

الجامعة التقنية الوسطى

كلية التقنيات الصحية والطبية/ بغداد

المرحلة: الرابعة

قسم : قسم تقنيات الاشعة

المادة: التصوير المقطعي المحوسب للصدر والبطن والحوض

Title:

العنوان:

CT Imaging of the Oesophagus and Stomach

Name of the instructor:

اسم المحاضر:

م. حيدر عبد القادر

Target population:

الفئة المستهدفة:

طلبة المرحلة الرابعة لكلية التقنيات الصحية والطبية في قسم تقنيات الاشعة

Introduction:

المقدمة:

Computed Tomography (CT) is an important imaging modality in the evaluation of the esophagus and stomach, providing detailed cross-sectional visualization of the upper gastrointestinal tract and adjacent anatomical structures. CT allows assessment of organ morphology, wall thickness, luminal distension, and anatomical relationships with surrounding mediastinal and abdominal tissues. It is particularly useful for evaluating structural abnormalities, disease extent, and extraluminal involvement, complementing endoscopic and contrast-based examinations. As a result, CT plays a supportive role in the comprehensive assessment of esophageal and gastric pathology.

Pretest:

الاختبار القبلي:

1. What's the most anatomical land mark seen in CT of esophagus & stomach?

Normal CT Anatomy of the Oesophagus

On CT images, the normal oesophagus appears as a tubular structure extending from the thorax into the upper abdomen. The oesophageal wall is typically thin and uniform, with the lumen containing variable amounts of air or fluid depending on swallowing and patient preparation.

The oesophagus is visualized in close relationship to surrounding mediastinal structures, and its appearance may vary depending on distension at the time of imaging.

