Computed tomography of the upper abdominal organs

Procedure: Ct  
Bodypart: Abdomen  
Patient Group: Female Male

Summary
Synonyms: Upper abdomen CT, MDCT of the upper abdomen  
A computed tomography (CT) of the upper abdomen is a conventional secondary examination procedure when an ultrasound examination of the upper abdomen organs provides no clear results. With the use of X-rays and special computers it is possible to depict organs of the body in tomogram (cross-sectional) images. Thereby the radiologist can gain information about the inside of the body and potentially assign the changes to a certain clinical condition, thus making the appropriate treatment possible. The examination shows changes in the region of the upper abdominal organs (liver, gallbladder, pancreas, spleen, kidneys), as well as in the vessels and upper abdomen lymph nodes.

Technique
What it is
A CT of the organs of the upper abdomen is an ultra-modern procedure that uses X-rays and special computers to examine the organs of the upper abdomen. Tomograms of these organs are generated and then assessed by the radiologist on a monitor.

How it works
For CT, X-rays are produced and bundled in a high performance generator. This radiation source rotates continuously around the lying patient for several seconds. A receiver (X-ray detector) is located opposite the X-ray source. The X-rays from the high performance generator pass through the body at a position selected by the radiologist. With a CT of the upper abdomen organs, the X-rays pass through the upper abdomen. The X-rays are attenuated when they pass through the body and lose part of their energy. The attenuated X-rays are then measured by the receiver unit detector. The whole system - X-ray source and detector unit opposite it - rotate around the patient's body for several seconds. Thousands of measurements are made and the high-performance computer creates between several hundred and a thousand tomograms of the examination area. This equipment is not visible to the patient as it is inside a case (gantry). The computer recognizes the different tissue structures of each layer and constructs an image in different shades of grey. Calcium, for example, appears bright grey while air and fluids appear dark grey.

Purpose
By means of a CT of the upper abdomen organs an assessment of the gallbladder, the pancreas, the spleen, the kidneys as well as the abdomen vessels including the abdominal aorta is possible. Very different conditions or complaints can be clarified, (e.g. stomach ache, liver functional disorders, gallstones, kidney stones and pathological changes in organs including tumours and malformations). It is also possible to take CT-specific samples of organs (biopsies). Inconclusive results from a preliminary examination (e.g. ultrasound or X-ray) can be definitively assessed. The aim is to discover all changes, and to differentiate benign and malignant changes where possible, so that the appropriate treatment can be introduced if necessary.

**Target Patient Group**

A CT of the upper abdominal organs is frequently carried out to clarify the inconclusive results of a preliminary examination (e.g. ultrasound, X-ray). Examples are:

1. Painful upper abdomen, bloated abdomen
2. Clarification of bad liver function values (liver dysfunction)
3. Enlarged upper abdominal organs, suspicion of a tumour
4. Exclusion/search for metastases (metastases from a known tumour)
5. Suspicion of inflammatory changes in the upper abdominal organs (e.g. liver, gallbladder, pancreas)
6. Stones in the gallbladder, the bile ducts or in the kidneys
7. Dilatation (aneurysm) of the abdomen aorta
8. Changes in the lymph nodes
9. Follow-up after an operation
10. Malformations

**Procedure**

**Persons**

You will be looked after by an experienced team consisting of a medical radiology technician (MRT) and a radiologist. In addition, you will also be observed from the switch-room via a monitor. The assistants (MRTs) can hear you and speak to you throughout the entire procedure. The radiologist examines and analyses the images after the examination. Then a report is drawn up. The report is either given to you or sent on to the doctor who referred you.

**Preparation**

1. You should eat no solid food for at least 4 hours before the procedure. You can drink as much water as you like.
2. You should take your usual daily medication with some liquid in the morning.
3. If you are a diabetic, please ask your doctor how you should take your medication on the day of your procedure. If you think that your blood sugar levels are low, please inform the MRT immediately.
4. Before the procedure, please tell the radiologist about all medication you are taking.
5. Please bring your up-to-date lab results with you (no more than 7 days old).

**Precautions**

Please be sure to inform the doctor if one of the following applies:

1. Pregnancy: If you are pregnant, this examination is absolutely NOT suitable for you.
2. Allergy to iodine: If you have ever had an allergic reaction to iodine, there is a high risk associated with administering these substances again. However, if the allergic reaction was only minor, it is possible to minimise the risk of a further allergic reaction by administering an appropriate drug. Please contact the doctor who referred you before the procedure.
3. Diabetes mellitus: If you are diabetic and need medication daily, please clarify with your family doctor before the procedure which medicines you should stop taking before/after the CT.
4. Thyroid gland disorder: If you suffer from an untreated hyperthyroidism (hyperactivity of the thyroid gland), then the contrast agent can cause a state of shock (thyrotoxic crisis). We therefore ask you to clarify this with your doctor beforehand and to treat this condition with medication. Then there will be no increased risk.
5. Kidney disorder: If you suffer from renal impairment, your laboratory results will determine whether or not you can be given contrast agent. Otherwise your kidneys must be protected from further damage through a special preparation (infusion). Please discuss this beforehand with the doctor who referred you.

**Duration**
The entire procedure including preparation takes about 10 minutes. There may be delays before the procedure if emergency patients have to take precedence. Please always allow sufficient time in your planning.

