in recent weeks. She reported being diagnosed with a supraumbilical hernia and is currently on the waiting list for surgery at a reference hospital (RH). During her last visit to the BES, which occurred four days prior, the attending physician manually reduced the hernia and subsequently discharged the patient.

Upon her arrival at the BES, the patient was classified as yellow according to the Manchester triage system, which indicated an urgent level of severity. Patient reported recurring vomiting, an abdominal pain rating of 7 on a scale of 0–10, a fever of 38.4°C, and was normotensive. The patient's abdomen was quite painful upon palpation but showed no peritoneal reaction. A simple blood analysis revealed slight leucocytosis and a slight decrease in hemoglobin levels, antiemetic and pain medication was administered.

Abdominal radiography is displayed in **figure 1**, and screening sonography images of para-umbilical hernia in **figure 2** and corresponding video may be observed [here](#).

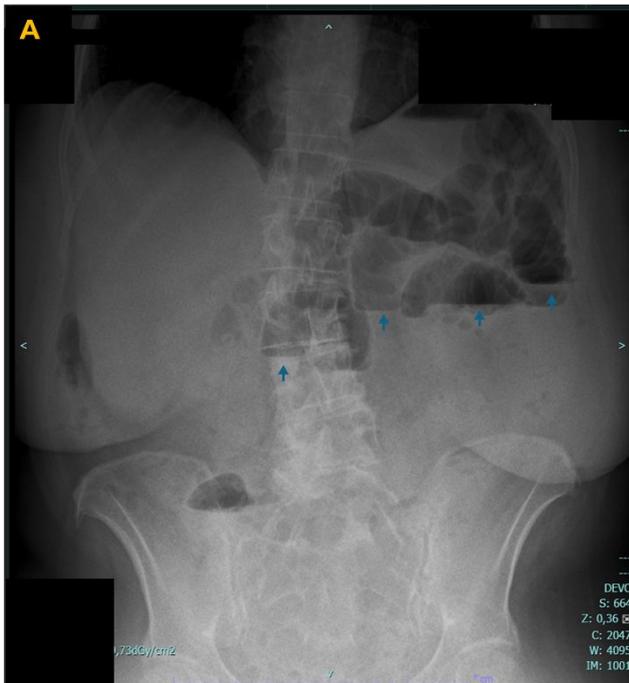


Figure 1

Shows image **A**, an orthostatic radiograph of the abdomen; air-fluid levels (blue arrows) and slight distension of the small bowel loops are visible.



Figure 2

Images **B** and **C** show axial and longitudinal sweeps, respectively; the hernial sac can be observed, containing pre-peritoneal fat and part of an intestinal loop. The herniated fat has an echogenic (hyperechoic) appearance, with several interfaces and acoustic shadows. There is also free fluid within the hernia sac, and no peristaltic movements are observed. Image **D** shows a 1.93-cm discontinuity in the aponeurosis of the abdominal wall measured in the longitudinal plane. In summary, the presence of fluid within the hernial sac, hyperechoic fat, loss of peristalsis, thickening of the hernial sac, dilated bowel within the sac.

Figure 3 represent assessment of bowel content and its dynamic content and free fluid between bowel loops can be observed [here](#). In **figure 4**, still images of approximated measurements of bowel loops were executed.

