AZIENDA OSPEDALIERO-UNIVERSITARIA SANT'ANDREA

SECONDA FACOLTÀ DI MEDICINA E CHIRURGIA

SAPIENZA UNIVERSITÀ DI ROMA

CASO CLINICO

Meeting scuola di specializzazione in Radiodiagnostica

10.09.2021

Marino Antonio

Donna, 86 anni

APP

- stipsi ostinata
- vomito caffeano
- dolore addominale diffuso
- Recente accesso in PS presso altro nosocomio; pregressa RX diretta addome: «non si documentano livelli idro-aerei né dilatazioni patologiche a carico delle anse del piccolo o grande intestino»

EO

- addome globoso, trattabile, dolorabilità diffusa sui quadranti centrali, Blumberg -, peristalsi conservata.

APR

- DM, FA parossistica, cardiopatia ischemica cronica (triplice BAC), IRC, tiroidectomia per gozzo

ESAMI EMATOCHIMICI:

- WBC: 15000/mm3
- Neutrofili: 91,9%
- Linfociti: 2,9%
- PCR: 15,53 mg/dl
- Glicemia: 136 mg/dl
- Creatinina: 1,32 mg/dl
- Azotemia: 66 mg/dl
- Na+: 136 mmol/L
- K+: 3,8 mmol/L
- Ca++: 7,3 mg/dl
- Fosforo: 4,9 mg/dl
- Troponina I (alta sensibilità): 28,8 pg/ml
- BNP: 476,6 pg/ml
- Mioglobina: 287 ng/ml
- LDH: 307 U/L
- D-dimero: 3429 ng/ml

ACR Appropriateness Criteria® Acute Nonlocalized Abdominal Pain

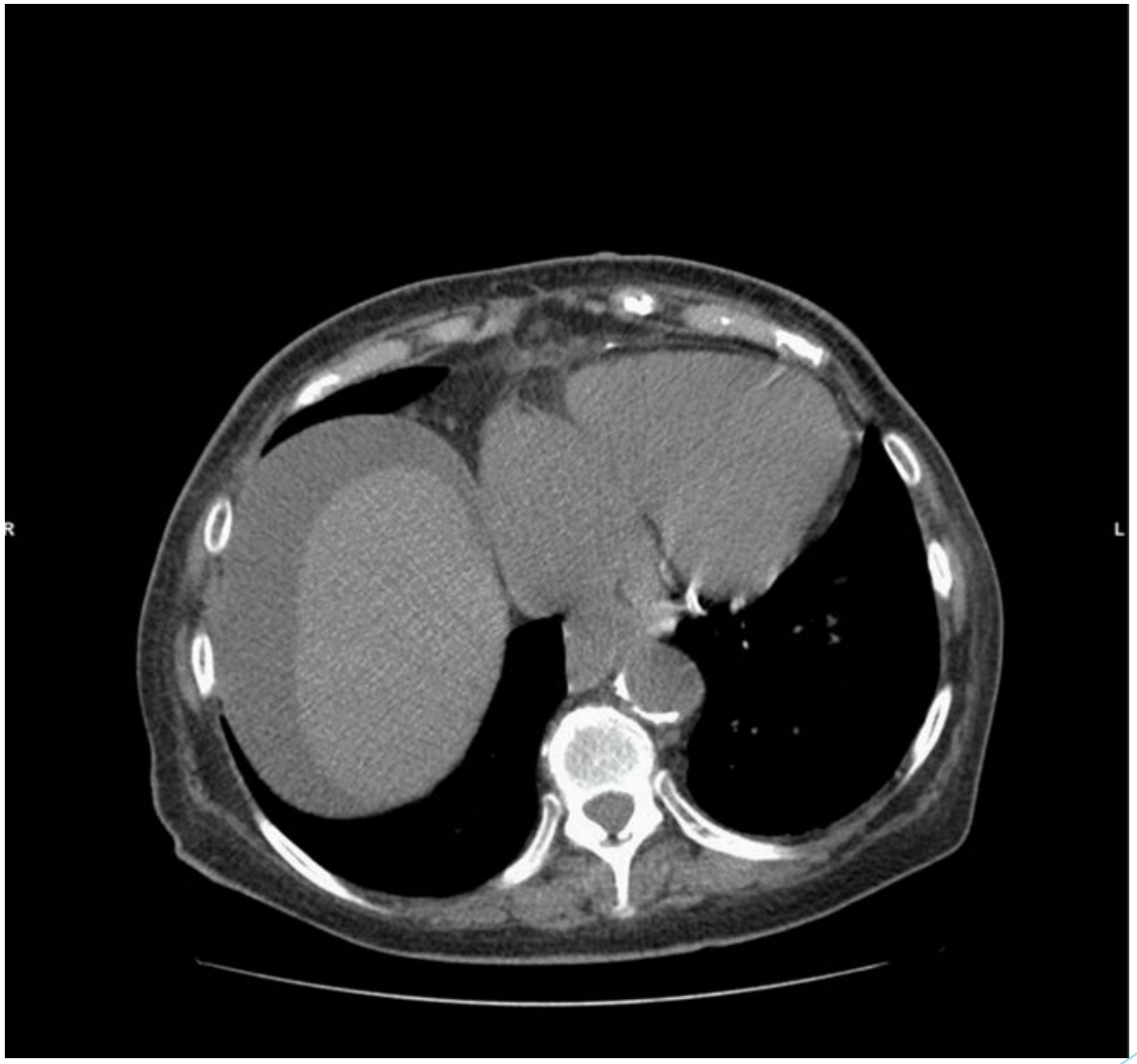
Variant 1. Acute nonlocalized abdominal pain and fever. No recent surgery. Initial imaging

