

Diagnostic Imaging Pathways - Acute Abdomen (Overview)

Population Covered By The Guidance

This pathway provides guidance for imaging adult patients with non-traumatic acute abdominal pain. An approach is used based on categorization of symptoms with associated links to more specific pathways.

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Quick User Guide

Move the mouse cursor over the PINK text boxes inside the flow chart to bring up a pop up box with salient points.

Clicking on the PINK text box will bring up the full text.

The relative radiation level (RRL) of each imaging investigation is displayed in the pop up box.

SYMBOL	RRL	EFFECTIVE DOSE RANGE
	None	0
	Minimal	< 1 millisieverts
	Low	1-5 mSv
	Medium	5-10 mSv
	High	>10 mSv

Pathway Diagram

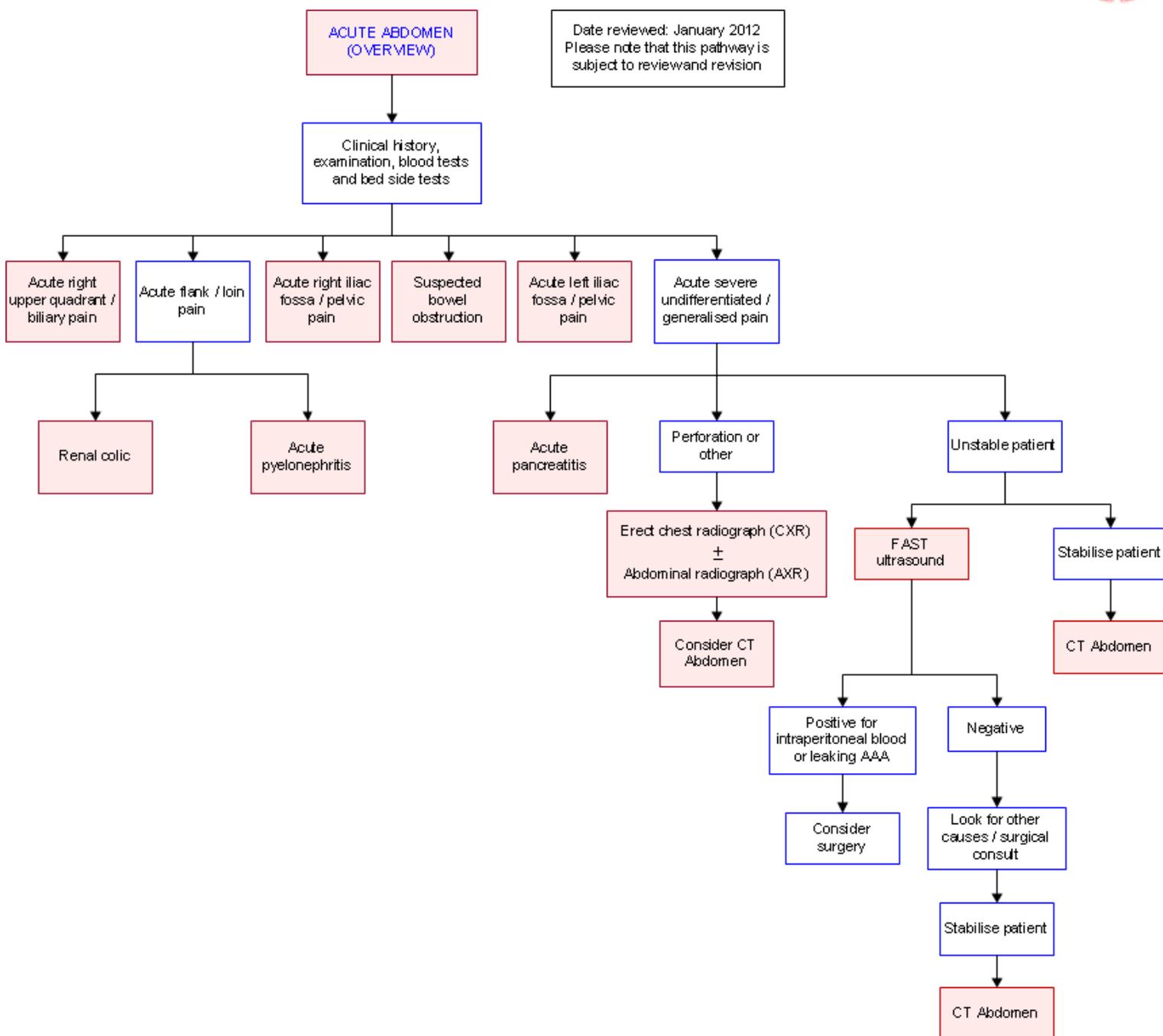


Image Gallery

Note: These images open in a new page

1a Small Bowel Obstruction

Image 1a (Plain radiograph, Supine view): Multiple dilated loops of small bowel.



