



COMPUTED TOMOGRAPHY OF THE GASTROINTESTINAL TRACT

2 nd stage

LECTUER 7

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Indications

1. Abdominal mass.
2. Suspected tumour and tumour staging.
3. Appendicitis—focused appendiceal CT (FACT).
4. Acute abdomen .
5. Altered bowel habit in the elderly and infirm.
6. Location of bleeding.
7. Trauma.

COMPUTED TOMOGRAPHY OF THE GASTROINTESTINAL TRACT

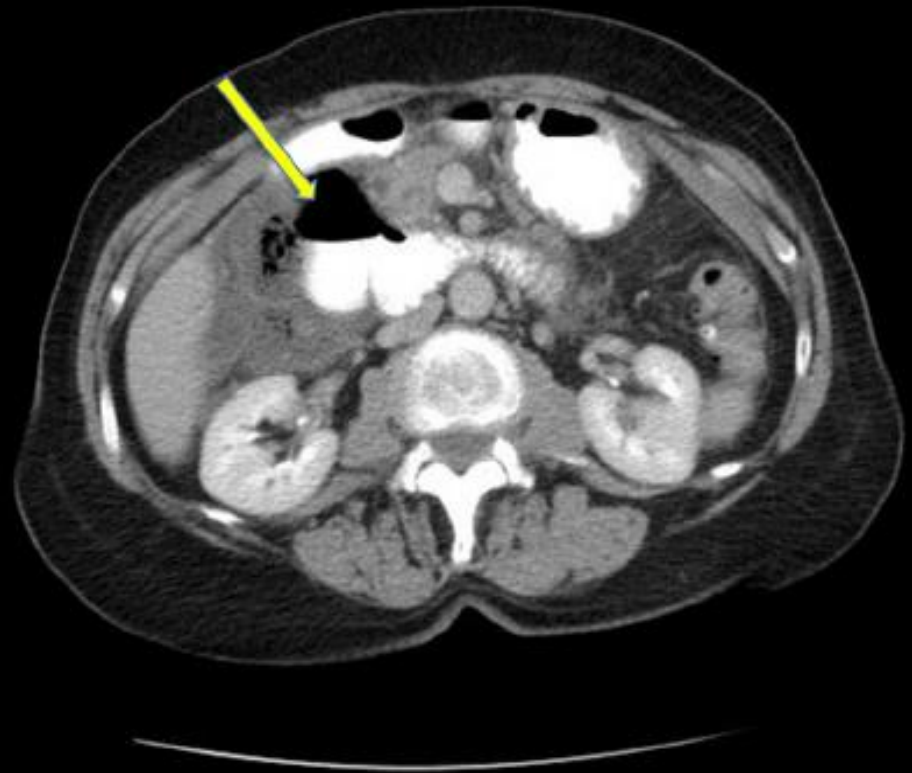


Intraluminal Contrast Agents

- **Positive oral contrast**

Positive oral contrast (e.g. 25 mL Omnipaque 300 made up to 1 L with water, low in density to avoid beam hardening artifact) can be used in abdominal and pelvic CT to delineate the bowel from pathology, which is especially useful in the pelvis. In the small bowel, positive oral contrast is helpful in the postsurgical abdomen, improving conspicuity of abscess and fistulae and their communications.