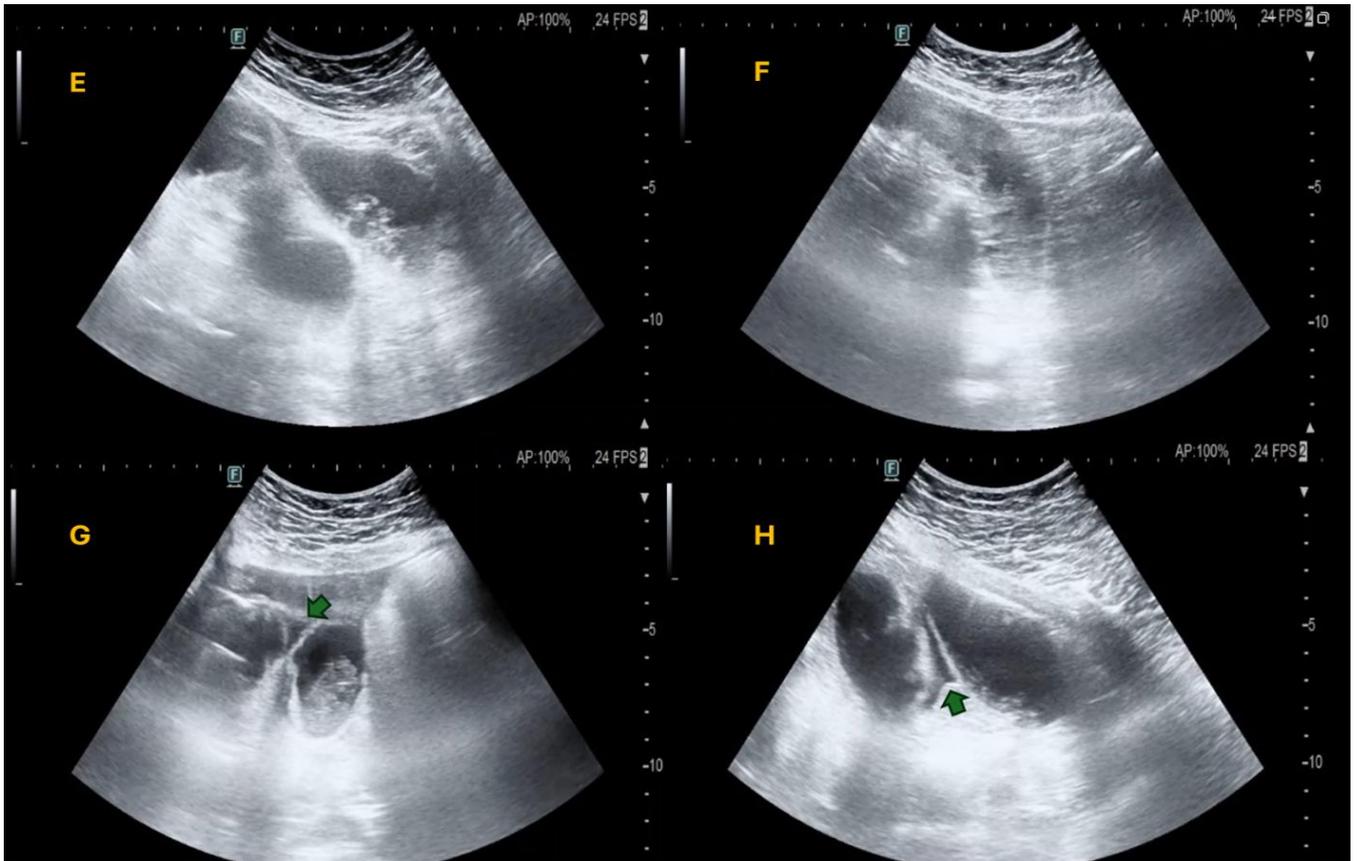


Figure 3

In a still image of the video loop, images **E** and **F** represent bowel content with “to-and-fro sign” movement traducing no real progression of bowel content, and **G** and **H** images traduces free fluid between bowel loops (green arrow).