Procedure	Appropriateness Category	Relative Radiation Level
CT abdomen and pelvis with IV contrast	Usually Appropriate	☢☢☢
MRI abdomen and pelvis without and with IV contrast	May Be Appropriate	○
US abdomen	May Be Appropriate	○
CT abdomen and pelvis without IV contrast	May Be Appropriate	☢☢☢
MRI abdomen and pelvis without IV contrast	May Be Appropriate	○
CT abdomen and pelvis without and with IV contrast	May Be Appropriate	☢☢☢☢
Radiography abdomen	May Be Appropriate	☢☢
FDG-PET/CT skull base to mid-thigh	Usually Not Appropriate	☢☢☢☢
In-111 WBC scan abdomen and pelvis	Usually Not Appropriate	☢☢☢☢
Tc-99m cholescintigraphy	Usually Not Appropriate	☢☢
Tc-99m WBC scan abdomen and pelvis	Usually Not Appropriate	☢☢☢☢
Fluoroscopy contrast enema	Usually Not Appropriate	☢☢☢
Fluoroscopy upper GI series with small bowel follow-through	Usually Not Appropriate	☢☢☢

ACR Appropriateness Criteria ® Acute Nonlocalized Abdominal Pain. **Expert Panel on Gastrointestinal Imaging:, Scheirey CD, Fowler KJ, Therrien JA, Kim DH, Al-Refaie WB, Camacho MA, Cash BD, Chang KJ, Garcia EM, Kambadakone AR, Lambert DL, Levy AD, Marin D, Moreno C, Noto RB, Peterson CM, Smith MP, Weinstein S, Carucci LR.** J Am Coll Radiol, 2018 Nov, 11S: 217-231.

Tecnica di acquisizione

- Scansioni basali + fase arteriosa (30-35 sec dopo iniezione di mdc) + fase portale (70 sec dopo iniezione di mdc)
- Flusso: 3-5 ml/sec
- Strato sottile (almeno 1,25mm)
- Ricostruzioni multiplanari


R
L

Questions to answer for suspected small bowel obstruction (SBO)

1) Is bowel obstruction present?

2) Where is the transition point?

3) Are there signs of complications such as ischemia, necrosis, or perforation?

4) What is the cause of the obstruction?

Is SBO present?
Where is the transition point?

Diagnostic criteria for SBO

Major criteria (necessary for diagnosis)	Dilated loops of small bowel ≥3 cm with normal-sized colon (<6 cm) Transition point from dilated to nondilated bowel within the small bowel
Minor criteria (not necessary but useful for diagnosis)	Air-fluid levels Collapsed colon Small bowel feces sign