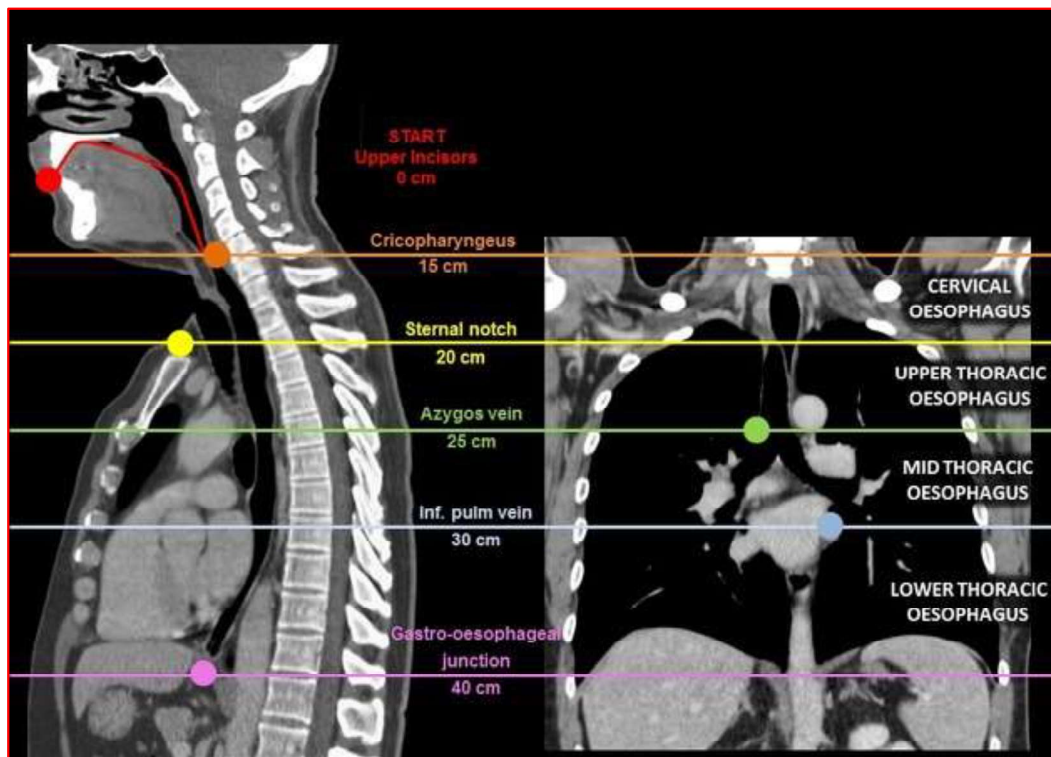
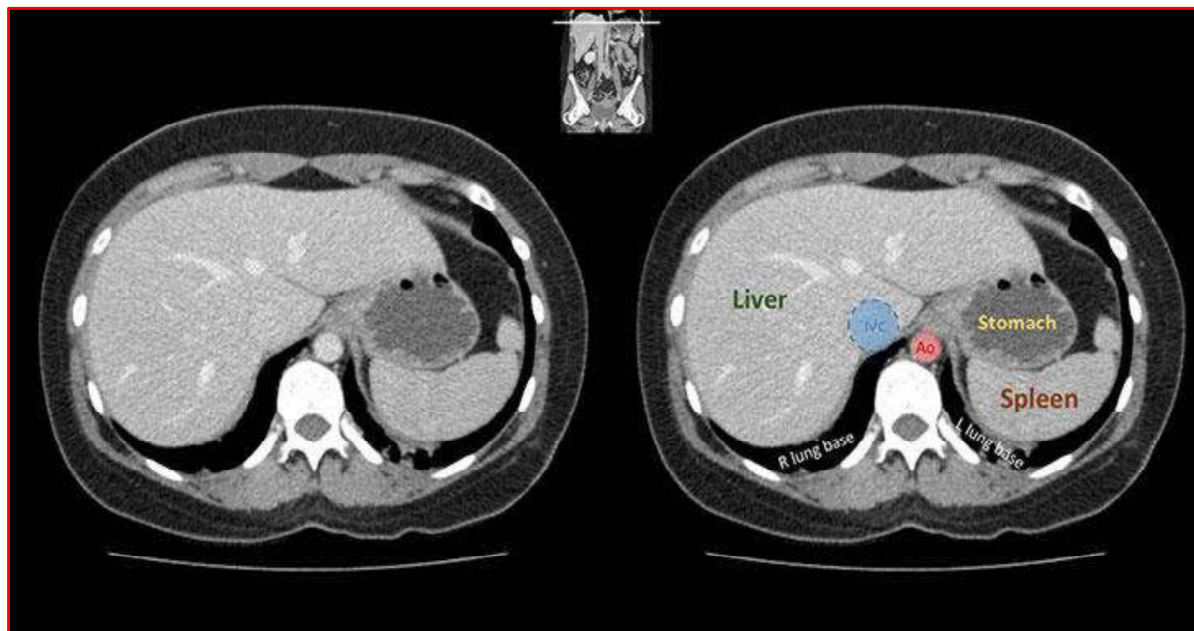
