

## Abdominal CT Scan

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**Abdominal computed tomography (CT) is an excellent modality to visualize abdominal contents. It entails the use of specific X-ray machines to image the inside of the abdomen. It provides detailed images of abdominal organs such as liver, pancreas, spleen, kidneys, gastrointestinal tract, colon, and rectum. Compared with conventional plain X-rays, CT scans provide comprehensive insight, including cross-sectional images of abdominal contents. Abdominal CT with contrast can be used to highlight the relevant structures in the abdomen and provide a definitive diagnosis of abdominal pathology.**



## Background

**Computed tomography (CT)** is a non-invasive diagnostic imaging modality that uses electromagnetic radiation (X-rays) to create detailed images of the body structure.

It entails the use of a CT scan machine that produces multiple X-ray beams from different directions focused on the patient positioned inside. The X-rays are later processed to create images of the examined part of the body based on the differences in tissue density of the body parts. For instance, some tissues (e.g., air, fluid) allow a majority of X-rays to pass through, while others (e.g., bone) allow only a few X-rays to penetrate across. Therefore, when an X-ray beam is focused on the body, tissues with different densities are delineated clearly and the images are reconstructed accordingly.

Although the exposure to electromagnetic radiation is greater in a CT scan than in a

conventional plain X-ray radiograph, the images obtained are more precise and meticulous.

A **CT scan of the abdomen and pelvis** facilitates the diagnosis of acute abdomen, diseases of the gastrointestinal tract and other internal abdominal organs. In an optimum setting, an abdominal CT scan is performed unenhanced (without contrast), with intravenous, oral, and rectal contrasts administered simultaneously. A contrast medium enhances the visibility of the tissue structures by enhancing the contrast among various tissues.

The use of plain chest and abdominal radiographs has many advantages, for instance, low radiation exposure, short duration, cost-effectiveness, and greater convenience. However, plain radiographs occasionally fail to accurately delineate the location of the abnormality. A CT scan is preferred in such cases and is often the modality of choice.

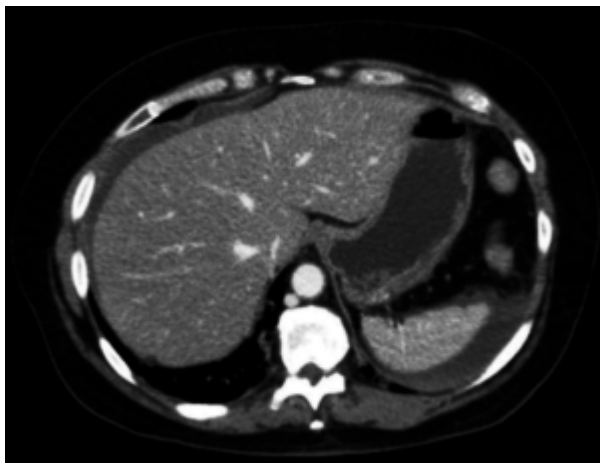
## Oral Contrast and Abdominal Computed Tomography

Oral contrast use is beneficial for the diagnosis of specific cases of acute abdomen. Small-sized abnormalities of the upper gastrointestinal tract, for instance, ulcers, obstructions or space-occupying lesions, are better visualized with contrast-enhanced CT, especially oral contrast enhancement.

Its use is limited in certain conditions, such as:

1. Patients with ileus intolerant to oral contrast
2. Patients with illnesses that cannot tolerate oral contrast and warranting the use of an intragastric tube route
3. The time between the administration of contrast and the CT scan. Patients typically need to wait for approximately 90 minutes before they perform a CT scan, which might be unethical in some scenarios or impractical in an emergency setting.

## Intravenous Contrast and Abdominal Computed Tomography



**Image:** "Abdominal computed tomography (CT) scan (axial) with intravenous contrast demonstrating an important hemoperitoneum with densities around the spleen and the right lobe of the liver." by Hassani KI, Bounekar A, Gruss JM. License:

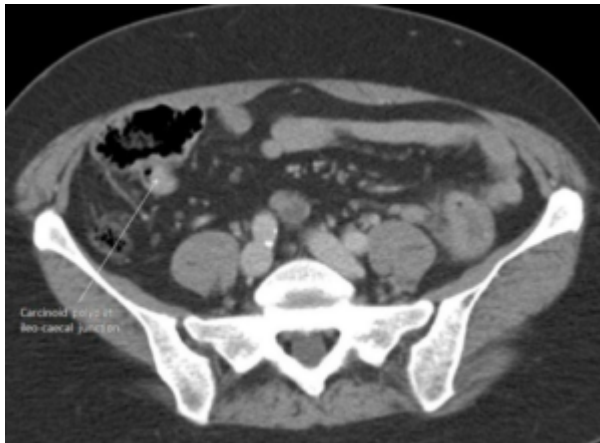
Intravenous contrast is often used in suspected gastrointestinal inflammatory pathologies, arteriovenous malformations, or space-occupying lesions.

The rationale behind using an intravenous contrast is that inflammatory lesions are more likely to absorb a specific contrast due to endothelial cell disruption compared with healthy tissues.