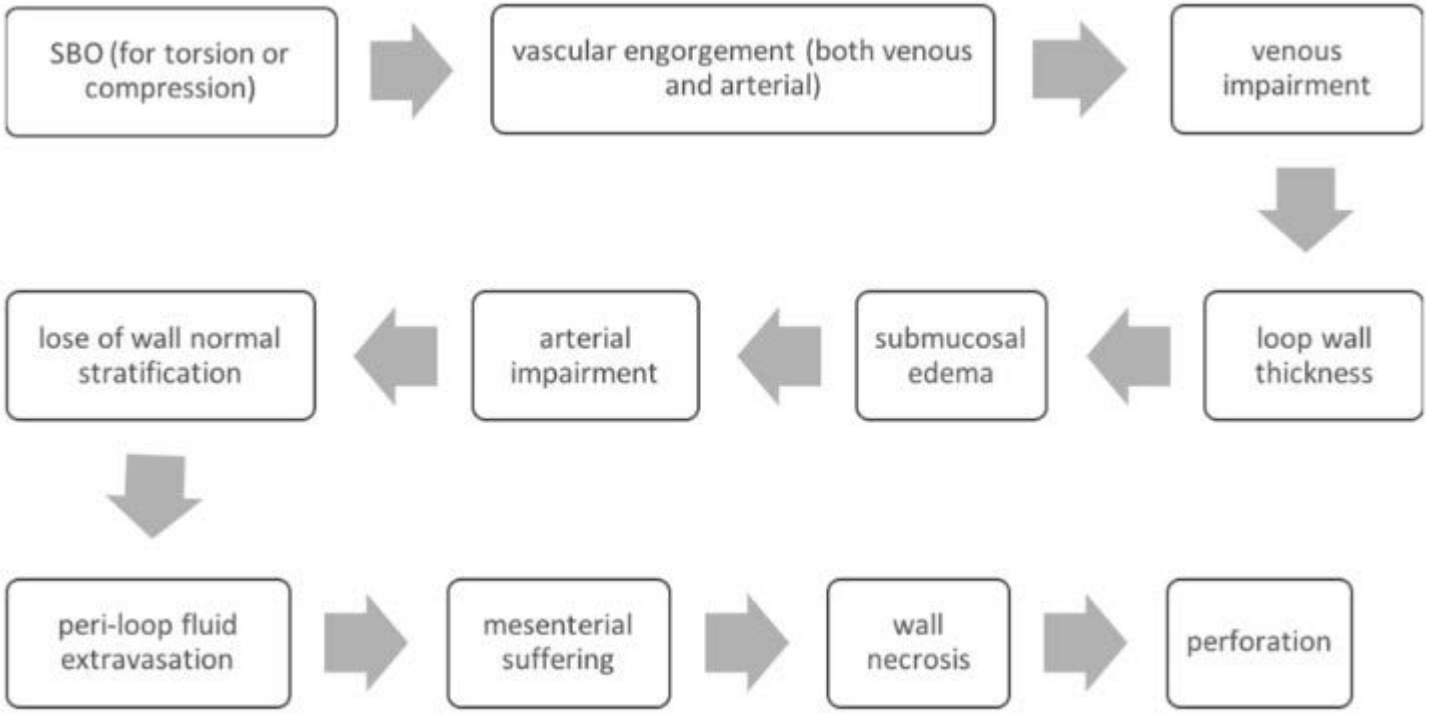
Differential diagnosis for SBO

Differential Diagnosis	Distinguishing Features
Paralytic ileus	Dilated loops of bowel without a transition point
Large bowel obstruction	Transition point within the colon

Bird beak sign

Small Bowel Obstruction and Ischemia. Diamond M, Lee J, LeBedis CA. Radiol Clin North Am, 2019 Jul, 57(4): 689-703.

Are there signs of complications?