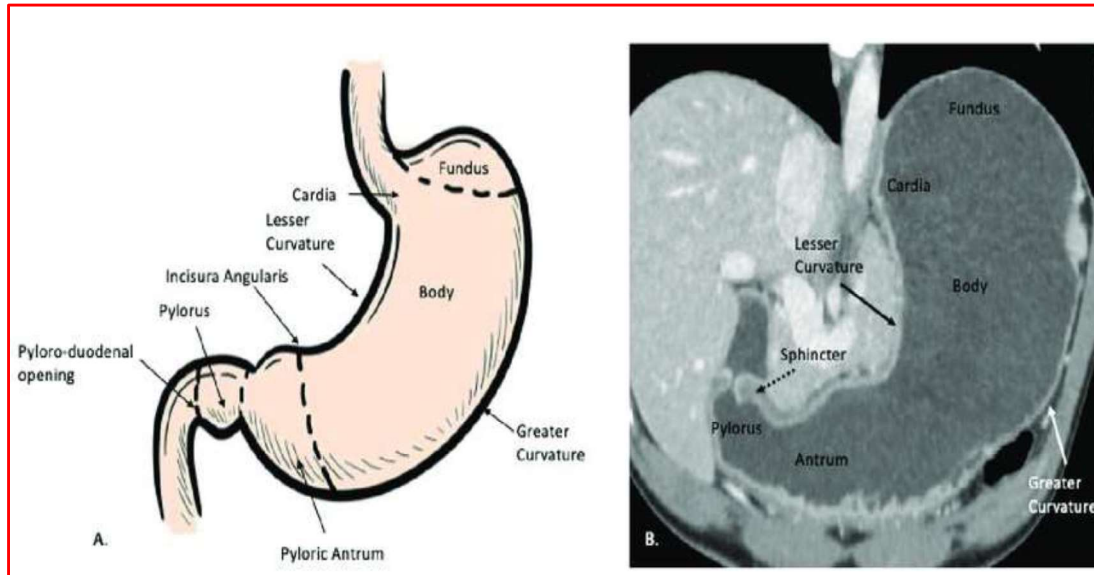