- **Positive oral contrast**



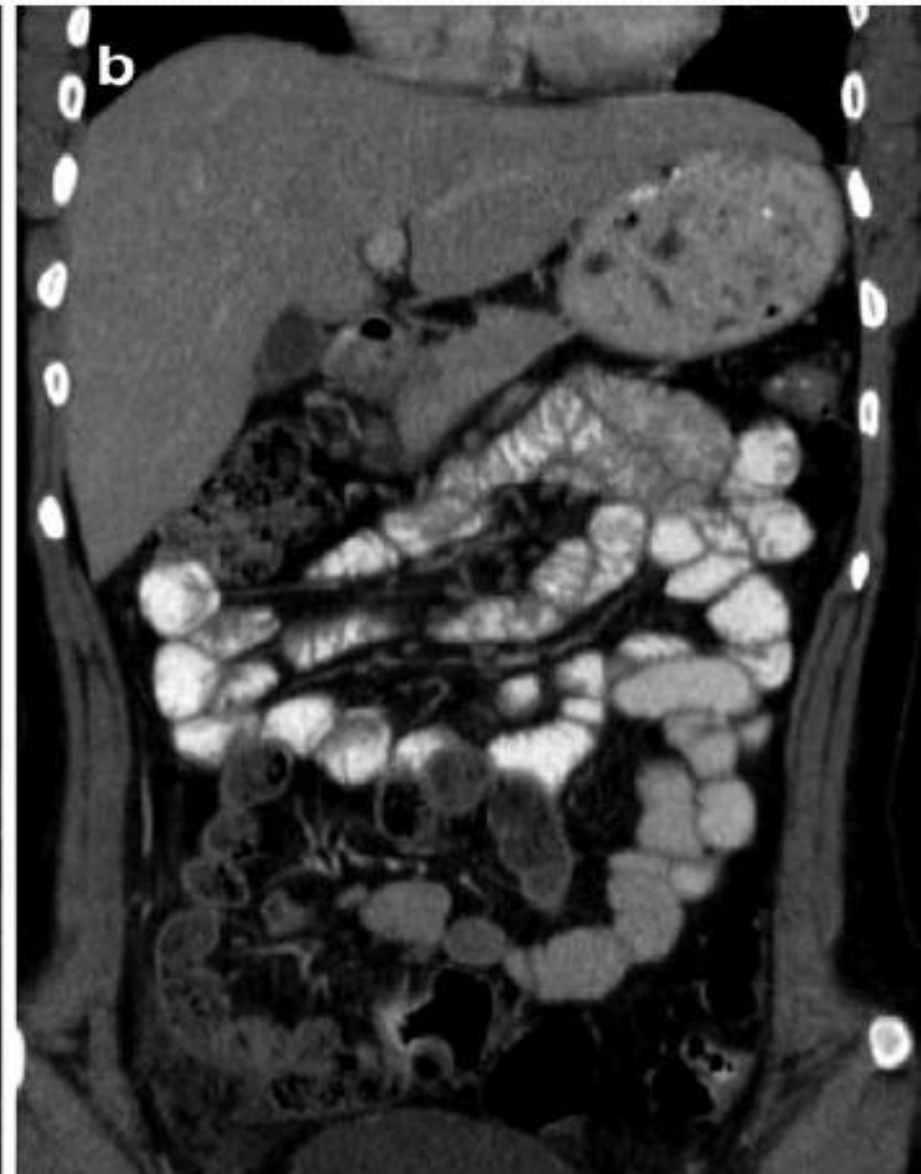
• Negative oral contrast

Multislice CT scanners have enabled the acquisition of thin slices (<3 mm), allowing multiplanar reformats such that the routine use of intraluminal contrast for all abdominal scanning (especially trauma and follow-up cancer imaging) may not be always necessary. The inherent negative properties of intraluminal contents will be sufficient contrast in high-grade intestinal obstruction, with the fluid within the dilated bowel acting as a negative contrast agent and allowing definition of the transition point. In trauma an ileus is common; the contrast will not progress and attempts to introduce positive oral contrast will delay an urgent scan. The absence of positive contrast does not reduce diagnostic accuracy of traumatic perforation.

Negative oral contrast



Positive oral contrast



- In elective imaging, the negative imaging properties of a litre of oral water will be sufficient for cancer staging and follow-up. In specific disease patterns that involve serosal calcification, water contrast is preferable, as positive contrast will obscure deposits. Negative oral contrast is recommended for the evaluation of oesophageal and stomach, up to 1 L of water as tolerated, starting 5–10 min before the scan. For the staging of oesophageal tumours, in patients who can tolerate the water despite dysphagia, the addition of 1 sachet of Carbex with prone scanning improves delineation of the tumour. The prone scanning allows gravity to separate the oesophageal tumour and aorta, reducing the falsepositive rate of aortic serosal invasion. The distension by Carbex improves the gastro-oesophageal junction distension, more accurately categorizing the Siewert type and the length of the tumour.

- Full-fat milk Alternatives preparations for the stomach include full fat milk to take advantage of delayed gastric emptying of a fatty meal to distend the stomach and to provide low Hounsfield units contrast. This strategy needs caution in populations with a high incidence of lactose intolerance.
- Osmotic negative contrast agents Distention of the small bowel by water is limited, as it is rapidly resorbed. Agents with increased osmolality are therefore advised in the elective setting, including water–methylcellulose mixtures, polyethylene glycol (the osmotic laxative Klean-Prep), mannitol (e.g. 250 mL mannitol 10% and 750 mL water), locust bean gum (a food additive), and Volumen (a low-density barium-based agent not available in the UK at present). In the majority of patients, approximately 1½ L drunk gradually over 30 min will fill the small bowel adequately. Patient encouragement and supervision are important to achieve this.