**Process**
Before the start of the procedure, you will be issued with an information sheet describing the relevant procedure again and asking you questions about pregnancy, current illnesses, allergies, intolerances and previous illnesses. The procedure is performed with your upper body undressed. You will usually be given a gown to wear during the procedure. Note that all foreign objects (such as necklaces, bras, etc.) must be removed before the procedure to guarantee optimum image assessment. Metals, for example, make the evaluation of the images harder or even impossible. Before the start of the procedure and depending on the diagnostic tasks, the radiologist will consider injecting a CT contrast agent and any necessary drugs via a vein cannula in the forearm. The CT contrast agent is a substance containing iodine. It causes a visible contrast in the individual tissue types and helps the radiologist to distinguish healthy from diseased tissue. An exact diagnosis is thereby often possible without an operation or a biopsy (removal of a tissue specimen). The procedure is usually performed with the patient lying on their back. During the examination you will be instructed to hold your breath for a few seconds to avoid possible artefacts (errors) caused by respiration. When the examination is over you can take a seat in the waiting room. The doctor/MRT checks the images and then removes the vein cannula after 20 minutes at the latest. Then you can go home. The results of the procedure will either be given to you or sent to the doctor who referred you.

**After procedure**
You will usually be able to go straight home after the procedure. Please tell an MRT immediately if you feel dizzy or sick. They will advise you to remain still until the symptoms improve, or for at least 30 minutes. In certain cases you may also be given medication to deal with the nausea. If you have come by car, please check with the medical staff after the procedure whether you have been given any medication which might affect your concentration and prevent you from driving home by car. You are asked to drink a lot during the course of the day so that the contrast agent leaves the body as rapidly as possible.

**Consideration**

**Risks**
A CT of the upper abdomen organs is a very low-risk procedure. An intolerance reaction to contrast agent is very rare. You may develop a rash and/or itching in such cases. The symptoms are usually only short-lived and disappear of their own accord. If necessary, medication may also be administered in the form of so-called antihistamines. On extremely rare occasions, severe allergic reactions (anaphylactic shock) may occur, accompanied by breathing and circulation problems and/or loss of consciousness. Depending on its severity this can be a life-threatening reaction and requires immediate medical attention. A CT of the upper abdomen organs uses X-ray radiation. To ensure your safety the X-ray level is reduced to a minimum. However, as X-rays can damage unborn life, this procedure is not carried out if you are pregnant.

**Alternatives**
An ultrasound scan is a simple, cost-effective, alternative procedure for assessing the upper abdominal organs. Here, the body is not exposed to X-rays, but small changes often cannot be clearly depicted. A further simple low-radiation alternative is the...
conventional abdomen X-ray. This procedure is only suitable for certain diagnostic tasks (e.g. obstructions of the small or large intestine, free air in the abdominal cavity, radio-opaque stones, swallowed foreign bodies). These are easily assessable but the precision and usefulness of this procedure are considerably lower than with a CT of the upper abdominal organs. Magnetic resonance imaging (MRI) is an additional or alternative procedure. As in a CT, images are produced before and after the use of contrast agents. No X-rays are used, so this examination is also suitable for pregnant women.

FAQ

**Can I have a computed tomography if I am highly claustrophobic?**
Yes. Computer tomography should not be confused with magnetic resonance imaging (MRI; nuclear magnetic resonance imaging). In a CT, the patient is lying on the examination table, which moves through a narrow "ring" (gantry). You always have a clear view of the examination room and therefore should not be concerned.

**Should a CT of the upper abdomen organs be performed as a screening test like a blood test, for example (once a year)?**
No. The method is not suitable for use as a preventative measure. It should only be performed if certain conditions are fulfilled and your doctor feels that it is justified.

**Do I have to be an in-patient in the hospital to have a computed tomography?**
No, the procedure can also be performed if you are an out-patient. You can go home again afterwards unless there are other medical reasons why you should not do so.

**Which patients should not undergo this procedure?**
This procedure is generally suitable for all patients. For pregnant patients and patients that have a manifest thyroid hyperfunction (hyperthyroidism) this procedure can only be carried out under exceptional circumstances and in the case of a life-threatening condition. Use of this method should be considered very carefully before undertaking the procedure in the following cases, and preparatory measures should be taken if applicable: Contrast agent allergies, frequent previous examinations, recent previous contrast agent use, the taking of certain drugs for the treatment of diabetes mellitus, restricted kidney function (renal failure), a treated thyroid hyperfunction, multiple myeloma plasma cell tumours (cancer of the bone marrow).

**Is a computed tomography of the upper abdominal organs the examination of the first choice for an acute stomach ache?**
No. The doctor decides which initial procedure is appropriate depending on the exact symptoms, the clinical examination, and the patient's laboratory results. An ultrasound examination of the upper abdominal organs and/or a conventional abdomen X-ray is usually carried out first. Computed tomography or magnetic resonance tomography procedures are mainly used when preliminary examinations of the upper abdominal organs have presented inconclusive findings (e.g. poor ultrasound quality in very overweight (obese) patients or patients severely bloated with gas). These procedures make it possible to recognise and to assess even the smallest changes.

**What do I need to bring with me?**
You should bring your up-to-date lab results (no more than 7 days old), showing results for the kidneys and thyroid gland in particular.

**How much radiation will I be exposed to?**
The radiation exposure during a CT of the upper abdomen organs is dependent on the duration of the procedure. The exposure is approximately 2-5 mSv, an exposure which equates to a natural radiation exposure of about 1.5 years.

Citations

1 - Team General Hospital Vienna