

# Diagnostic imaging methods in the examination of the gallbladder and bile ducts

## Anatomy of the bile ducts

 For more information see *Bile ducts*.

## Native image of the abdomen

A native abdominal radiograph is the basic investigative method for acute conditions. Of the pathologies of the biliary tract, the following can be imaged:

- **aerobilia**,
- **gallstones** (if those are calcified),
- **metal clamps** after cholecystectomy,
- exceptionally **gas in the gallbladder wall** in emphysematous cholecystitis,
- **gallstone ileus** (ileus caused by the penetration of the gallstone into the small intestine and its wedging usually in the area of the Bauhin's valve),
- **sentinel loop** (reactively dilated loop of the small intestine, e.g. in cholecystitis),
- **the position of the biliary stent**.

Native image of the abdomen: cholecystolithiasis (<http://atlas.mudr.org/Case-images-Cholecystolithiasis-gall-stones-300>)

## Ultrasound

Also a basic examination method. Reliably shows:

- **widening of the bile ducts**,
- **gallstones, sludge** (sand, sediment),
- **inflammatory changes of the wall of the gallbladder (thickening, stratification, hyperemia, streak of fluid)**,
- **postoperative complications after cholecystectomy** (bed hematoma, impaired vascular supply to the liver),
- **the position of the biliary stent** (and its patency, which is manifested by aerobilia),
- **the cause of obstruction** (sometimes it is possible to visualize the cause of obstruction leading to the enlargement of the bile ducts – tumor, gallstone in the bile duct, enlarged lymph node, expansion in the liver parenchyma or in the head of the pancreas).

X-ray pneumobilia: negative filling of the hepatocholedochus and central intrahepatic branches (<http://atlas.mudr.org/Case-images-Pneumobilia-914>)

Ultrasound: pneumobilia (<http://atlas.mudr.org/Case-images-Pneumobilia-208>)

T-drain cholangiography: three facet defects in the contrast filling of the hepatocholedochus correspond to concretions (<http://atlas.mudr.org/Case-images-Cholangiography-T-drain-choledocholithiasis-689>)

Perioperative cholangiography: inhomogeneous contrast content of bile ducts in the presence of mucus and sludge (<http://atlas.mudr.org/Case-images-Cholangioitis-acute-perioperative-cholangiography-486>)

## Cholangiography

### Perioperative cholangiography

It is performed during the surgical procedure. The injection is usually through a cannula inserted through the *ductus cysticus*. The examination is usually performed with a focus on the presence of residual stones (filling defects) in the bile ducts. The outflow of contrast medium into the duodenum is also monitored.

### T-drain cholangiography

If a T-drain is inserted peroperatively into the hepatocholedochus, cholangiography can be performed to exclude residual choledocholithiasis, evidence of a fistula or bile leak.

## CT

Hepatocholedochus, the central intrahepatic bile duct, can be well imaged on computed tomography. CT is indicated for unclear findings on ultrasonography, suspected tumor of both the bile ducts, gallbladder and surrounding structures – especially the pancreas and liver, as well as to show the complications of cholangitis and cholecystitis (abscess).

## MRCP

MR cholangiopancreatography is a native MR examination of the bile tree. It is a non-invasive alternative to ERCP where we do not anticipate the need for intervention. It is used to detect choledocholithiasis, strictures and dilatations (e.g. in sclerosing cholangitis), stenoses (including tumorous). In addition to the bile ducts, it also displays the *Wirsungi duct*.<sup>[1]</sup>

## ERCP

Endoscopic retrograde cholangiopancreatography.

 For more information see *Endoscopic retrograde cholangiopancreatography*.

## PTC

Percutaneous transhepatic cholangiography is a radiological interventional method to provide so-called external biliary drainage where ERCP cannot be performed due to difficult anatomical conditions or in postoperative conditions. A thin drain is inserted percutaneously through the liver parenchyma under skiascopic control using a Chiba needle (Seldinger method) up to the large bile ducts. The procedure is difficult to perform if the intrahepatic bile ducts are not dilated (here the procedure usually lacks even an indication).

## Links

### External links

- Pictures at atlas.mudr.org
  - T-drain cholangiography: choledocholithiasis (<http://atlas.mudr.org/Case-images-Cholangiography-T-drain-choledocholithiasis-689>)
  - ERCP: choledocholithiasis (<http://atlas.mudr.org/Case-images-Choledocholithiasis-bile-duct-stones-ERCP-301>)
  - CT: porcelain gallbladder (<http://atlas.mudr.org/Case-images-Porcelain-gall-bladder-821>)
  - USG: emphysematous cholecystitis (<http://atlas.mudr.org/Case-images-Emphysematous-cholecystitis-peri-cholecystitic-abscess-953>)
  - USG: biliary stent obstruction, dilatation of intrahepatic bile ducts (<http://atlas.mudr.org/Case-images-Obstruction-of-biliary-stent-dilated-intrahepatic-biliary-ducts-503>)
  - CT: gallbladder cancer (<http://atlas.mudr.org/Case-images-Carcinoma-of-gallbladder-446>)
- Teaching portal of the 1st Faculty of Medicine, Charles University - Radiodiagnostics: Quiz of ZM in imaging of the gallbladder and bile ducts (<https://el.lf1.cuni.cz/p20692027/>)

### Reference

1. VITELLAS, K.M. – KEOGAN, M.T. – SPRITZER, C.E.. *MR cholangiopancreatography of bile and pancreatic duct abnormalities with emphasis on the single-shot fast spin-echo technique* [online]. [cit. 2000 Jul-Aug]. <<https://www.ncbi.nlm.nih.gov/pubmed/10903685>>/nowiki>.