A rare indication for liver resection

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Introduction

In clinical practice, congenital abnormalities of the liver are very rare (1). Many kinds of congenital abnormalities of the liver have been described: agenesis or absence of its lobes or segments, lobar atrophy or hypertrophy, transposition of the gallbladder and Riedel's lobe (2). Riedel's lobe (named after the German surgeon, Bernhard Moritz Carl Ludwig Riedel) is a downward tongue-like projection of the anterior edge of the right liver lobe to the right of the gallbladder (3). Knowledge of this anomaly is important as it does not always remain clinically latent. The possible presence of abnormal liver has to be kept in mind whenever unexplained abdominal mass is encountered (2).

Case report

A seventy-year-old girl was hospitalized in our clinic, after being transferred from another institution, with the diagnosis of right abdomen tumoral mass and abdominal discomfort. The abdomen tumoral mass was discovered incidental, during a routine abdominal ultrasonography (U.S.) examination. Physical examination revealed that she had an abdominal mass (25 / 10 cm. in diameter, round shape, regular outline, rentenire consistency, relatively mobile versus the adjacent structures, sensitive on examination), descending below the right costal margin and costal angle, moving with respiration, with dullness to percussion in this area, corresponding with the mid-analytic line. Biohumoral characteristics: the patient presented a total bilirubin value of 1.36 mg/dl with a direct bilirubin value 0.4 mg/dl and a hematocrit value of 38%. The upper digestive endoscopy did not show any other associated pathologies. The scheduled surgical intervention showed a hepatic lobe anomaly on segment VI, with tumoral hypertrophy of Riedel's lobe, and multiple biliary cysts (fig. 3a), for which an ablation of the abnormal hepatic parenchyma was performed. The resected specimen had its own vascular pedicle which included: an arterial branch from the right hepatic artery, a portal venous branch from the right portal vein and a vein tributary to right hepatic vein (fig. 3b). On section, the resected specimen presented multiple brown-colored cysts, different from the rest of the normal hepatic parenchyma (fig. 3c). Histopathological examination revealed: diffuse collagen fibrosis delimiting parenchyma pseudonodules by biliary ducts and pseudocysts with serous content (fig. 4).

The postoperative course was uneventful, the patient being discharged six days after surgery, on a healing course.

Histopathologic examination revealed: diffuse collagen fibrosis delimiting parenchyma pseudonodules by biliary ducts and pseudocysts with serous content (fig. 4).

Conclusions

Summarizing, we can state that the Riedel's lobe, despite its reduced incidence, can pose several diagnostic problems. Not the least of these arises from the fact that most patients are asymptomatic and the diagnosis is often made as an incidental finding at the time of surgery, radiographic, or endoscopic examination, or at the time of autopsy. Accessory lobes may also simulate tumors with or without clinical signs, but in most persons this anomaly is of no clinical significance although it might erroneously be diagnosed as hepatomegaly. In cases in which the accessory lobe has a pedicle, torsion is a possible complication that can lead to ischemia or infarction.Accessory lobes may play a role in the development of neoplastic or metastatic disease. Therefore, whenever an abnormal liver mass is encountered, the possibility of an accessory lobe should be considered and the anatomical variations of the liver should be kept in mind.
Common events leading to discovery of the abnormal mass. In these cases (presence of clinical signs or complications of Riedel’s lobe) liver resection is the best treatment. Therefore, the imagistic examinations (U.S., C.T., M.R.I., and arteriography) have proven themselves to be extremely useful for outlining this pathology, always having in mind what Riedel himself said: “Anatomy and more anatomy is the essence of surgery.”

References
What is The LIVER?

An organ in the upper abdomen that aids in digestion and remove waste products and worn-out cells from the blood. It is the largest solid & glandular organ in the body.
What’s the significance of functional anatomy!? 

In order to perform segmental or subsegmental resection of the liver, the surgeon must know exactly which parts of the liver are diseased so that vascular supply and venous and biliary drainage can be preserved. Also, because of this division into self-contained units, each segment can be resected without damaging those remaining.
Ultrasound

• Is the first and the most commonly obtained method of examination in patients with RUQ pains, abnormal LFTs, or suspected liver masses.

• Is a noninvasive and excellent screening tool.

• Used to evaluate the presence of bile duct obstruction and gallstones as well as to distinguish a solid lesion from a cystic one.

• Has low sensitivity and high false negative rate for detection of liver metastases.
Ultrasound Doppler imaging can be very helpful in identifying vascular abnormalities, i.e. patency of hepatic vessels, portal vein, and IVC as well as flow direction in these vessels. Flow in the portal vein and hepatic arteries are hepatopetal (toward the liver) while flow in hepatic veins and hepatic ducts are hepatofugal (away from the liver).
CT

• Uses X-ray to acquire data that can be displayed in axial, coronal, and sagittal planes.

• I.V. iodinated contrast is commonly used in liver imaging to demonstrate any abnormal enhancement of a hepatic lesion and to show vascular structures.

