College of Health and Medical Technologies
Department of Radiology Technologies
Computed Tomography

# CT of the stomach
# CT of the small intestine
# - CT of the large bowel

## 4 th stage

LECTUER 11

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MSc Radiographic Imaging

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# Position of Abdomen (CT) scan


# Computed tomographic (CT) gastrography

Computed tomographic (CT) gastrography, also called virtual gastroscopy (VG), is a noninvasive procedure for the detection of gastric abnormalities.

## Advantages

rapid and noninvasive exam offers information about local tumor invasion, lymph node and distant metastasis in cases of gastric cancer

## Indications

- early detection of gastric carcinoma
- to examine gastric abnormalities, e.g. hiatus hernia,polyps and ulcers
- post-surgical assessment of the stomach
- CT gastrography and volumetry are used to assess the volume of the gastric pouch after bariatric surgery

## CT Technique:

Optimum CT technique requires high spatial resolution, good gastric distension and an appropriate timing of contrast media injection in order to detect subtle changes in the gastric wall and to accurately stage tumors.

- **Patient Preparation: -**

-Fasting: no solid food for at least 6 h.

- **Patient position:**

Prone position if known lesion in the antrum or pyloric wall.

Supine position in all other lesions.

## Contrast administration:

**1• Oral contrast:** Adequate distension of the stomach using (water 1000–1500 ml) as 1 to 1.5 cc contrast agent (hydro-CT) is a prerequisite for assessing the stomach.

**Gastrografine instead of barium Used in cases of:**

-Suspected perforation.

-Suspected intestinal obstruction. anastomotic leaks.

**Barium causes**: inflammatory reaction if leaked outside the bowel also could be transfer to the solid state.

- **Hypotonia:** 20 mg scopolamine intravenously.

**2• Intravenous contrast medium injection:**

Contrast volume + saline flush: 120 ml (or 1.5 ml/kg body weight) CM + 60 ml saline

- **Flow rate:** 4 ml/s (or 30-s injection duration)

- **Start delay.**

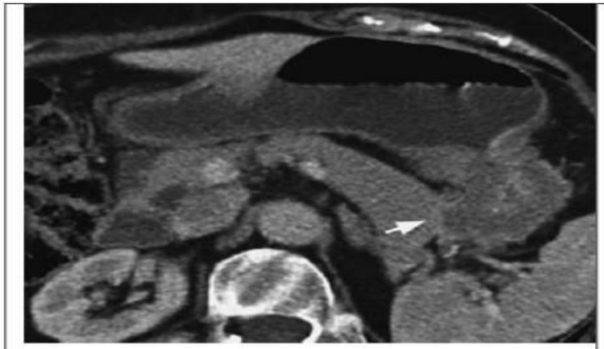
– **Arterial phase:** 30 s (or bolus tracking: 10 s after aortic arrival) for tumor staging.

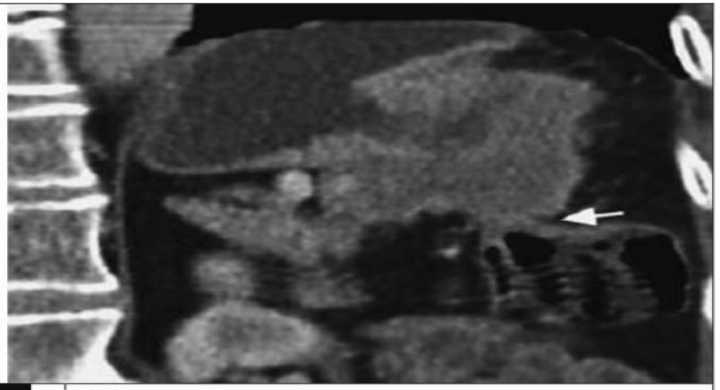
– **Portal venous phase:** **60 s (or bolus tracking: 40 s after aortic arrival) for stomach.**