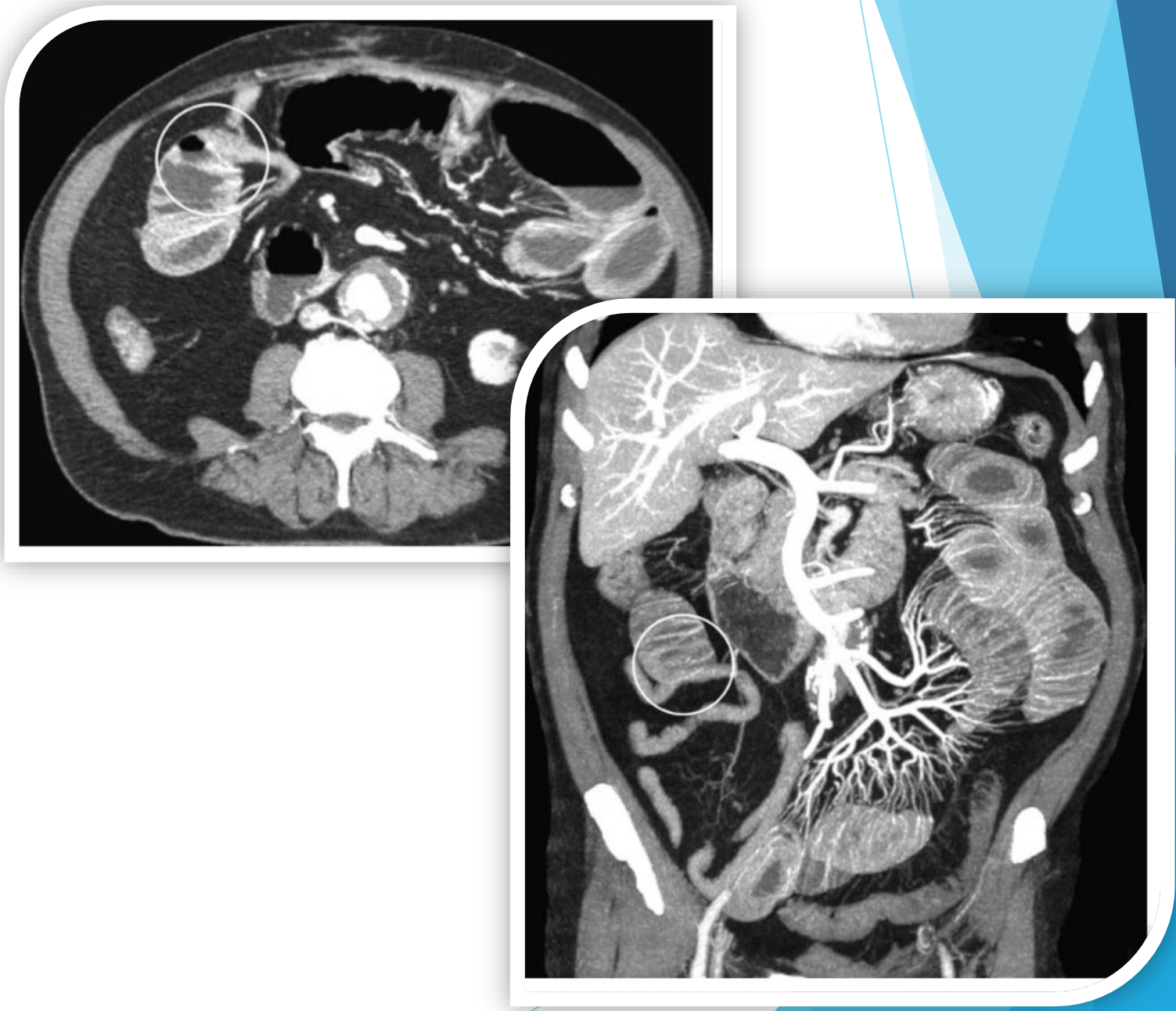


The scheme represents all progressive events from SBO conduct to wall loop necrosis and perforation if there is no obstruction resolution

SBO semplice

Quadro d’ansa

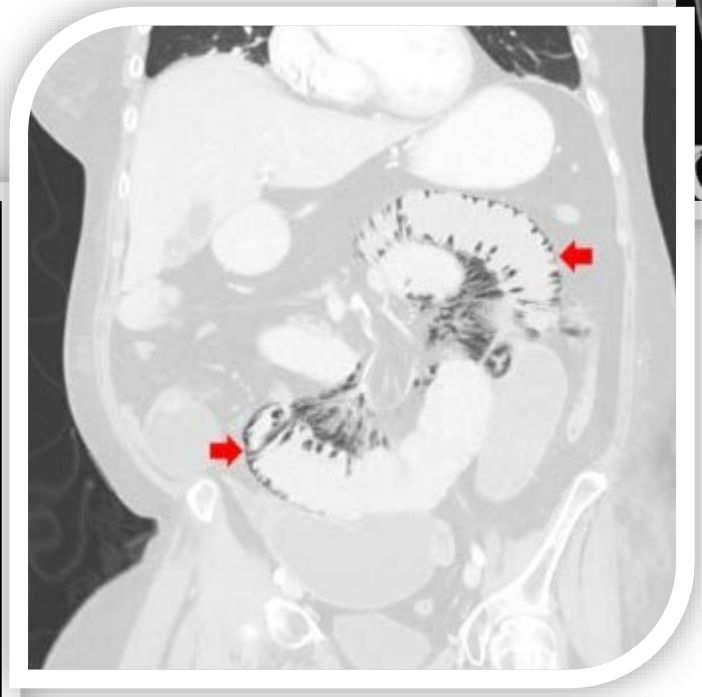
- Mesentere normo-conservato, normo-trasparente
- Vascolarizzazione mesenterica normo-rappresentata, integra
- Assenza di liquido peritoneale
- Anse distese, con pareti regolari e sottili a CE omogeneo