The use of intravenous contrast is limited under certain conditions, for instance, allergic reaction to intravenous contrast, and renal impairment.

Intravenous contrast dose adjustments are necessary for patients with renal impairment. Patients with acute abdomen are prone to acute kidney failure, which is a contraindication for the use of intravenous contrast.

## Rectal Contrast and Abdominal Computed Tomography



**Image:** "CT scan image showing polypoid lesion at ileocaecal junction" by Aslam MI, Salha IB, Muller S, Jameson JS. License: [CC BY 3.0](#)

Rectal contrast facilitates visualization of colonic pathologies, such as:

- Tumor
- Obstruction
- Perforation
- Diverticula
- Inflammatory changes

The risks associated with rectal contrast are limited to contrast extravasation and procedural delays.

## Emergency Abdominal Computed Tomography

In an emergency setting, abdominal CT is often preferred for the timely diagnosis and management of hemodynamically **stable** patients. It is impractical to follow the usual complete protocol; therefore, contrast use should be individualized.

For instance, contrast use is not required in case of suspected intra-abdominal hemorrhage, while it is required in suspected parenchymal pathologies. A patient with

suspected bowel obstruction might need both oral and rectal contrast.

## Impact of Emergency Abdominal Computed Tomography on the Management Plan

A CT scan of the abdomen reveals a significant pathology in up to two-thirds of the cases presenting with acute abdomen. An emergency abdominal CT scan is used to detect the most common pathologies including inflammatory, infectious and obstructive diseases.

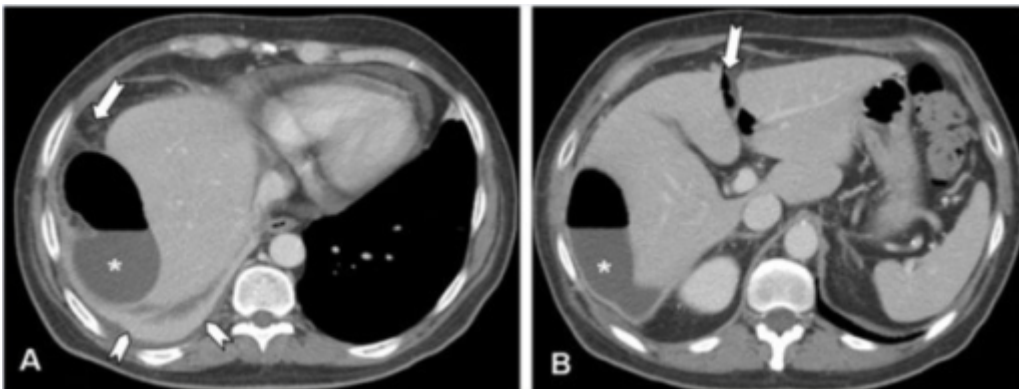
After a CT scan of the abdomen, no intervention is needed in half of the cases, while surgical intervention is needed only in a quarter of all the cases. Therefore, emergency CT scans of the abdomen facilitate the management of patients and are indicated in hemodynamically stable patients presenting with an acute abdomen in emergency.

## Multiple Detector Computed Tomography

Multiple detector computed tomography (**MD-CT**) scans of the abdomen are beneficial in the emergency setting. **This technique is faster than conventional CT scans** and produces images of better quality.

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The diagnostic quality of MD-CT in pathologies of the small bowel and colon is excellent and comparable to magnetic resonance imaging (MRI). The terminal ileum is usually better visualized compared with the rest of the small bowel. In one study, approximately 95% of the patients with confirmed positive colonic pathology showed an abnormal MD-CT scan of the colon. It also facilitates accurate detection of fistulas, extraintestinal abscesses, and enlarged lymph nodes.



**Image:** "Multi-detector contrast-enhanced computed tomography. Axial scans at the level of the upper abdomen are shown. In (A), a huge air-fluid collection (asterisk) can be seen in the right subphrenic space with mild stranding of the surrounding fat (arrow). There are also reactive pericardial and pleural effusions, the latter with associated atelectasia of the right lung base (arrowheads). In (B), the air-fluid collection (asterisk) appears to extend to the perihepatic space. Extraluminal air bubbles can also be detected in the fissure of Teres' ligament (arrow)" by Camera L, Calabrese M, Romeo V, Scordino F, Mainenti PP, Clemente M, Rapicano G, Salvatore M.

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## References

Schreyer, A. G., Hoffstetter, P., Daneschnejad, M., Jung, E. M., Pawlik, M., Friedrich, C., ... Zorger, N. (2010, February 6). *Comparison of Conventional Abdominal CT with MR-Enterography in Patients with Active Crohn's Disease and Acute Abdominal Pain*.

Retrieved March 12, 2018, from

<https://www.sciencedirect.com/science/article/pii/S1076633209005959>

Hill, B. C., Johnson, S. C., Owens, E. K., Gerber, J. L., & Senagore, A. J. (2010, January 7). *CT Scan for Suspected Acute Abdominal Process: Impact of Combinations of IV, Oral, and Rectal Contrast*. Retrieved March 12, 2018, from

<https://link.springer.com/article/10.1007/s00268-009-0379-6>

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