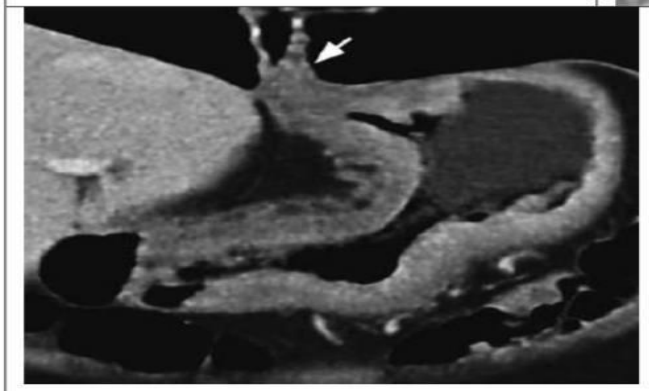
Contrast material injection for the stomach is timed in a manner that assures portal phase imaging.

If tumor staging is required, an additional arterial phase examination of the liver is added to the protocol.

In such cases, the scan range includes only the liver and the stomach in the arterial phase, and then the entire abdomen down to the level of the iliac crest for the portal venous phase.

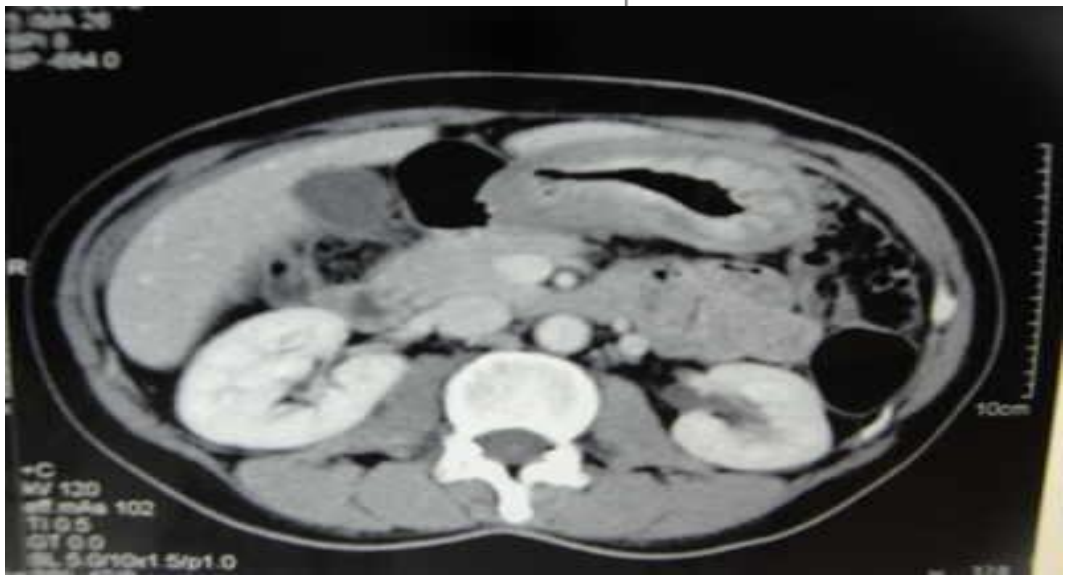






**Advanced gastric cancer**

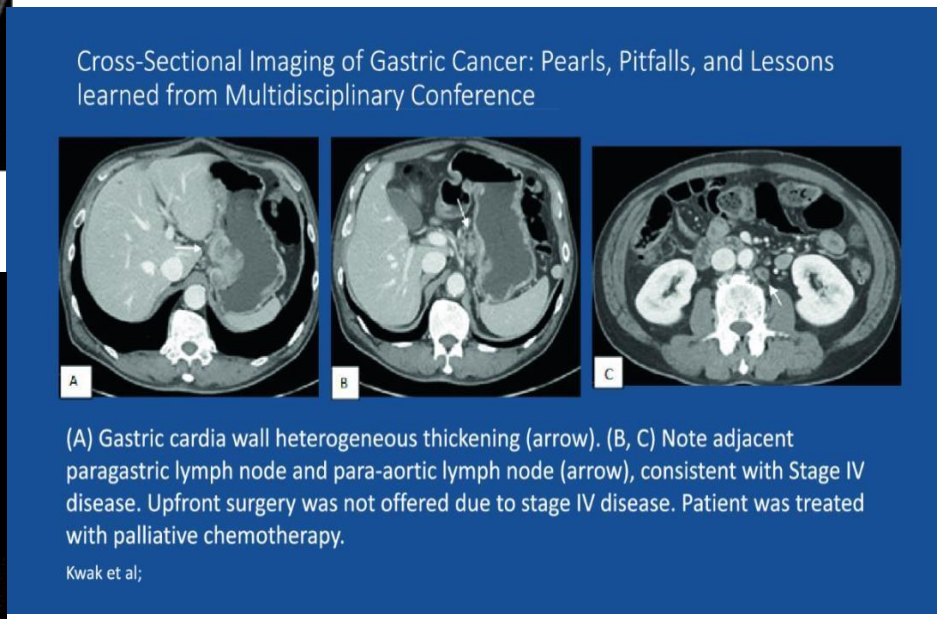
**a)** Advanced gastric cancer of the posterior wall of the stomach that infiltrates the tail of the pancreas (*arrow*).
**b)** Coronal reformation of the posterior portions of the abdomen. Large gastric cancer with obliteration of the fat plane and thickening of
the colonic wall (*arrow*).
**c)** Oblique coronal reformation through esophagus, fundus and body of the stomach. There is circumferential thickening of the gastric wall with loss of gastric folds from **linitis plastica**. The tumor extends into the distal esophagus (*arrow*)



***Schirrhous carcinoma:***
it shows us the shape of the stomach, its wall is very thick and the remaining part is to receive the food that is very tight.

37-year-old woman with perforated gastric ulcer. Focal defect in lesser curvature of gastric body is caused by deep ulcer (arrow) associated with surrounding mural thickening. Note small air bubble (arrowhead) on anterior peritoneal surface of the liver.