SBO complicata da strozzamento-strangolamento

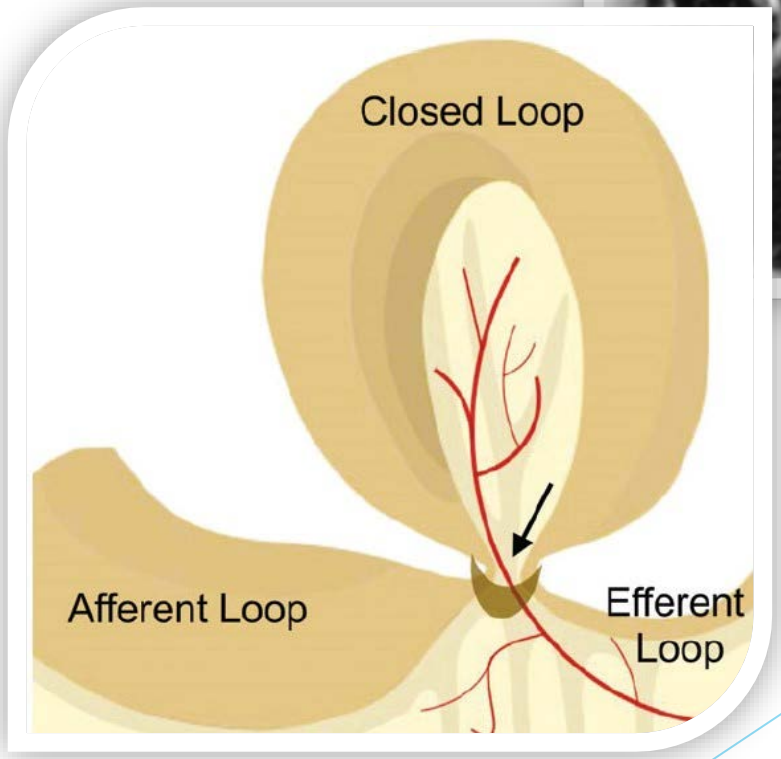
Segni d'ischemia:

- Ridotto enhancement parietale
- Ispessimento parietale (>3mm)
- Imbibizione edematosa mesenterica
- Congestione dei vasi mesenterici
- Emorragia intraluminale
- Pneumatosi intestinale
- Gas nel sistema venoso mesenterico o aeroportia
- Aria libera endoaddominale (perforazione)