Fig (1): CT image show normal anatomy of esophagus

Normal CT Anatomy of the Stomach

The stomach appears on CT as a distensible organ located in the upper abdomen. Its shape and size vary depending on patient preparation and degree of distension. The gastric wall normally appears smooth and uniform when adequately distended.

The stomach is evaluated in relation to adjacent organs such as the liver, spleen, and pancreas, with surrounding fat planes providing important anatomical landmarks.



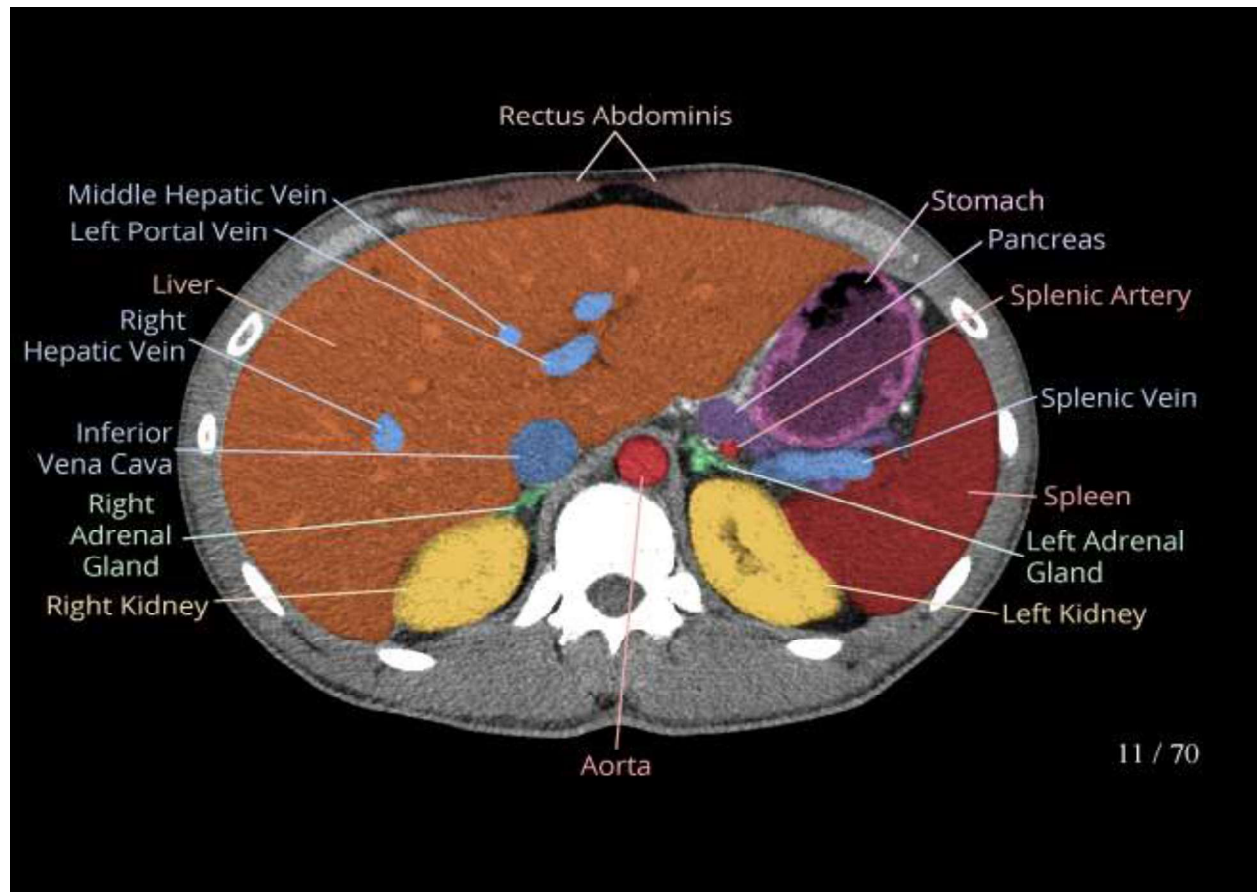


Fig (3): CT images of abdomen

Indications

CT imaging of the oesophagus is indicated when cross-sectional anatomical evaluation is required. It is commonly used to assess oesophageal tumors, including wall thickening, extent of disease, and involvement of adjacent mediastinal structures, and plays an important role in staging oesophageal carcinoma. CT is also useful in evaluating oesophageal strictures, luminal narrowing, and extrinsic compression. In acute settings, CT is valuable for detecting oesophageal perforation, rupture, trauma, or foreign body complications, often demonstrated by extraluminal air or fluid collections. In addition, CT may be used to assess hiatal hernia, diverticula, and anatomical abnormalities, as well as the relationship of the oesophagus to surrounding mediastinal structures.

CT imaging of the stomach is performed when detailed evaluation of gastric wall abnormalities is required, including focal or diffuse wall thickening and masses. It is commonly indicated for assessment of gastric tumors, inflammatory conditions, and gastric outlet obstruction, allowing visualization of luminal narrowing and gastric distension. CT is also valuable in detecting complications such as perforation or haemorrhage, and plays

an important role in staging gastric malignancies, evaluating lymph node involvement, and assessing postoperative anatomy and related complications.

Patient Preparation

Proper patient preparation is essential for optimal CT visualization of the oesophagus and stomach. Fasting prior to the examination helps reduce residual gastric contents and allows clearer assessment of the gastric lumen and wall appearance. Breath-holding instructions are important to minimize motion artefacts, particularly in the lower thoracic and upper abdominal regions, and patient cooperation plays a key role in achieving consistent image quality. Selective use of oral contrast agents, such as water or other low-attenuation solutions, may be employed to improve distension and delineation of the distal oesophagus and gastroesophageal junction, aiding differentiation between intraluminal contents, wall thickening, masses, or fluid collections; however, oral contrast is not required for all examinations. Intravenous contrast administration may be used when detailed evaluation of the oesophageal or gastric wall and surrounding structures is clinically indicated, further supporting accurate anatomical assessment.

Contraindications

CT examination of the oesophagus and stomach has several contraindications and precautions that should be considered to ensure patient safety and diagnostic effectiveness. Pregnancy is a major contraindication due to exposure to ionizing radiation, unless the potential clinical benefit clearly outweighs the associated risk. Use of intravenous contrast media represents an important consideration, as patients with known hypersensitivity to iodinated contrast agents or significant renal impairment may be at increased risk of adverse reactions. In such cases, non-contrast CT or alternative imaging modalities may be considered. Patients who are unable to cooperate with the examination, particularly those who cannot follow breath-holding instructions or remain still during image acquisition, may produce motion-degraded images that limit diagnostic value. Severe dysphagia or risk of aspiration may also represent a relative contraindication when oral contrast administration is planned.