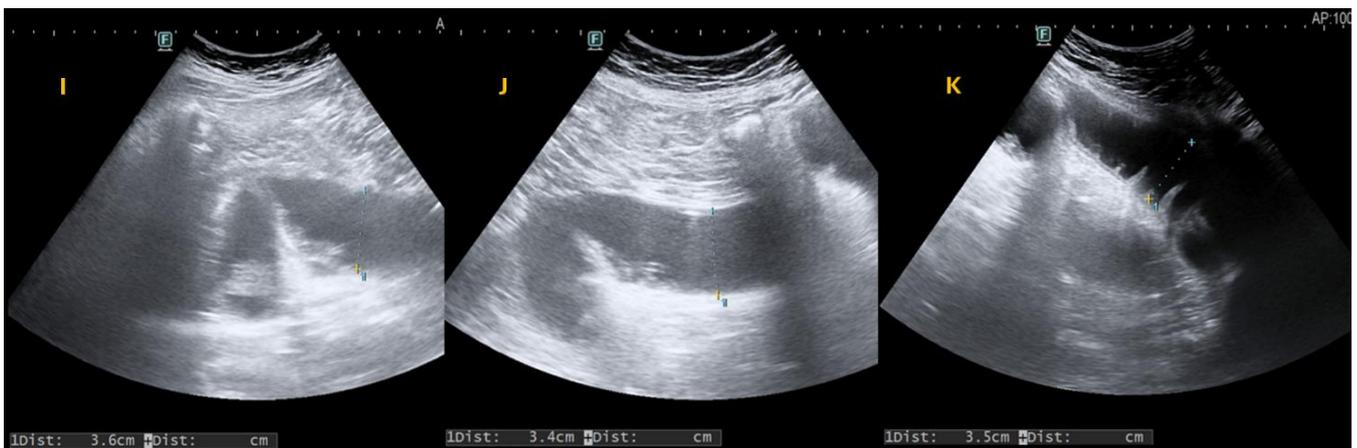


Figure 4

Still Images **I** and **J** and **K**, show small bowel distended above 2.5 cm, which suggests dilation.

Based on the abdominal radiograph, the presence of air-fluid levels and dilated small bowel loops raised initial concern for an obstructive process. Complementary sonographic assessment of the para-umbilical region revealed several features suggestive of a complicated hernia. These included a hernial sac containing hyperechoic fat with acoustic shadowing, absence of peristaltic activity within a herniated intestinal loop, and the presence of free fluid inside the hernial sac.

Additionally, free fluid was observed between bowel loops, and video imaging demonstrated a characteristic to-and-fro movement of the intestinal contents, indicating impaired transit. Measurements confirmed small bowel dilation exceeding 2.5 cm.

Considering these combined findings radiographic signs of obstruction, specific sonographic features of a potentially incarcerated hernia, and signs of bowel suffering; the attending physician decided to refer the patient to the RH with suspected incarcerated hernia and evolving bowel obstruction.

A brief report of the screening sonography was documented in the patient's clinical record by the BES physician, along with a request for the patient to be observed by surgery specialist.

Upon her arrival at the RH, the patient underwent a complete blood analysis, which revealed discrete elevations in several parameters: serum creatinine at 1.2 mg/dL (normal range: 0.6–1.1 mg/dL), C-reactive protein at 7 mg/L (normal range < 5 mg/L), leukocytes at $10,5 \times 10^9/L$ (normal range: $4.0\text{--}10.0 \times 10^9/L$), and neutrophils at $8.4 \times 10^9/L$ (normal range: $1.8\text{--}8.0 \times 10^9/L$). Her erythrocytes were also slightly decreased at $4.1 \times 10^{12}/L$ (normal range: $4.6\text{--}5.2 \times 10^{12}/L$). However, the patient reported that she already had mild anemia and was undergoing investigation.

At the RH, a manual reduction of the hernia was successfully performed, followed by a series of intestinal cleansing enemas. The patient was sent home with advice in case her condition worsened, she should return to RH. Although there was initial local improvement following manual hernia reduction, the hernia recurred within six days, leading to the patient's readmission to RH due to a worsening of her condition and the need for further evaluation. During this second hospital stay, blood tests revealed erythrocytes at $4.10 \times 10^{12}/L$ (normal range: $4.6\text{--}5.2 \times 10^{12}/L$), leukocytes at $13.6 \times 10^9/L$ (normal range: $4.0\text{--}10.0 \times 10^9/L$), neutrophils at $12.1 \times 10^9/L$ (normal range: $1.8\text{--}8.0 \times 10^9/L$), blood urea nitrogen at 40 mg/dL (normal range: 9.8–20.1 mg/dL), and serum creatinine at 2.4 mg/dL (normal range: 0.6–1.1 mg/dL).

An ultrasound was subsequently conducted by the radiologist, with a portion of the report stating, "*...The findings strongly suggest a mechanical obstruction of the small intestine caused by an incarcerated hernia...*"The report noted thickening of the hernial sac, hyperechoic fat, fluid within the sac, and bowel wall edema.

Although the initial reduction was successful, the recurrence of the hernia led to a return of obstructive symptoms. Given the persistence of the condition, the patient underwent surgery for definitive treatment. Following the procedure, she experienced a gradual and sustained recovery, ultimately returning to her normal daily life.

Discussion

The detection of intestinal obstruction, combined with the identification of signs of incarcerated umbilical hernia, presents significant challenges in clinical practice, particularly in emergency settings. Accurate interpretation of imaging studies is crucial for therapeutic decision-making and the prevention of severe complications.