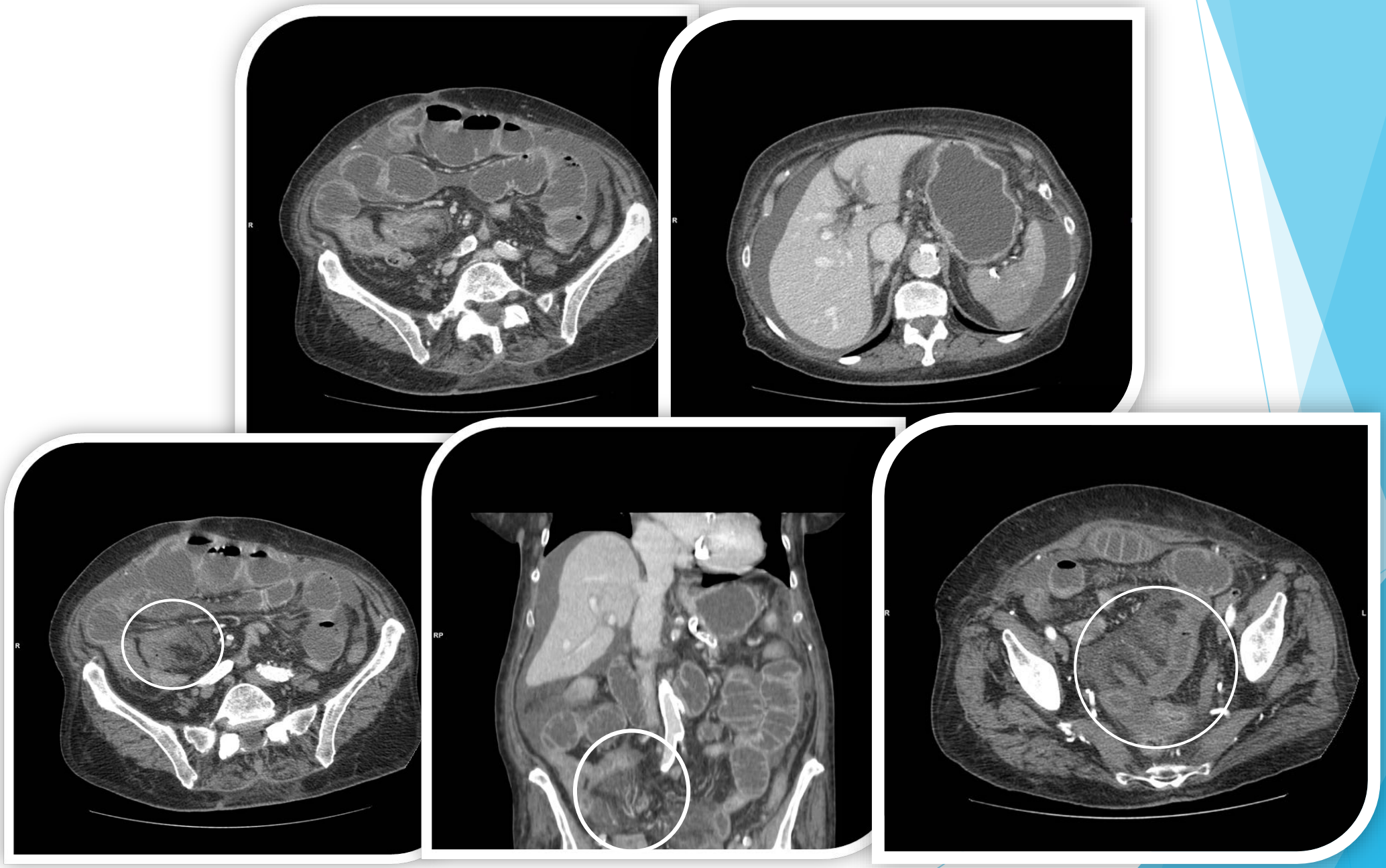


Closed-loop SBO

- Ansa ostruita in punti adiacenti
- Progressivo accumulo di fluidi endoluminali
- Elevato rischio di ischemia, necrosi, perforazione



Are there signs of complications?



What is the cause of the obstruction?

Causes of SBO	
Extrinsic	Adhesions Hernias (internal and external) Endometriosis Neoplasms (extraintestinal)
Intrinsic	Inflammatory/infectious diseases Neoplasms of the small bowel (primary and secondary) Vascular causes (mesenteric ischemia) Intramural hematoma Radiation enteritis Intussusception
Intraluminal	Gallstone ileus Bezoars Foreign bodies

Frequenza cause:

- Aderenze (49-56%)
- Ernie esterne (15-18%)
- Neoplasie (12-16%)
- Ernie interne (3%)
- Intussuscezione (2%)
- Volvolo (1-6%)
- Altre (8%)

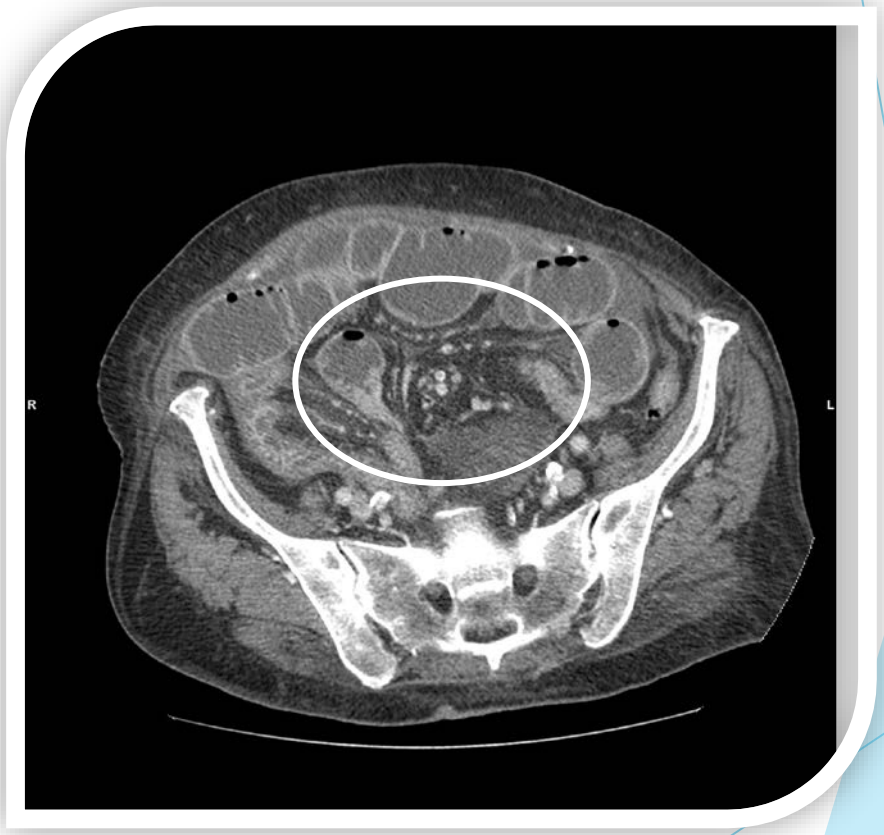
Small Bowel Obstruction and Ischemia. Diamond M, Lee J, LeBedis CA. Radiol Clin North Am, 2019 Jul, 57(4): 689-703.

What is the cause of the obstruction?