- CT enteroclysis Contrast may also be administered via an NJ tube when it is termed 'enteroclysis'.
- Faecal tagging Colonic pathology is best demonstrated on CT by a combination of catharsis, distension with gas and intraluminal contrast (see CT colonography). For those unable to tolerate full catharsis, oral contrast given at least 24 h before the examination (e.g. 30 mL Omnipaque 300 given the evening before) 'tags' the faeces and enables obvious colonic pathology to be more easily identified. Divided doses given over 3 days achieve more uniform colon tagging.

COMPUTED TOMOGRAPHIC ENTEROCLYSIS



Intravenous Contrast

Bolus timing

Scans of the colon are generally obtained in portal venous phase (70 s) following i.v. contrast. Modifications depend on the clinical question. In the case of suspected active GI bleeding precontrast, arterial (20–25 s), portal (70 s) and perhaps delayed (150 s) phase contrast should be considered. In the specific case of small bowel evaluation, 80 Chapman & Nakielny's Guide to Radiological Procedures peak mucosal enhancement is seen at 50 s, and this 'enteric' phase is recommended



A



B



C

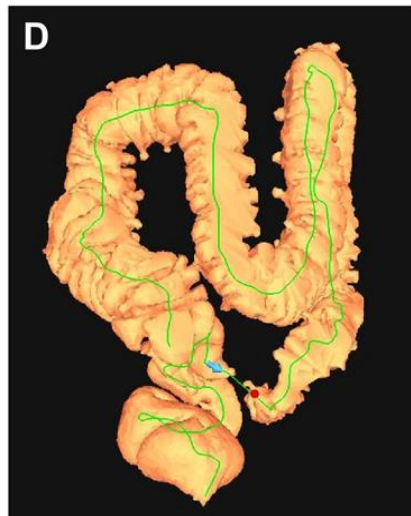
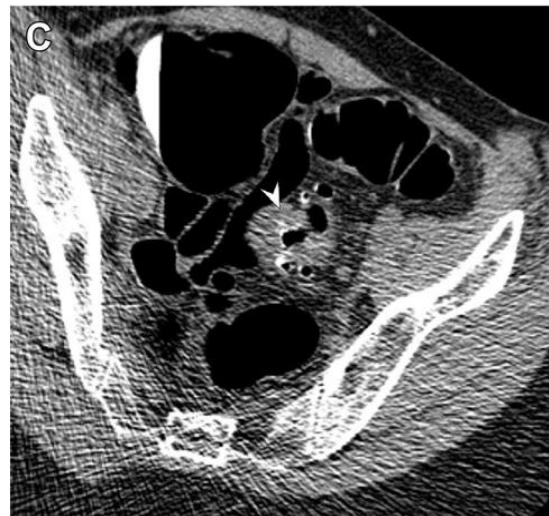
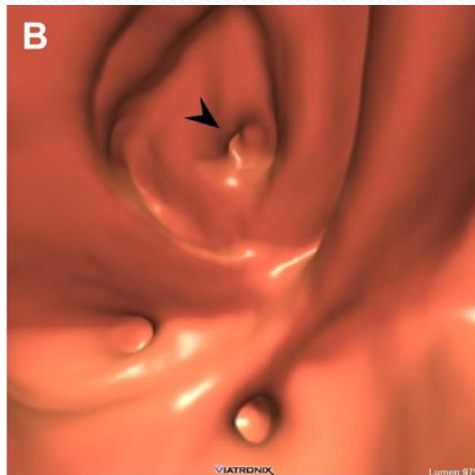
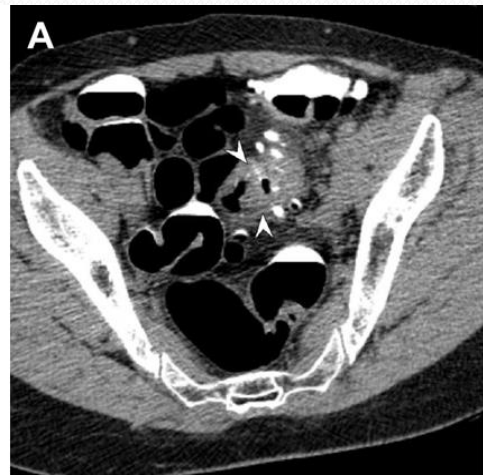


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COMPUTED TOMOGRAPHIC COLONOGRAPHY

Computed tomography colonography (CTC), also known as 'virtual colonoscopy', is the radiological examination of choice for the detection of colonic neoplasia of the large bowel with superior sensitivity and better patient experience compared with barium enema. Where available, this supersedes barium enema.