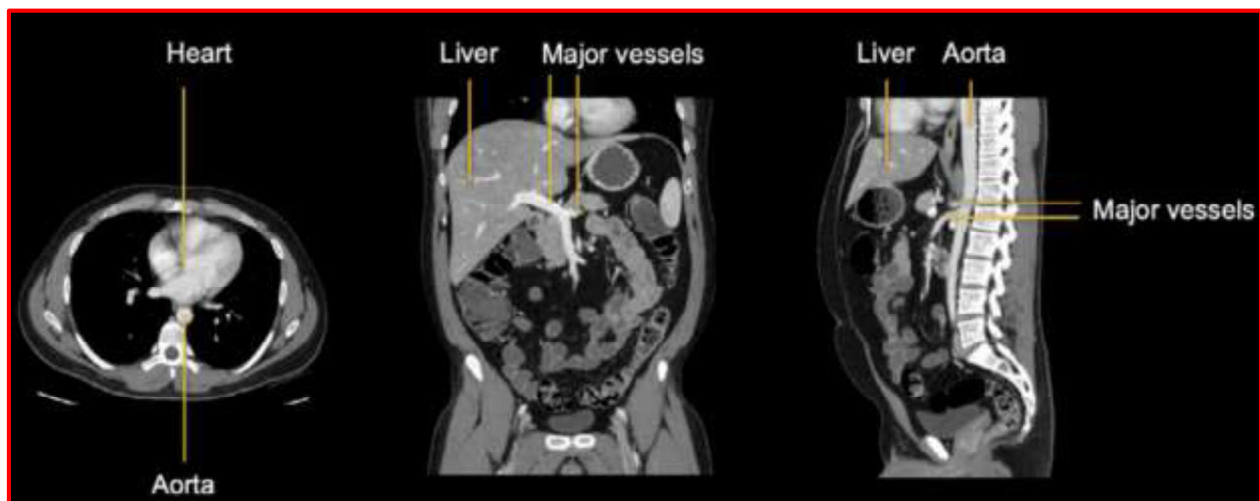
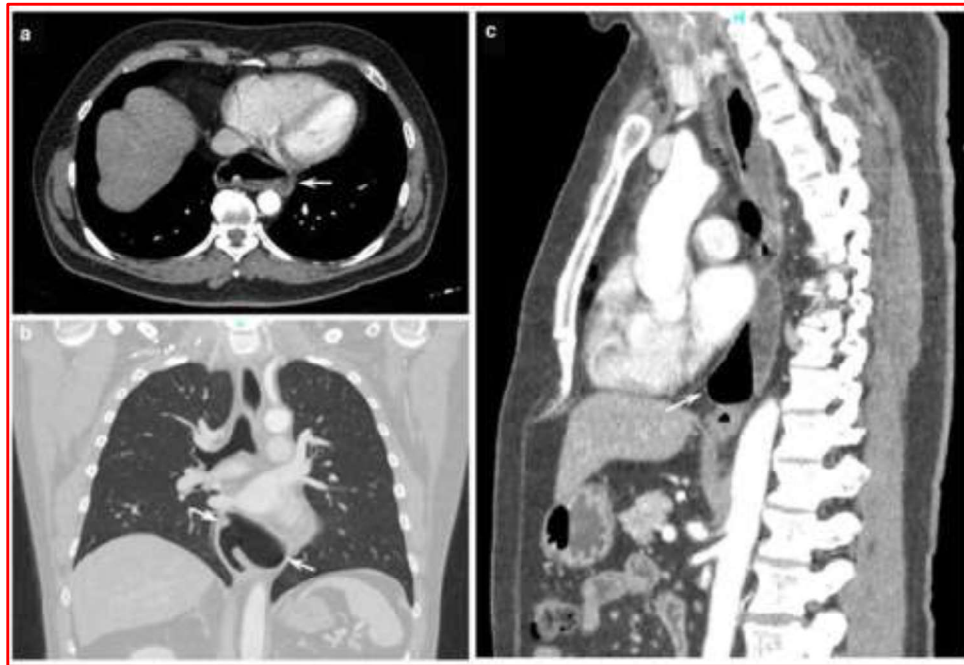
Scan Coverage