Disposizione anomala delle anse e dei vasi, che appaiono convergenti verso il fulcro torsivo:

- Configurazione a spirale: segno del vortice («whirlpool sign»)
- Vasi mesenterici stirati e ruotati

Volvolo del tenue



Intervento di laparotomia in urgenza

MATERIALE ACCETTATO:
Resezione ileare

DESCRIZIONE MACROSCOPICA:
Segmento di piccolo intestino della lunghezza di cm 50 con evidenza di soluzione di continuo a cm 5 dal margine più prossimo e sierosa diffusamente brunastra, opacata come da emorragia per un tratto di cm 30 circa.

Campionamento: 1-2) Margini di resezione 3-4) area attorno alla perforazione 5-6) prelievi verso emorragia

DIAGNOSI:
Necrosi ischemica transmurale con sierosite acuta. Margini di resezione indenni.

Key points

- La TC addomino-pelvica con mdc è la metodica di scelta in caso di sospetta occlusione intestinale

- Essa permette di:

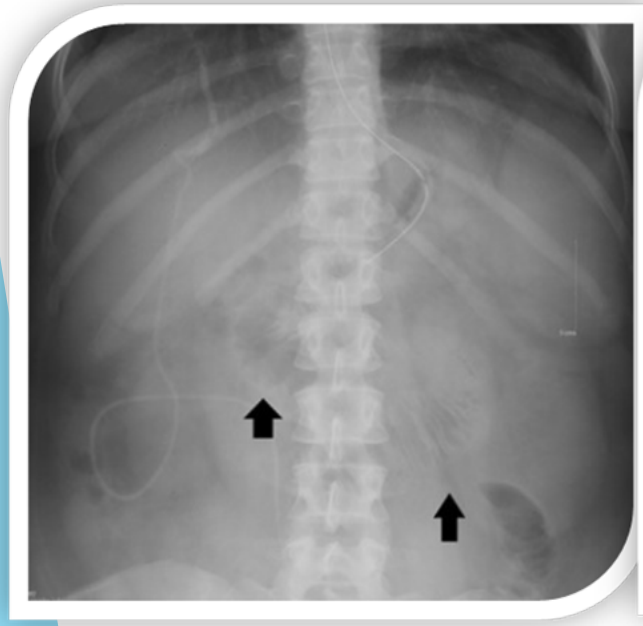
  - Confermare la diagnosi
  - Identificare il «transition point»
  - Identificare la causa dell'ostruzione
  - Valutare eventuali complicanze
  - Suggerire la corretta gestione terapeutica (chirurgica o conservativa) ed il timing di un eventuale trattamento chirurgico.

RX diretta dell'addome

- Bassa sensibilità per le ostruzioni di basso grado (>20% di falsi negativi
- Accuratezza diagnostica del 50-86%
- Limitata capacità di identificazione della causa e delle complicanze

Radiographic Signs of SBO

Type of Radiograph	Specific Signs
Supine or prone	1. Dilated gas or fluid-filled small bowel (>3 cm)
	2. Dilated stomach
	3. Small bowel dilated out of proportion to colon
	4. Stretch sign
	5. Absence of rectal gas
	6. Gasless abdomen
	7. Pseudotumor sign
Upright or left lateral decubitus	1. Multiple air fluid levels
	2. Air fluid levels longer than 2.5 cm
	3. Air fluid levels in same loop of small bowel of unequal heights
	4. String of beads sign



Stretch sign

String of pearls sign

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SPECIAL SECTION: INTESTINAL ISCHEMIA

Small bowel obstruction and intestinal ischemia: emphasizing the role of MDCT in the management decision process

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Abstract

The objective of this article is to assess the computed tomography (CT) findings of small bowel obstruction (SBO) complicated by ischemia. SBO is a frequent clinical entity characterized by high morbidity and mortality. The radiologic aim is not just to diagnose the obstruction itself but to rule out the presence of complications related to SBO. This is crucial for differentiating which patients can be safely treated non-operatively from the ones who may need an urgent surgical approach. The main complication of SBO is intestinal ischemia. In the emergency setting, CT imaging is the modality of choice for SBO because of its ability to assess the bowel wall, the supporting mesentery and peritoneal cavity all in one. On the other hand, the radiologist who documents an intestinal ischemia should think about SBO as possible cause. In this case, the main finding which helps the radiologist in the identification of SBO is the presence of multiple and packed valvulae conniventes in the dilated bowel wall and the "transition zone" that indicates the passage between compressed and decompressed small bowel, otherwise the localization of the obstruction cause. Once the site of obstruction has been recognized, the other issue is to assess the cause of obstruction, considering that the most common cause of SBO remains "unidentified" and related to intra-abdominal adhesions. After that, the following most important point is to rule out the presence of an ischemic bowel and mesenteric changes associated to SBO. CT signs of bowel ischemia include reduced or increased bowel wall enhancement, mesenteric edema or engorgement, fluid or free air in the peritoneal cavity. This condition usually leads to an urgent laparotomy and, in some cases, to a surgical resection.