COMPUTED TOMOGRAPHIC COLONOGRAPHY



Indications

1. Incomplete colonoscopy secondary to technical or pathological reasons. Proximal colon evaluation can be performed the same day if no biopsies have been taken. The patients should be given 30 mL of Gastrografin following recovery from sedation, and 2 h prior to the scan, which will deliver adequate tagging in a cleansed colon. If the patient has had a colonic biopsy, CT colonography can still be performed if the endoscopist confirms only superficial biopsies have been performed.
2. Comorbidities precluding colonoscopy.
3. Patient choice.
4. Patients on warfarin when the clinician preference is not to discontinue anticoagulants for colonoscopy.
5. Alteration in bowel habit.
6. Anaemia.

Bowel Preparation

Full bowel preparation with standard laxatives is used in many centres but the benefits of faecal tagging are increasingly accepted.

Three types of preparation may be considered:

1. 'Standard' purgative large-bowel preparation as for barium enema without tagging is no longer recommended.¹
2. 'Faecal tagging' using water-soluble contrast (e.g. an additional 50 mL Gastrografin on the evening before the scan).
3. Faecal tagging alone with no formal bowel prep:

(A) Low-residue diet for 2 days before test

(b) Light breakfast and light lunch on the day before the examination, then fast until after the examination

(c) 100 mL Gastrografin or 150 mL of Omnipaque split in three divided doses on the day before the examination

Technique

1. Patient is instructed to go to the toilet immediately before the procedure.
2. 20 mg i.v. Buscopan is given (glucagon is not recommended).
3. Patient is positioned on the left side and a thin (e.g. Foley) catheter is placed in rectum and gas insufflated. The gas may be air, but CO₂ is better tolerated by patients. Gas is best administered by a dedicated pump. If a pump is available, then 1.5–2 L of CO₂ is initially administered, the patient is turned supine, and further gas (typically up to 4–6 L) is administered. Pumps limit the administered pressure to 25 psi and deliver further gas to maintain this pressure. Manual inflation with a bulb-sized hand pump or alternatively an empty enema bag filled with air/CO₂ and gentle pressure on the enema bag have the disadvantage of surges of intraluminal pressure during insufflation, and troughs during scanning with collapse of the lumen.

4. CT scout performed to check satisfactory gaseous distension of large bowel.

5. CT parameters will depend upon the type of CT scanner available, but collimation thickness should be between 1 and 3 mm. IV contrast is commonly used in symptomatic patients where the extracolonic yield will be in the region of 4%–7%. Asymptomatic patients from cancer screening programmes should not receive i.v. contrast. CT scan sequences without contrast should be performed using a low-dose technique (e.g. 80 mA).

6. Patient is turned prone during continued insufflations, and a further low-dose scanogram is performed. The retaining balloon should be deflated on the second scan position to avoid effacing low rectal pathology. If the patient is unable to turn prone, they can be scanned in the left lateral position. The supine and prone scans should be reviewed to ensure all areas of the colon are distended on at least one of the acquisitions. If segments remain collapsed, a further low-dose scan in a third position with continued insufflation and an additional dose of 20 mg Buscopan IV should be considered. If a tumour is detected on the first position, the chest should be added to the field of scan for the second position for one-stop staging

COMPLICATIONS

1. Perforations are rare (approximately 1 in 3000 diagnostic CTC examinations in the UK). The operator needs to be trained to identify this at the time of scanning.
2. Discomfort.
3. Adverse reaction to hyoscine or contrast.

AFTERCARE

1. The patient should be advised that cramping sensations are normal for the subsequent 24 h and a mild analgesia should suffice, but to contact the department if pain is severe. 82 Chapman & Nakielny's Guide to Radiological Procedures
2. The potential for acute closed angle glaucoma should be explicit in a written postcare leaflet, advising urgent attendance at A&E if a painful red eye or painless red eye develops
3. The patient should be advised to consume additional fluids for the subsequent 24 h.



THANKS