

## Ileus in Adults

Pathogenesis, Investigation and Treatment

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### Failure to Use Ultrasound Is a Glaring Shortcoming

The diagnosis section of this article cannot go uncontested (1). The authors attach only minor importance to ultrasound. The reason given for this is that displaced gases would quickly limit its utility. This is untrue. Ultrasound must be performed from below in suspected ileus; rising gases then cause no problem. If this advice is heeded, ultrasound is a definitive diagnostic method in many situations (2, 3). A major advantage of it is evaluation of motility and perfusion; contrast agents can be used if needed. The details of ultrasound diagnosis of ileus can be found in textbooks on the subject. Current guidelines establish ultrasound as the first-line method of diagnosis of diverticulitis (4).

X-ray of the whole abdomen is obsolete as a result of its low specificity and sensitivity, for the reasons stated in the article, and should not be performed.

Failure to use diagnostic ultrasound is a glaring shortcoming and should give the authors cause for critical scrutiny of training and outcomes of teaching. The 2011 German X-ray regulation (Section 23) (1) stipulates that X-ray is only to be used if there is an indication that justifies it and that other methods with the same healthcare benefit and no [...] radiation exposure should be considered. Thus there are even legal reasons for requiring expertise in ultrasound for intestinal diagnostics. Simply repeating the persistent—and false—premise that ultrasound diagnosis is particularly subjective and dependent on the person who performs it gets us nowhere.

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#### References

- Vilz TO, Stoffels B, Straßburg C, Schild HH, Kalff JC: Ileus in adults—pathogenesis, investigation and treatment. *Dtsch Arztebl Int* 2017; 114: 508–18.
- Taylor, Mark R: Adult small bowel obstruction. *Acad Emerg Med* 2013; 20: 528–44.
- Nylund K, Maconi G, Hollerweger A, et al.: EFSUMB recommendations and guidelines for gastrointestinal ultrasound. *Ultraschall Med* 2017; 38: e1–15.
- AWMF: S2k Leitlinie Divertikelkrankheit / Divertikulitis. [www.awmf.org/uploads/tx\\_szleitlinien/021-0201\\_S3\\_Divertikelkrankheit\\_Divertikulus\\_2014-05.pdf](http://www.awmf.org/uploads/tx_szleitlinien/021-0201_S3_Divertikelkrankheit_Divertikulus_2014-05.pdf) (last accessed on 30. October 2017)

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### Experience and a Certain Amount of Time Are Required

Abdominal complaints of unclear etiology pose a great challenge in the care of both inpatients and outpatients, not only medically

but also financially. Swift diagnosis of the underlying pathology is equally important to patients and the healthcare system.

The diagnostic power of ultrasound imaging of the gastrointestinal tract has significantly increased in recent years, thanks to improvements in the technology. Unlike a paper on a disease pattern, in routine clinical practice diagnosis comes at the end of a process, not the beginning; ultrasound can make a substantial contribution to this process and often provides prompt findings that indicate the direction treatment should take (1).

For example, incarcerated external hernias are not always detected on clinical examination. Ultrasound can be used to evaluate the fullness and motility of the stomach, small intestine, and large intestine accurately (2). In many cases in which ileus is clinically suspected, it can be ruled out using ultrasound; this has a major effect on the course of the patient's treatment. In addition, ultrasound examination often reveals important evidence for differential diagnoses such as coprostasis. As a rule, ultrasound can accurately determine the diameter of intestinal segments and the thickness of the intestinal wall. It is therefore suitable for monitoring various pathologies.

Ultrasound examination of the gastrointestinal tract requires experience and a certain amount of time but can provide reliable findings and contribute to radiation hygiene. This article and the cited reference from 1999 reflect its value is to only a limited extent (3). It is worth familiarizing oneself with ultrasound diagnostics for the gastrointestinal tract in more detail.

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#### References

- Schuler A, Karbe T, Vasilakis D, et al.: Primär Ultraschall als Bildgebung in der Notaufnahme. Endergebnisse der PRIMUS-Studie (DEGUM Multicenter-Studie). *Ultraschall in Med* 2012; 33: 901.
- Hollerweger A, Wüstner M, Dirks K: Bowel obstruction: sonographic evaluation. *Ultraschall in Med* 2015; 36: 216–38.
- Vilz TO, Stoffels B, Straßburg C, Schild HH, Kalff JC: Ileus in adults—pathogenesis, investigation and treatment. *Dtsch Arztebl Int* 2017; 114: 508–18.