**Gastric trichobezoar**

# CT of the stomach

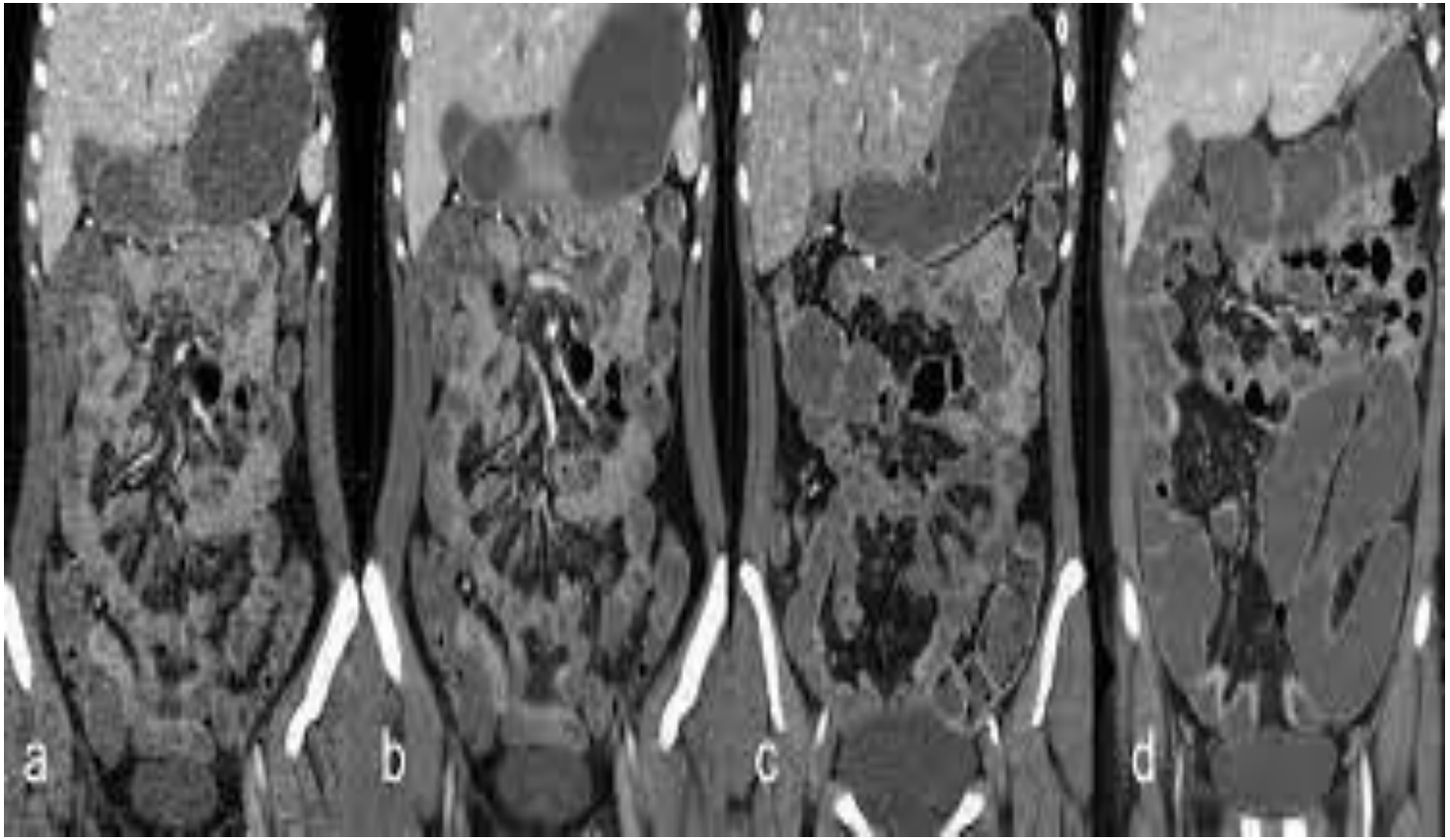

# CT enterography

Computed tomographic (CT) enterography is a non-invasive technique for the diagnosis of small bowel disorders.

**Indications:**

- Crohn disease ( diagnosis and complications)
- suspected small bowel bleeding, usually performed after negative endoscopy
- suspected small bowel tumor, e.g. carcinoid, polyposis syndromes
- celiac disease: assess for complications such as lymphoma
- partial small bowel obstructions, e.g. postoperative adhesions, radiation enteritis, scleroderma
- chronic diarrhea and/or abdominal pain
- suspected chronic mesenteric ischemia

# CT of the small intestine



## Technique

**Bowel preparation**

1 abstain from all food and drink 4-6 hours before the exam

2 patients drink about 1.5 L of oral contrast over 30-60 minute