1b



Image 1b (Plain radiograph, Erect view): Multiple dilated loops of small bowel with air-fluid levels and "string of pearls" sign indicating a mechanical small bowel obstruction.

2a



Incarcerated Small Bowel Hernia

Image 2a (Plain radiograph): Multiple dilated loops of small bowel in the upper abdomen.

2b



Image 2b (Plain radiograph): Lower abdominal film showing increased density in the right obturator foramen.

2c



Image 2c (Computed Tomography): Coronal view of the same patient demonstrating an incarcerated small bowel. Dilated proximal loops of small bowel enter a large right inguinal hernia. The distal small bowel loop exiting the hernia is collapsed.

2d



Image 2d (Computed Tomography): Axial view showing the dilated small bowel loop in the right inguinal hernia (arrow).

3



Malignant Small Bowel Obstruction

Image 3 (Small bowel enteroclysis): Small bowel obstruction due to a serosal metastasis (arrow).

4 Gallstone Ileus



Image 4 (Plain radiograph): Multiple loops of distended small bowel with air in the biliary tree (arrow).

5 Gallstone Ileus

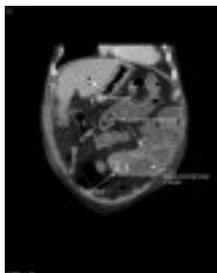


Image 5 (Computed Tomography): A large gallstone (arrow) is impacted in the small bowel causing mechanical obstruction.

6 Pneumoperitoneum



Image 6 (Plain radiograph): Perforated bowel and pneumoperitoneum. The intraabdominal gas outlines the liver edge, gallbladder and falciform ligament.

7 Pneumoperitoneum

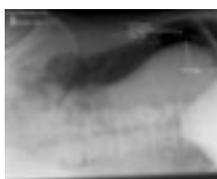


Image 7 (Plain radiograph, Lateral decubitus): Perforated bowel with pneumoperitoneum. The intraabdominal gas outlines the liver edge and chest wall.

8a Large Bowel Obstruction



Image 8a (Plain radiograph): Distension of the caecum, ascending and transverse colon.

8b Large Bowel Obstruction

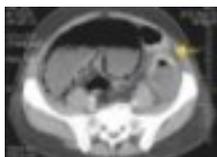


Image 8b (Computed Tomography): CT of the same patient showing marked caecal distension secondary to a constricting tumour (arrow).

9a Colorectal Carcinoma



Image 9a: A right hemicolectomy showing a large, ulcerated and exophytic caecal adenocarcinoma.

9b Colorectal Carcinoma

Image 9b (H&E, x2.5) and 9c (H&E, x10): Histological sections showing a moderately differentiated colorectal adenocarcinoma composed of malignant



glands invading into the bowel wall (blue arrows). The glands are lined by cells showing marked nuclear atypia. Normal colonic mucosa is included for comparison (green arrow).

9c



10



Caecal Volvulus

Image 10 (Plain radiograph): Markedly distended loop of large bowel from a caecal volvulus.

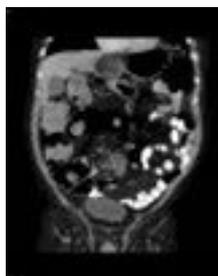
11



Sigmoid Volvulus

Image 11 (Plain radiograph): Markedly dilated loop of large bowel. The dense white line between the limbs (arrow) points to the origin of the volvulus.

12



Sigmoid Volvulus

Image 12 (Computed Tomography): Sigmoid volvulus with the classical "swirl" sign representing the twisted sigmoid mesentery (arrow).

Teaching Points

- An acute abdomen can be defined as severe, persistent abdominal pain of sudden onset that requires immediate surgical or medical review
- Plain Film Radiography (PFR) has limited efficacy in an unselected population with acute abdominal pain, as it rarely alters clinical management
- Utilising PFR for the assessment of 'non-specific abdominal pain' is unlikely to yield a positive finding. Significantly, unrelated or incidental pathology can be identified and alter clinical management erroneously
- Evidence and consensus indications for plain film radiography in the investigation of 'non-traumatic acute abdominal pain' include
 - Suspected bowel obstruction or ileus
 - Suspected bowel perforation
 - Ingested foreign body
 - Severe abdominal pain/tenderness of unknown origin requiring opiate analgesia

Non-Traumatic Abdominal Pain

- An acute abdomen can be defined as severe, persistent abdominal pain of sudden onset that requires immediate surgical or medical review
- An initial differential diagnosis is established after careful history, examination, considered blood tests and bed-side tests. Below is a list of differential diagnosis, which by no means is comprehensive
 - Gall bladder related disease
 - Acute pancreatitis
 - Bowel obstruction
 - Visceral perforation
 - Infection
 - Inflammatory
 - Gynaecological
 - Renal colic
 - Vascular
 - Referred pain - pneumonia, acute coronary syndrome, musculoskeletal, genitalia (torsion of testis), neurogenic
 - Metabolic
 - Autoimmune
 - Functional - irritable bowel syndrome
- Careful consideration should be given prior to requesting plain film radiography in the diagnostic algorithm of an 'acute abdomen'. They are infrequently diagnostic, often non-specific and are usually normal. A normal abdominal plain film series, **DOES NOT** exclude significant disease and hence should not be used (in the absence of certain clinical indications) to ensure 'normality' [1](#)