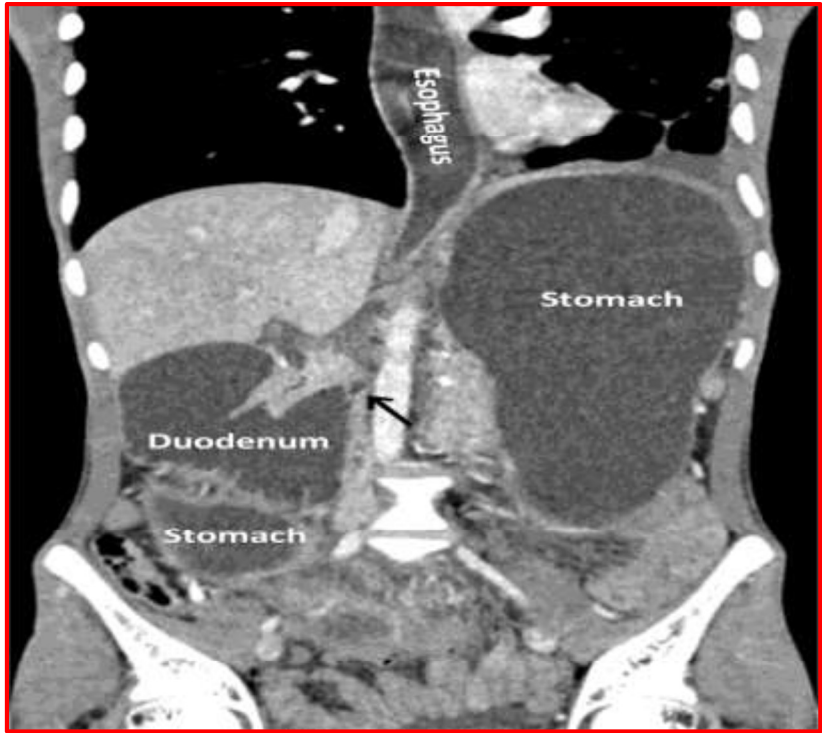
CT imaging of the esophagus and stomach typically includes coverage from the distal esophagus through the entire stomach, ensuring adequate visualization of the gastroesophageal junction. Appropriate scan coverage is essential to allow continuous assessment of the upper gastrointestinal tract and to accurately demonstrate anatomical relationships between the oesophagus, stomach, and adjacent mediastinal and abdominal structures.