Traditionally, abdominal radiography has been the initial imaging modality of choice due to its speed and availability. This method can reveal air-fluid levels and intestinal loop dilation, both suggestive of obstruction. However, its sensitivity can be limited, particularly in the early stages or in cases where radiographic findings are subtle. The reported sensitivity of abdominal radiography for detecting small bowel obstruction varies between 50% and 66%, with a specificity ranging from 50% to 80% (13–15).

On the other hand, point-of-care ultrasound has demonstrated dynamic assessment of bowel motility, the presence of intraperitoneal fluid, and tissue integrity. Studies suggest that ultrasound achieves a sensitivity of 88% to 94% and a specificity of 81% to 97% (16–18) in detecting intestinal obstruction, making it a highly effective tool, particularly in early-stage cases. . When evaluating an umbilical hernia, ultrasound can also detect key signs of incarceration(19).

The discussion regarding the sensitivity of ultrasound compared to abdominal radiography revolves mainly around its ability to detect early and dynamic changes that may be missed on radiographs. However, it is important to acknowledge that ultrasound is highly operator-dependent(20), and its effectiveness relies on the experience and training of the examiner. This factor may limit its application in settings where professionals lack specific training in diagnostic imaging. Although manual reduction is often used as a quick way to relieve symptoms in emergency situations, it's not a definitive solution. The recurrence rate of hernias after manual reduction is quite high — around 75%(21). However, in many cases, emergency departments are under significant pressure and it's not always easy to get immediate access to an operating room. Because of this, manual reduction becomes a necessary temporary measure, but surgery remains the definitive treatment to prevent future recurrences.

Conclusion

The initial concerns raised during basic emergency service assessment were later confirmed at the central hospital, highlighting the importance of early imaging. While CT remains the gold standard for diagnosing intestinal obstruction and incarcerated umbilical hernias, ultrasound plays a crucial role when CT is not available. It provides valuable clinical information and helps ensure that patients are referred to the right specialists based on clear imaging evidence.

Using both abdominal X-rays and point-of-care ultrasound offers a more thorough and reliable way to diagnose intestinal obstruction and assess umbilical hernias. The choice of imaging should depend on available resources, the experience of healthcare professionals, and the urgency of the case, always aiming for the safest and most effective care for the patient.

Ethics Statement

All examinations in this study were requested by the attending physician, either in the Basic Emergency Service or during outpatient follow-up. No personal or institutional data was collected, ensuring full compliance with general data protection regulations. The patient received information about the study's purpose and gave written informed consent to participate. The study was approved by the Ethics Committee of the Local Health Unit of Algarve under the protocol number 058/2025. The main goal was to highlight the practicality and effectiveness of the screening ultrasound technique, particularly in remote settings. The research adhered to ethical guidelines for scientific studies, including the principles outlined in the Helsinki Declaration and applicable national data protection laws.

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Conflict of Interest

The authors declare no conflict of interest.