Indications for Abdominal Radiography

- Despite the known limitations of indiscriminate plain film abdominal radiography (PFR) in the evaluation of acute abdominal pain, it is still used with high frequency in patients presenting with acute abdominal pain [1,2](#)
- The ideal rate of PFR for acute abdominal pain should probably not exceed 10%, if indications for its use are stringently followed [1](#)
- PFR has limited efficacy in an unselected population with acute abdominal pain, as it rarely alters clinical management [3,4](#)
- Utilising PFR for the assessment of 'non-specific abdominal pain' is unlikely to yield a positive finding. Significantly, unrelated or incidental pathology can be identified and alter clinical management erroneously [5](#)
- An erect abdominal radiograph, in most circumstances adds little additional diagnostic information [6,7](#)
- The most likely clinical scenarios where PFR is likely to yield a finding that adds to or changes management includes; bowel obstruction, renal colic, bowel ischemia, and moderate-severe abdominal tenderness. [8](#) Note in the case of renal colic, a more sensitive test (LDCT renal colic protocol) is currently recommended
- There are number of reasons to ensure PFR of the abdomen is requested appropriately
 - Indiscriminate use may identify incidental radiological abnormalities that are unrelated to the patients current presentation
 - Financial cost

- Man power hours required in performing the test and its interpretation
- It is necessary for the referring practitioner to exclude pregnancy in female patients (appropriate age group), prior to radiation exposure
- Radiation exposure - it should be noted that the radiation from one PFR series of the abdomen is equivalent to 30 chest radiographs [2](#)
- **Therefore - recognised indications for PFR of the abdomen**
 - **Suspected bowel obstruction or ileus**
 - Supine abdominal radiograph (AXR)
 - Erect abdominal radiograph (AXR)
 - ± Erect chest radiograph (CXR) (lateral abdominal decubitus if patient unable to sit up)
 - **Suspected bowel perforation**
 - Supine abdominal radiograph (AXR)
 - Erect abdominal radiograph (AXR)
 - ± Erect chest radiograph (CXR) (lateral abdominal decubitus if patient unable to sit up)
 - **Ingested foreign body**
 - Supine abdominal radiograph (AXR)
 - **Severe abdominal pain / tenderness of unknown origin requiring opiate analgesia**
 - Supine abdominal radiograph (AXR)
 - Erect abdominal radiograph (AXR)
 - ± Erect chest radiograph (CXR) (lateral abdominal decubitus if patient unable to sit up)

References

References are graded from Level I to V according to the Oxford Centre for Evidence-Based Medicine, Levels of Evidence. [Download the document](#)

- [1.](#) Anyanwu A, Moalypour S. **Are abdominal radiographs still over-utilised in the assessment of acute abdominal pain? A district general hospital audit.** J R Coll Surg Edin. 1998;43:267-70. (Level IV evidence)
- [2.](#) Morris-Stiff G, Stiff R, Morris-Stiff H. **Abdominal radiograph requesting in the setting of acute abdominal pain: temporal trends and appropriateness of requesting.** Ann R Coll Surg Eng. 2006;88:270-4. (Level IV evidence)
- [3.](#) Boleslawski E, Panis Y, Benoist S et al. **Plain Abdominal radiography as a routine procedure for acute abdominal pain of the right lower quadrant: Prospective Evaluation.** World J Surg. 1999;23:262-4. (Level II evidence). [View the reference](#)
- [4.](#) Stower M, Amar S, Mikulin J et al. **Evaluation of the plain abdominal X-ray in the acute abdomen.** J Royal Soc of Med. 1985;75:630-3. (Level II evidence). [View the reference](#)
- [5.](#) Campbell J, Gunn A. **Plain abdominal radiographs and acute abdominal pain.** Br J Surg. 1988;75:554-6. (Level IV evidence)
- [6.](#) Hayward M, Hayward C, Ennis W et al. **A pilot evaluation of radiography of the acute abdomen.** Clin Radiol. 1984;35:289-91. (Level IV evidence)
- [7.](#) Lacey G, Wignall B, Bradbrooke S et al. **Rationalising abdominal radiography in the accident and Emergency Department.** Clin Radiol. 1980;31:453-5. (Level III evidence)
- [8.](#) Eisenberg R, Heineken P, Hedgcock M et al. **Evaluation of plain abdominal radiographs in the diagnosis of abdominal pain.** Ann Surg. 1983;197:464-9. (Level II evidence). [View the reference](#)



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