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### Ultrasound First

The following is a direct quotation concerning ultrasound from the cme paper on ileus: “It plays a less important role in the evaluation of ileus, as its utility is limited by artifacts from air in the distended abdomen.” This is incorrect: many publications rate ultrasound (US) and computed tomography (CT) imaging as equally good (2).

The only available meta-analysis (3) clearly finds that plain abdominal radiograph is inferior, so it should no longer be relied upon. The sensitivity and specificity for CT were 87% (83 to 90) and 81% (74 to 87) respectively. The corresponding figures for US were 97% (92 to 99) and 90% (84 to 95) respectively.

This finding is unsurprising, as the criteria underlying US and CT findings are almost identical (4). US requires no orally or anally administered contrast medium and is the only method able to visualize peristalsis in vivo. This means that US can provide a diagnosis several hours earlier than CT and can detect the causes of intestinal occlusion very effectively during this phase, at this time largely unaffected by intestinal gas. This is more difficult only in advanced ileus, due to increasing gas formation. The diagnostic potential of CT using intravenous contrast is increasingly matched by sensitive color Doppler and intravenous contrast-enhanced ultrasound without contraindications.

US and CT are the methods of choice for the diagnosis of ileus. Ultrasound should be used as the first-line method, as it is a repeatable at any time, can be performed at the patient's bedside, and is free of radiation. In addition, primary X-ray is not indicated on the strength of an "indication that justifies it."

The lack of importance attached to US for ileus in this publication (1) may be a consequence of both an insufficient literature research and a lack of personal experience of such examinations on the part of the authors.

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#### References

1. Vilz TO, Stoffels B, Straßburg C, Schild HH, Kalf J: Ileus in adults—pathogenesis, investigation and treatment. *Dtsch Arztebl Int* 2017; 114: 508–18.
2. Suri S, Gupta S, Sudhakar PJ, Venkataramu NK, Sood B, Wig JD: Comparative evaluation of plain films, ultrasound and CT in the diagnosis of intestinal obstruction. *Acta Radiol* 1999; 40: 422–8.
3. Taylor MR, Lalani M: Adult small bowel obstruction. *Acad Emerg Med* 2013; 20: 528–44.
4. Hollerweger A, Wüstner M, Dirks K: Bowel obstruction: sonographic evaluation. *Ultraschall in Med* 2015; 36: 216–38.

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### Oral Contrast is no Longer Needed

The authors attribute only a secondary role to abdominal ultrasound in the diagnosis of ileus (1). This is asserted on the basis of a study that reports sensitivity and specificity of 83% and 100% respectively for ultrasound. A recent meta-analysis found a sensitivity of 92% and a specificity of 96% for ultrasound, based on a total of 11 studies (2). This shows that ultrasound is a very good first-line method for this issue and one that can point the way for further diagnosis and treatment immediately after history and clinical examination, within a few minutes. Finally, we come across many patients in whom mechanical ileus is only one of several differential diagnoses, but for whom ultrasound can nevertheless provide swift clarification. Naturally, computed tomography (CT) is the gold standard that can diagnose the site and cause of ileus (usually better than ultrasound). However, for a number of our patients the cause of ileus is already known thanks to prior history and diagnosis (relapsing ileus or subileus) and does not need to be confirmed by computed tomography.

However, the statement that prior oral contrast is needed is outdated. The literature by Branco et al. referred to on this subject concerns the value of oral contrast to evaluate intestinal transit

(Gastrografin tracing). Oral contrast does not increase the diagnostic value of CT; this has been shown several times very recently (3, 4). It merely prolongs diagnosis, as the passage of contrast medium is substantially delayed in these patients. It also hinders the evaluation of mural uptake of contrast medium, which does, as explained, play a part in the Schwenter risk score.

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#### References

1. Vilz TO, Stoffels B, Straßburg C, Schild HH, Kalf J: Ileus in adults—pathogenesis, investigation and treatment. *Dtsch Arztebl Int* 2017; 114: 508–18.
2. Gottlieb M, Peksa GD, Pandurangadu AV, et al.: Utilization of ultrasound for the evaluation of small bowel obstruction: a systematic review and meta-analysis. *Am J Emerg Med* 2017; 17: 30635–6.
3. Kammerer S, Höink AJ, Wessling J, et al.: Abdominal and pelvic CT: is positive enteric contrast still necessary? Results of a retrospective observational study. *Eur Radio* 2015; 25: 669–78.
4. Schuur JD, Chu G, Sucov A: Effect of oral contrast for abdominal computed tomography on emergency department length of stay. *Emerg Radiol* 2010; 17: 267–73.