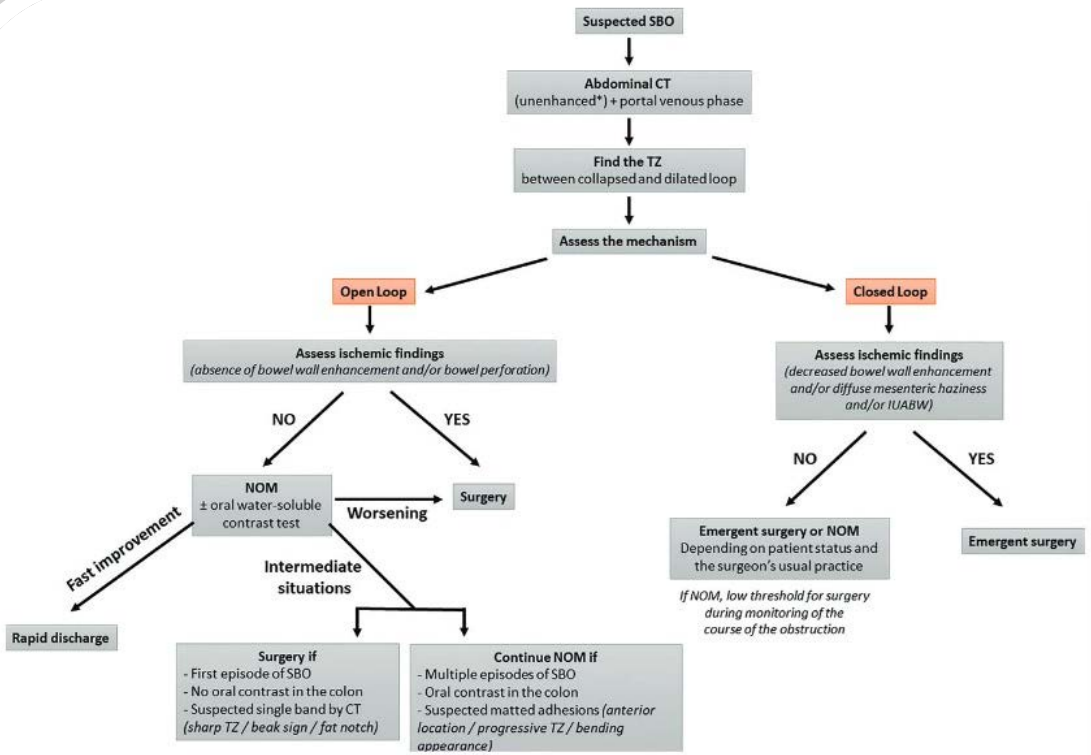

Figure 13: Algorithm for the diagnostic work-up of patients suspected of having small bowel obstruction (SBO). IUABW = increased unenhanced attenuation of the bowel wall, NOM = nonoperative management, TZ = transition zone. * = Suggested but not recommended in American College of Radiology guidelines.

Radiology

REVIEWS AND COMMENTARY • REVIEW

Adhesive Small Bowel Obstruction: Predictive Radiology to Improve Patient Management

Marc Zins, MD • Ingrid Millet, MD, PhD • Patrice Taourel, MD, PhD

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Conflicts of interest are listed at the end of this article.

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Adhesive small bowel obstruction (SBO) remains one of the leading causes of emergency room visits and is still associated with high morbidity and mortality rates. Because the management of adhesive SBO has shifted from immediate surgery to nonoperative treatment in the absence of ischemia, it is crucial to rapidly detect or predict strangulation, which requires emergent surgery. CT is now established as the best imaging technique for the initial assessment of patients suspected of having adhesive SBO. CT helps confirm the diagnosis of mechanical SBO, locate the site of obstruction, establish the cause, and detect complications. This article is a review of the role of imaging in answering specific questions to help predict the management needs of each individual patient. It includes *(a)* an update on the best CT signs for predicting ischemia and a need for bowel resection; *(b)* a discussion of the CT features that help differentiate open-loop from closed-loop obstruction and a single adhesive band from matted adhesions and how these differences can influence the management; and *(c)* a review of the main CT predictors of the success or failure of nonoperative management in adhesive SBO.

Adhesive Small Bowel Obstruction: Predictive Radiology to Improve Patient Management. Zins M, Millet I, Taourel P. Radiology, 2020 Sep, 296(3): 480-492

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