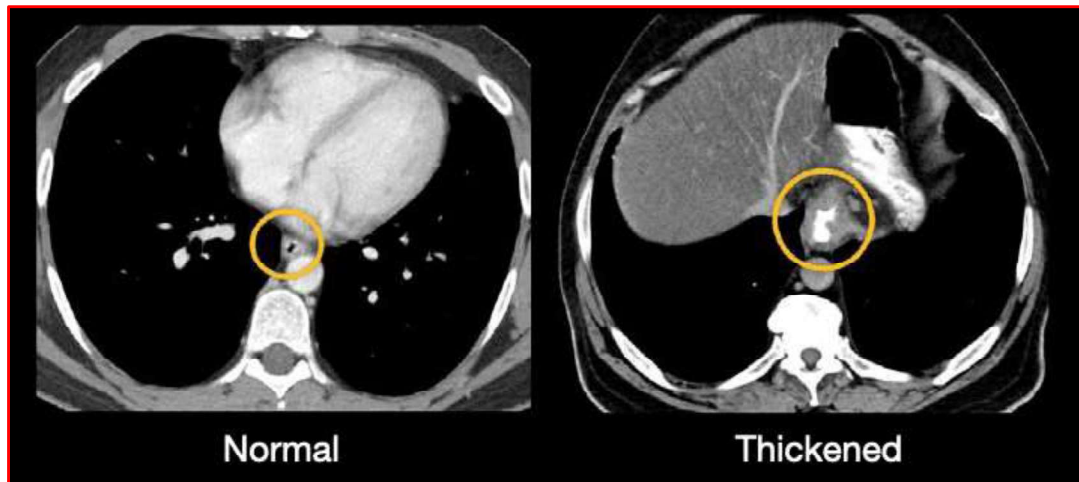
From a technical perspective, correct selection of scout scan coverage for the es ensures that areas of anatomical transition, such as the gastroesophageal junction, are fully included and not partially imaged. Adequate coverage also supports consistent evaluation of wall morphology and luminal configuration across the upper gastrointestinal tract, contributing to optimal image interpretation and reducing the risk of incomplete anatomical assessment.

Image Display and Windowing

CT images of the esophagus and stomach are primarily reviewed using soft-tissue window settings, which allow visualization of the organ walls and surrounding fat planes. Axial images serve as the primary reference, while coronal reformatted images assist in understanding organ length and orientation. In selected cases, alternative window settings may support visualization of air-filled portions of the esophagus.







Technical Considerations Affecting Image Appearance

CT appearances of the oesophagus and stomach may vary according to patient preparation, degree of luminal distension, and imaging technique. Apparent wall thickening or luminal narrowing should always be interpreted with consideration of physiological factors and technical influences rather than assumed pathology.

The appearance of the oesophagus and stomach on CT images is influenced by several technical and physiological factors. Adequate luminal distension plays a key role in proper wall visualization, as under distension may exaggerate wall thickness or obscure luminal contours. Patient motion and respiratory phase during image acquisition can further affect image sharpness and wall definition, particularly in the upper abdomen and distal oesophagus. Understanding how these factors influence image appearance helps students recognize normal anatomical variation and differentiate between true anatomical findings and technique-related effects.

Slice thickness plays an important role in the appearance of the oesophagus and stomach on CT images. Thicker slices may increase partial volume effects, leading to apparent wall thickening or loss of fine anatomical detail. In contrast, thinner slices improve spatial resolution and allow clearer visualization of luminal contours and wall morphology. Understanding the impact of slice thickness helps students recognize how technical choices can influence image appearance without reflecting true anatomical abnormality. On the other hand, Oral contrast administration may be used in CT imaging of the oesophagus and stomach to improve luminal visualization and assist in assessing wall configuration. Adequate distribution of oral contrast helps distinguish the lumen from the surrounding wall and adjacent structures, while inadequate or uneven filling may alter the apparent thickness or shape of the gastrointestinal tract. Awareness of the role of oral contrast supports accurate interpretation of image appearance from a technical perspective.

Advantages and Limitations

CT imaging provides a comprehensive anatomical overview of the esophagus and stomach by enabling cross-sectional visualization of the organs and their surrounding mediastinal and abdominal structures. The technique offers rapid image acquisition and clear depiction of anatomical relationships, making it particularly useful for assessing wall morphology, luminal configuration, and adjacent anatomy in a single examination. However, CT primarily provides anatomical information and does not directly assess functional aspects such as motility or physiological activity. Recognition of these limitations is important to ensure appropriate interpretation of CT images within a technical and anatomical context.

Posttest:

الاختبار البعدي:

1. What's the Advantages and Limitations of CT for stomach?
2. What's the most anatomical land mark seen in CT of esophagus & stomach?

References:

المصادر:

References

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8. Seeram, E. *Computed Tomography: Physical Principles, Clinical Applications, and Quality Control*. 4th ed. St. Louis: Elsevier; 2016.
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