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### Critical Scrutiny Needed

The following observations should be made in relation to this article regarding opiate-induced constipation and the recommendation for oxycodone/naloxone therapy for treatment-refractory or opiate-induced ileus (1):

- The anticonstipation effect of oxycodone/naloxone seems to be of little or no clinical significance.
- The reference cited for this recommendation in the article stated above is based on the S3 guideline, which gives a level Ib recommendation (2).
- However, study availability for this drug combination is known to be poor, and the guideline refers to only one observational study with no control. Not only did this study include only a small number (15) of patients; it also (like other studies on the combination of oxycodone/naloxone) lists employees of the drug manufacturer, Mundipharma (M. Hopp, G. Mundin), among its authors (3).  
In other studies on oxycodone/naloxone in patients without tumors, patients who were so constipated that they were unable to cope with the reduced study protocol—in other words, the most constipated patients—were excluded from the study. The authors employed by Mundipharma were involved here, too (4).
- The discrepancies between clinical effect and a supposedly level Ib recommendation thus seem to be caused by insufficient research or objectivity on the part of the guideline team. Guideline recommendations should therefore be critically scrutinized, not simply accepted wholesale.

Where appropriate, a positive trend in OIC can be expected with oxycodone/naloxone; however, the recommendation for use in treatment-refractory cases of opiate-induced ileus stated in the article seems hard to comprehend.

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This finding is unsurprising, as the criteria underlying US and CT findings are almost identical (4). US requires no orally or anally administered contrast medium and is the only method able to visualize peristalsis in vivo. This means that US can provide a diagnosis several hours earlier than CT and can detect the causes of intestinal occlusion very effectively during this phase, at this time largely unaffected by intestinal gas. This is more difficult only in advanced ileus, due to increasing gas formation. The diagnostic potential of CT using intravenous contrast is increasingly matched by sensitive color Doppler and intravenous contrast-enhanced ultrasound without contraindications.

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#### References

1. Vilz TO, Stoffels B, Straßburg C, Schild HH, Kalf J: Ileus in adults—pathogenesis, investigation and treatment. *Dtsch Arztebl Int* 2017; 114: 508–18.
2. Suri S, Gupta S, Sudhakar PJ, Venkataramu NK, Sood B, Wig JD: Comparative evaluation of plain films, ultrasound and CT in the diagnosis of intestinal obstruction. *Acta Radiol* 1999; 40: 422–8.
3. Taylor MR, Lalani M: Adult small bowel obstruction. *Acad Emerg Med* 2013; 20: 528–44.
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#### References

1. Vilz TO, Stoffels B, Straßburg C, Schild HH, Kalf J: Ileus in adults—pathogenesis, investigation and treatment. *Dtsch Arztebl Int* 2017; 114: 508–18.
2. Gottlieb M, Peksa GD, Pandurangadu AV, et al.: Utilization of ultrasound for the evaluation of small bowel obstruction: a systematic review and meta-analysis. *Am J Emerg Med* 2017; 17: 30635–6.
3. Kammerer S, Höink AJ, Wessling J, et al.: Abdominal and pelvic CT: is positive enteric contrast still necessary? Results of a retrospective observational study. *Eur Radio* 2015; 25: 669–78.
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**References**

1. Vilz TO, Stoffels B, Straßburg C, Schild HH, Kalf J: Ileus in adults—pathogenesis, investigation and treatment. *Dtsch Arztebl Int* 2017; 114: 508–18.
2. AWMF: S2k Leitlinie Chronische Obstipation beim Erwachsenen. [www.awmf.org/uploads/tx\\_szleitlinien/021-019I\\_S2k\\_Chronische\\_Obstipation\\_2013-06\\_01.pdf](http://www.awmf.org/uploads/tx_szleitlinien/021-019I_S2k_Chronische_Obstipation_2013-06_01.pdf) [last accessed on 20 June 2017]
3. Smith K, Hopp M, Mundin G, et al.: Naloxone as part of a prolonged release oxycodone/naloxone combination reduces oxycodone-induced slowing of gastrointestinal transit in healthy volunteers. *Expert Opin Investig Drugs* 2011; 20: 427–39.
4. Simpson K, Leyendecker P, Hopp M, et al.: Fixed-ratio combination oxycodone/naloxone compared with oxycodone alone for the relief of opioid-induced constipation in moderate-to-severe noncancer pain. *Curr Med Res Opin* 2008; 24: 3503–12.