Referências / References

1. Jackson P, Cruz MV. Intestinal obstruction: Evaluation and management. *Am Fam Physician* [Internet]. 2018;98(6):362–7. Available from: <https://pubmed.ncbi.nlm.nih.gov/30215917/>
2. Long B, Robertson J, Koyfman A. Emergency Medicine Evaluation and Management of Small Bowel Obstruction: Evidence-Based Recommendations. *J Emerg Med* [Internet]. 2019;56(2):166–76. Available from: <https://doi.org/10.1016/j.jemermed.2018.10.024>
3. Schick MA, Kashyap S, Collier SA MM. Small Bowel Obstruction. *StatPearls* [Internet] [Internet]. 2025;1–23. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK448079/>
4. Khan MAB, Abu-Zidan FM. Point-of-care ultrasound for the acute abdomen in the primary health care. *Turkish J Emerg Med* [Internet]. 2020;20(1):1–11. Available from: <https://turkjemergmed.com/full-text/705>
5. Hefny AF, Corr P, Abu-Zidan FM. The role of ultrasound in the management of intestinal obstruction. *J Emergencies, Trauma Shock* [Internet]. 2012;5(1):84–6. Available from: <https://pmc.ncbi.nlm.nih.gov/articles/PMC3299163/>
6. Kehrl T, Wilson C. Sonoguide Home. *Ultrasound Guid Emerg Physicians* [Internet]. 2020; Available from: <https://www.acep.org/sonoguide/advanced/gi---bowel-obstruction>
7. Volz N, Bogaert K RJ. US Probe: Ultrasound for Small Bowel Obstruction NOV. *emdocs.net/us-probe* [Internet]. 2017;5(1):1–8. Available from: <http://www.emdocs.net/us-probe-ultrasound-for-small-bowel-obstruction/>
8. Tamburrini S, Serra N, Lugarà M, Mercogliano G, Liguori C, Toro G, et al. Ultrasound signs in the diagnosis and staging of small bowel obstruction. *Diagnostics* [Internet]. 2020;10(5):1–12. Available from: <https://pubmed.ncbi.nlm.nih.gov/32375244/>
9. Rosano N, Gallo L, Mercogliano G, Quassone P, Picascia O, Catalano M, et al. Ultrasound of small bowel obstruction: A pictorial review. *Diagnostics* [Internet]. 2021;11(4):1–13. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8065936/>
10. Kaiyasah H. Strangulated para-umbilical hernia (ultrasound). *radiopaedia.org*. 2019;11(1):1–14.
11. Jamadar DA, Jacobson JA, Morag Y, Girish G, Dong Q, Al-Hawary M, et al. Characteristic locations of inguinal region and anterior abdominal wall hernias: Sonographic appearances and identification of clinical pitfalls. *Am J Roentgenol* [Internet]. 2007;188(5):1356–64. Available from: <https://www.ajronline.org/doi/10.2214/AJR.06.0638>
12. Savicke AM, Levine D. Dynamic Ultrasound of Hernias of the Groin and Anterior Abdominal Wall. *Diagnostic Ultrasound, 2-Volume Set, 6th Ed* [Internet]. 2023;I(3):545–81. Available from: https://journals.lww.com/ultrasound-quarterly/citation/2010/09000/dynamic_ultrasound_of_hernias_of_the_groin_and.4.aspx
13. Shrake PD, D K Rex, J C Lappas DDM. Radiographic evaluation of suspected small bowel obstruction. :1992631. Available from: <https://pubmed.ncbi.nlm.nih.gov/1992631/>
14. Nicolaou S, Kai B, Ho S, Su J, Ahamed K. Imaging of acute small-bowel obstruction. *Am J Roentgenol* [Internet]. 2005;185(4):1036–44. Available from: <https://www.ajronline.org/doi/10.2214/AJR.04.0815>
15. Maglinte DDT, Heitkamp DE, Howard TJ, Kelvin FM, Lappas JC. Current concepts in imaging of small bowel obstruction. *Radiol Clin North Am*. 2003;41(2):263–83.
16. Tamburrini S, Lugarà M, Iaselli F, Saturnino PP, Liguori C, Carbone R, et al. Diagnostic accuracy of ultrasound in the diagnosis of small bowel obstruction. *Diagnostics*. 2019;9(3):1–9.
17. Jang TB, Schindler D, Kaji AH. Bedside ultrasonography for the detection of small bowel obstruction in the emergency department. *Emerg Med J*. 2011;28(8):676–8.
18. Ünlüer EE, Yavaş Ö, Eroğlu O, Yılmaz C, Akarca FK. Ultrasonography by emergency medicine and radiology residents for the diagnosis of small bowel obstruction. *Eur J Emerg Med*. 2010;17(5):260–4.

19. Rettenbacher T, Hollerweger A, Macheiner P, Gritzmann N, Gotwald T, Frass R, et al. Abdominal wall hernias: Cross-sectional imaging signs of incarceration determined with sonography. *Am J Roentgenol* [Internet]. 2001;177(5):1061–6. Available from: <https://ajronline.org/doi/10.2214/ajr.177.5.1771061>
20. Clevert DA, Nyhsen C, Ricci P, Sidhu PS, Tziakouri C, Radziņa M, et al. Position statement and best practice recommendations on the imaging use of ultrasound from the European Society of Radiology ultrasound subcommittee. *Insights Imaging* [Internet]. 2020;11(1). Available from: <https://insightsimaging.springeropen.com/articles/10.1186/s13244-020-00919-x>
21. Yehuda Hershkovitz 1 2, Yaniv Zager 3 2, Batia Segal 3 2 YK 3 2. Manual Closed Reduction of Incarcerated Hernia: Is It Safe in the Emergency Department? 2015;(5596):6. Available from: <https://pubmed.ncbi.nlm.nih.gov/35077039/>

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