* adequate luminal distension is necessary as collapsed bowel loops may mimic pathology

*CT enterography utilizes negative or neutral oral contrast attenuation similar to that of water - e.g. water, PEG, mannitol, methylcellulose, locust bean gum, and low-density barium sulphate preparations (Volumen, 0.1% W/V)

Fluid distension of the small bowel allows better assessment of mucosal enhancement, mural thickness as well as mesenteric vasculature, this is important especially in the evaluation of Crohn disease .

## Procedure

CT scanning is ideally performed on a multi-detector computed tomography (MDCT) scanner

## intravenous contrast

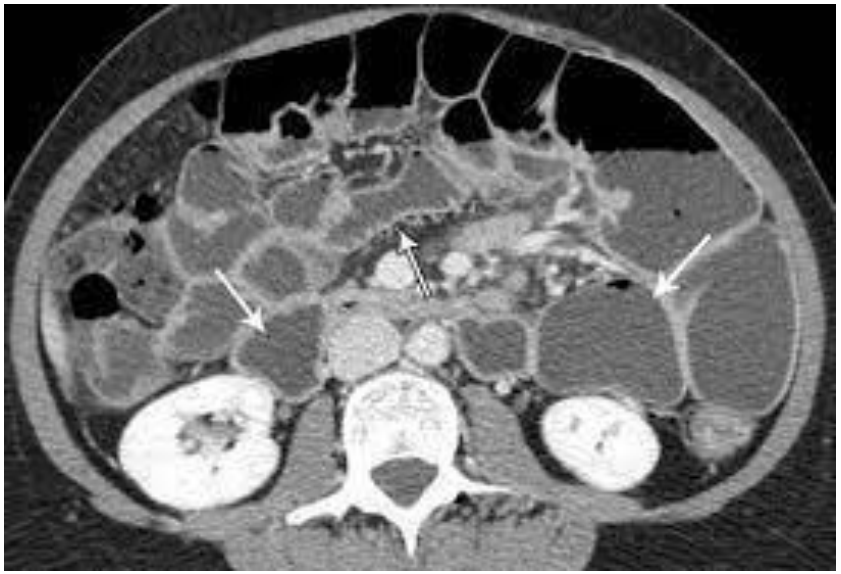
1 Crohn disease, celiac disease, postoperative adhesions, radiation enteritis, and scleroderma: **a single enteric phase** where peak mucosal enhancement is achieved is sufficient - either enteric phase (45-50s) or portal venous phase (60-70s)