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Dr. Nickel has received conference participation fees and reimbursement of travel and accommodation costs from Mundipharma.

**In Reply:**

Our cme article *Ileus in Adults: Pathogenesis, investigation and treatment* has stirred up some controversy. This has come as no great surprise to us (1): interestingly, treatment of mechanical ileus in the context of malignant stenosis in cancer of the lower or middle third of the rectum has not been discussed. This is because a three-step procedure (insertion of double-barrel stoma at the ileus, neoadjuvant therapy, rectal resection preserving the protective stoma, removal of stoma at end of treatment) may be necessary depending on tumor stage, in addition to the one- or two-step procedures mentioned in the article. For the sake of completeness, this should not go unmentioned.

In his comment on the treatment and prophylaxis of opioid-induced ileus, Dr. Nickel states that the use of the drug combination oxycodone + naloxone for manifest opioid-induced ileus has no positive effect. We agree, there are no relevant studies. Regarding use to prevent constipation, the data is indeed controversial. Therefore the drug can be used, but it is true that no clear recommendation can be made.

Discussion is most needed regarding radiological diagnostics and the value of ultrasound in confirming a diagnosis of mechanical ileus. It should be noted at the outset that our article did not concern patients with “abdominal complaints of unclear etiology and coprostasis,” as often seen in primary care practices or for “semielective” clarification in hospitals. Rather, it concerned often critically ill patients with severe clinical symptoms up to and including the complete disease pattern of acute abdomen. In the German-speaking world there are no guidelines for this issue (the quotation in Dr. Lang’s discussion piece concerns diagnosis of sigmoid diverticulitis, not mechanical ileus); when writing this article, we therefore referred to the recommendations from the English-speaking world ([www.uptodate.com](http://www.uptodate.com)). In these the wording regarding the value of computed tomography and ultrasound for mechanical ileus is clear. A reference is made to the only pros-

pective study that directly compared computed tomography and ultrasound; this found computed tomography to be significantly superior (2).

We do agree with the authors of the discussion pieces that ultrasound can be unreservedly recommended for the diagnosis of abdominal pain of unclear etiology. It is also, of course, the first-line method for children and pregnant women. We therefore entirely agree with PD Dr. Seitz’s call for improved ultrasound training.

However, where mechanical ileus with complications is suspected on the basis of thorough history, physical examination, and elevated signs of infection, we believe that ultrasound is insufficient. The question of inexperienced examiners cannot be ignored, particularly regarding length of service, especially as the consequences are so far-reaching (surgery versus conservative therapy). In addition, for patients with manifest ileus, acute abdomen is not unusual, in addition to severe tympanites. In our experience, any attempt to expel intra-abdominal gases via compression of the abdominal wall or patient positioning is not tolerated by patients. Evaluation of peristalsis, often put forward as an argument “for ultrasound and against computed tomography,” is not of use in manifest ileus, as there is complete intestinal paralysis due to bacterial translocation. Computed tomography imaging, in contrast, detects the cause of obstruction as well as its precise location and potential complications. Furthermore, computed tomography can be immediately evaluated both remotely and by the operating surgeon and can be consulted again at the operating table if findings are unclear. Also worthy of mention is the advantage of an orally administered contrast medium, which has been shown to be associated with shorter hospital stays and lower surgical exploration rates (3, 4).

In conclusion, we would like to thank our readers for the highly interesting specialized discussion. All the discussion pieces have further convinced us that the development of an interdisciplinary guideline for functional and mechanical ileus is long overdue in an era of evidence-based medicine.

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**References**

1. Vilz TO, Stoffels B, Straßburg C, Schild HH, Kalf J: Ileus in adults—pathogenesis, investigation and treatment. *Dtsch Arztebl Int* 2017; 114: 508–18.
2. Suri S, Gupta S, Sudhakar PJ, et al.: Comparative evaluation of plain films, ultrasound and CT in the diagnosis of intestinal obstruction. *Acta Radiol* 1999; 40: 422–8.
3. Abbas S, Bissett IP, Parry BR: Oral water soluble contrast for the management of adhesive small bowel obstruction. *Cochrane Database Syst Rev* 2007: CD004651.
4. Zielinski MD, Haddad NN, Cullinane DC, et al.: Multi-institutional, prospective, observational study comparing the gastrografin challenge versus standard treatment in adhesive small bowel obstruction. *J Trauma Acute Care Surg* 2017; 83: 47–54.

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