Ultrasound examination of normal gall bladder and biliary system

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Abstract

Biliary system diseases are a common pathology in medical practice. A frequent situation in everyday practice is a patient with pain in the right upper quadrant, in which the suspicion of biliary disease is the first diagnosis to confirm or exclude.

Ultrasound is a reliable method for the evaluation of the biliary system and is the first method of choice when a biliary disease is suspected.

Ideally a correct examination of the gallbladder and the biliary tree is performed on fasting patients. The gallbladder is evaluated by means of right subcostal oblique sections while for the hilum evaluation sections perpendicular on the ribs are used. The structures are assessed regarding their size, wall thickness and content.

Keywords: gallbladder, biliary system, ultrasonography

Biliary system diseases are a common pathology in medical practice. A frequent situation in everyday practice is a patient with pain in the right upper quadrant, in which the suspicion of biliary disease is the first diagnosis to confirm or exclude.

Ultrasound is a reliable method for the evaluation of the biliary system and is the first method of choice when a biliary disease is suspected. It is actually a routine examination in the daily practice, performed in asymptomatic patients as a screening tool, but also for the evaluation of any abdominal pain. It is an accurate, safe, non-invasive, inexpensive, accessible, repeatable imaging modality, highly sensitive and specific for the detection of gallstones and biliary obstruction, which also frequently demonstrates an alternate diagnosis as the cause of the patient’s symptoms when the biliary system is normal. But it is an operator dependent method that has a few limitations in several situations as obesity, surgical dressings, distended abdomen due to intestinal gas.

The gallbladder is a saccular structure for bile storage, situated in the gallbladder fossa of the posterior right hepatic lobe. It is divided into fundus, body, infundibulum (Hartman’s pouch, which is the portion of...
body that joins the neck) and neck. It has a pear or tear-drop shape, laterally situated to the second part of the duodenum and anteriorly to the right kidney and transverse colon.

Ideally a correct examination of the gallbladder and the biliary tree should be performed on fasting patients (they should not eat or drink anything at least 8 hours before ultrasound examination), because fasting distends the gallbladder and reduces the bowel gas for an optimal visualization. In emergency situations, however, the examination can be also performed if the gallbladder is partially contracted.

It is recommended to take a short history of the patient and to palpate the abdomen before the examination, in order to complete the ultrasound information with clinical data.

The “real-time” examination should be performed in all standard and any other necessary planes. Routinely, a convex multifrequency (2-5 MHz) transducer should be used for the evaluation of the gallbladder. The examination can be started in a supine position and continued with the patient in a left lateral decubitus (a mobile content of the gallbladder will then move with the patient position change). Sometimes, in order to demonstrate the mobility of gallbladder stones, prone or standing positions can be used. The examination can start with a right subcostal oblique section, following the ribs, angling the probe superiorly in order to avoid the bowel while the patient is asked to take a suspended full inspiration. Longitudinal sections can be used in the same area as well as intercostal sections (depending on the position of the gallbladder).

Useful landmarks for the evaluation of the gallbladder are the edge of the right hepatic lobe and the liver hilum. In the right subcostal oblique section, the landmark structure to be used is the interlobar fissure and the gallbladder will be found by aligning the probe with the fissure and then tilting it. The gallbladder is located inferiorly or laterally to the fissure (between liver segments IV and V). It should be evaluated regarding the size, wall thickness and content. The normal gallbladder will have an anechoic content, with thin (1-3 mm) echoic walls (fig 1-3). If the patient is not fasting the gallbladder will be partially contracted and the walls will appear thicker (fig 4, fig 5).

The demonstration of the cystic duct is easiest in deep inspiration with the patient in supine or left lateral decubitus. It is visualized beginning from the infundibulum of the gallbladder.

The next step in the evaluation of the biliary system is the visualization of the main biliary duct (MBD). It can be demonstrated with the patient in supine or lat-
eral decubitus by using a perpendicular on the ribs section in the right hipocondrum. The main biliary duct appears as a tube situated in front of the portal vein (fig 6). In the same section the hepatic artery will appear as a round structure between the MBD and the portal vein. Sometimes, if there is a good acoustic window, the MBD can be also followed into the retro pancreatic portion. It must be evaluated regarding the size (normal up to 6 mm), wall thickness and content. After colecystectomy the normal size of the MBD may increase.

Normally, the intrahaepatic biliary ducts are not visible (they become visible when they are dilated). Sometimes they can be also visualized in the left liver lobe in normal subjects, accompanying the portal branches.

The evaluation of the biliary system as presented here allows the ultrasonographists to answer the question if there is or not a suspicion of biliary disease.

Selective references