2 small bowel tumors: an additional **arterial phase** can be performed, in particular for the assessment of hypervascular lesions (e.g. neuroendocrine tumors)

3 in cases of suspected GI bleeding, **pre-contrast, arterial, portal venous, and delayed phases** should be considered

*data interpretation with the use of axial and coronal reformatted images for proper evaluation

# CT of the small intestine



# CT enteroclysis

Computed tomographic (CT) enteroclysis refers to a hybrid technique that combines the methods of fluoroscopic intubation- infusion small bowel examinations with that of abdominal CT.

## Indications

CT enteroclysis is complementary to capsule endoscopy in the elective investigation of small-bowel disease, with a specific role in the investigation of Crohn disease, small-bowel obstruction and unexplained gastrointestinal bleeding.

CT enteroclysis is considered significantly superior to conventional enteroclysis in depicting Crohn disease-associated intra- and extra-mural abnormalities

# CT enteroclysis


## Technique

CT enteroclysis utilizes mainly two types of contrast:

**neutral contrast media**

- these have attenuation similar to that of water, e.g. water, methylcellulose
- intravenous contrast is used with neutral agents
- these agents allow better assessment of mucosal enhancement,

mural thickness as well as mesenteric vasculature

- better used in unexplained subacute gastrointestinal bleeding due to vascular malformation and assessment of inflammatory activity and complications of small bowel Crohn disease

**positive enteral contrast material**

- e.g. 4 to 15% water-soluble (sodium diatrizoate) solution or a dilute (1%) barium solution
- no intravenous contrast is used with these agents mainly used to detect lower grades of small bowel obstruction and internal fistula

## Procedure

1 bowel preparation: low-residue diet, large amount of fluids, laxative on the day prior to the examination, and nil by mouth on the day of the examination

2 conscious sedation (optional, according to patient's preference)

3 introduction of the 12 to 14-F enteroclysis tube (under fluoroscopy or through duodenoscope), the tube tip is usually placed distal to the ligament of Treitz

4 contrast is administered either on the fluoroscopy table or after transferring the patient to the CT unit for commencement of the CT scan (usually 1.5-2 L of oral contrast)

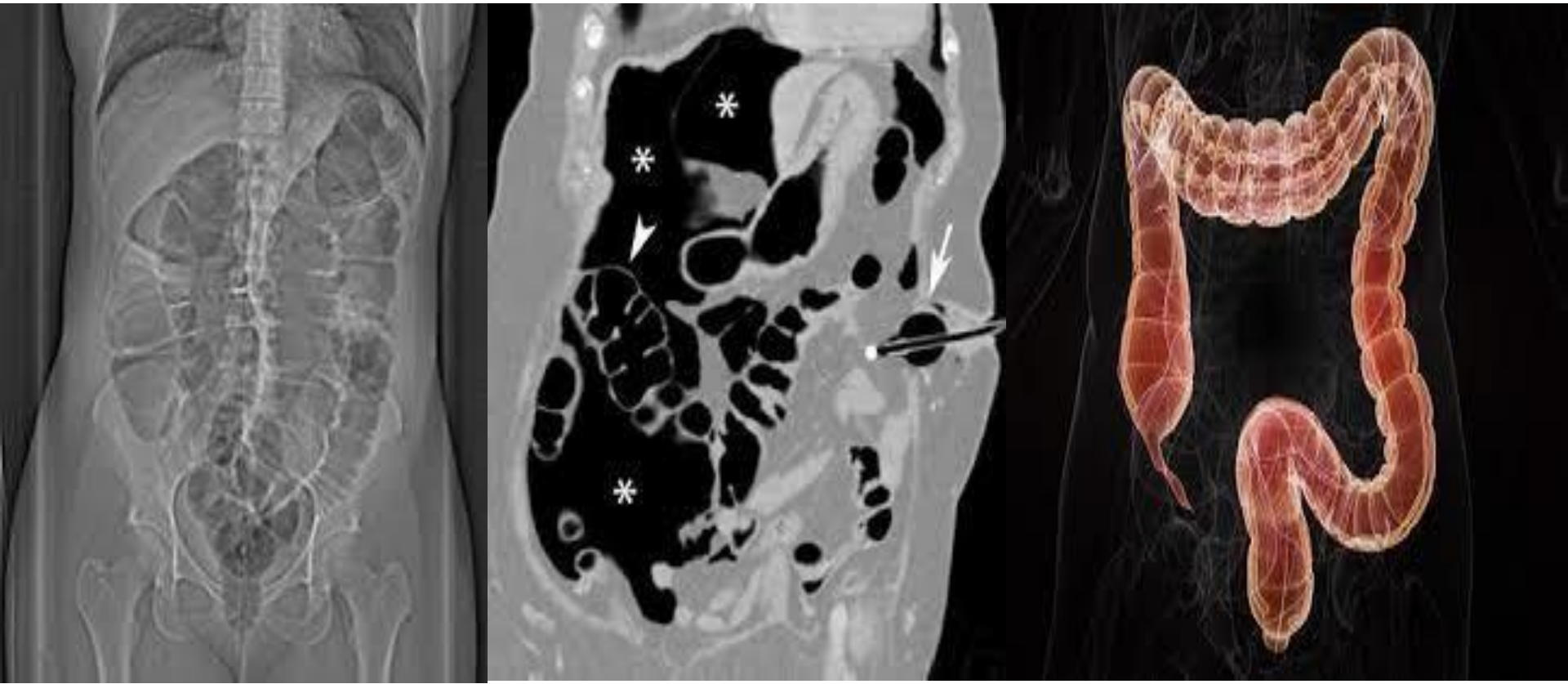
5 in the CT unit, the position of the enteroclysis tube is checked in the topogram

6 in case negative oral contrast is to be used, intravenous contrast injection will be given (approximately 100-150 mL)

7 after completing the scan, the tube is withdrawn gradually to the stomach and any extra contrast volume is suctioned

# Computed tomographic (CT) colonography

Computed tomographic (CT) colonography, also called CTC, virtual colonoscopy (VC) or CT pneumocolon, is a powerful minimally invasive technique for colorectal cancer screening.



# Indications

-screening test for colorectal carcinoma

-colon evaluation after incomplete or unsuccessful optical (conventional) colonoscopy

-assessment of strictures to better evaluate the colon proximal to obstructing neoplasms detected by conventional colonoscopy

-patients with contraindications or refusing conventional colonoscopy

## Technique

**patient preparation**

for optimal image quality, the colon should be clean and completely distended

**bowel distension**

optimal colonic distention is critical to technical success for proper intraluminal evaluation of the large bowel

distension can be achieved via a pressure-regulated device with carbon dioxide (preferred) or room air

**intravenous contrast**

not necessary for colonic interpretation although it is used in some centers for better assessment of the remaining abdominal organs

**antispasmodic agent**

IV/IM hyoscine-N-butylbromide (Buscopan), an antimuscarinic drug reduces colonic motion, leading to higher quality images and reduced patient discomfort

## Data acquisition and analysis

CT scanning is ideally performed on a multidetector computed tomography (MDCT) scanner in both supine and prone positions with a thin collimation

image review with the use of two-dimensional (2D) and three-dimensional (3D) displays is strongly advised for optimal evaluation

***THANK YOU***