• An I.V. bolus of 100 to 150 ml of iodinated contrast is often used. The contrast agent is injected into veins, travels to the heart, aorta, celiac trunk, hepatic arteries, liver parenchyma and mixes with blood in portal veins drained into venules and then hepatic veins and then out to the IVC.
the hepatic enhancement can be divided into 3 phases:

1- Arterial phase (when the contrast just fills up the aorta and the main hepatic arterial structures), kidneys also show corticomedullary differentiation

2- Portal venous phase (when the contrast disperses into the liver parenchyma (liver brighten) and mixes with portal blood (portal v brighten)

3- Equilibrium phase (Delayed phase) (when the contrast further scatters in the parenchyma and drains out the hepatic veins and also be seen in the renal collecting system).
• When searching for hypervascular lesions, such as hepatoma or metastatic disease, a three-phase technique often should be used: non-contrast phase, arterial phase, and portal venous phase.

• The appropriate delay times for scanning in the arterial phase and portal venous phase for a 2-3 ml/sec injection are 25 seconds and 70 seconds, respectively.

• The rationale behind this technique is that primary and secondary malignancies of the liver typically have hepatic arterial supply, thus will enhance during the arterial phase, whereas benign entities and normal liver parenchyma have primarily portal venous supply, therefore, will enhance during portal-venous phase of I.V. contrast.
• However, MRI is similar to CT in that it has the same dynamic multiphase contrast enhancement capability.

• MRI can be helpful in the characterization of a small (< 2 cm) benign hemangioma that is equivocal on CT.
Agenesis of the right hepatic lobe. A. CT reveals agenesis of the right lobe of the liver with compensatory hypertrophy of the left lobe.
Agenesis of the left hepatic lobe. CT shows tongue like projection (arrow) of caudate lobe at the upper image.
Development anomalies of the liver: What went wrong?

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Learning objectives

This exhibit classifies, describes and illustrates various development anomalies of the liver.

We present a comprehensive review of the imaging of development anomalies of the liver.

This exhibit will be a core learning tool for the residents and radiology physicians.

Background

Development anomalies may occur within the liver in regard to the arrangement of the liver cells, the lobules, the intrahepatic bile ducts, and also in the mesenchymal architecture of the portal areas.

The liver is frequently involved in the spectrum of situs anomalies.

The tongue-like accessory lobe of the liver (Riedel's lobe) that is related to the inferior portion of the right hepatic lobe is a common finding on nuclear medicine imaging of the liver (up to 20% in females).

Anomalous vascular branching variants are common, being present in up to 59% patients.

Biliary variants are also common, occurring in 42% of the population.

Imaging findings OR Procedure details

1) Location (situs anomalies)

Situs inversus is a rare anomaly that is characterized by mirror-image location of the abdominal organs and, in most cases, the cardiac apex relative to situs solitus. The liver
Conclusion

Recognizing these different anomalies is essential since many of them can mimic pathological conditions and others are important in surgical planning, such as living donor liver transplantation.

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References

Ultrasound images of diseases of the liver

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Normal anatomical variants

The papillary process of the caudate lobe of liver

This patient presented with abdominal discomfort and underwent sonography of the abdomen. Ultrasound images show a rounded mass in the region of the pancreatic head and isthmus. It shows the same echogenicity as the liver (see 1 and 2). This suggested the possibility of a pancreatic mass, possibly malignant. However, images 3 and 4, reveal a different diagnosis - the possible "mass" appears to be an extension of the caudate lobe of the liver. These ultrasound images are diagnostic of "papillary process of the caudate lobe of liver." This normal variant may thus mimic pancreatic or preaortic lymph node masses.

Images courtesy of Dr. Ravi Kadasne, UAE.
Riedel's lobe of liver

The above ultrasound images show what appears to be right renal lower pole mass (image in top row left). But further ultrasound imaging of the liver shows it to be an extension of the right lobe draped over the anterior surface of the right kidney. The apparent mass (M) appears to be on the tip of the tongue of liver tissue. This beak of liver tissue extending from the right lobe of liver is called Riedel's lobe of the liver and is a very rare normal variant. This patient was referred to a CT imaging center for further evaluation of the suspected mass in the tip of the Riedel's lobe. The sketch in bottom row-Right shows detailed anatomy of the Riedel's lobe. The gall bladder was visualized and appeared normal.


Elongated Left Lobe of Liver (the Beaver Tailed Liver)

Long left lobe of liver (normal variant). In certain thin individuals (usually seen in thin women), the left lobe of liver appears elongated (see ultrasound images above), and overlies the spleen. In the above pictures, the spleen is seen to be hyperechoic compared to the left lobe (the so called "beaver tailed liver"). Ultrasound images courtesy of Dr. Ravi Kadasne, UAE. The machine used here is the Philips IU 22.


Liver cyst

A) Sonography of hepatic cysts
What are congenital liver defects?

Defects of the liver at birth usually affect the bile ducts. Though rare, some congenital liver defects include:

- **Biliary atresia.** A condition in which the bile ducts are blocked or have developed abnormally to obstruct flow of bile in infants.
- **Choledochal cyst.** A malformation of the hepatic duct that can obstruct flow of bile in infants.

What are the indicators that a congenital liver defect may be present?

Congenital liver defects that affect the flow of bile share some common symptoms. The following are the most common symptoms of congenital liver defect. However, each individual may experience symptoms differently. Symptoms may include:

- Jaundice (yellowing of the skin and eyes)
- Dark urine
- Pale, white, or gray-colored stools
- Abdominal (belly) mass
- Abdominal pain
- Failure to thrive or not gaining weight

The symptoms of congenital liver defects may resemble other medical conditions or problems. Always consult your child’s doctor for a diagnosis.

How are congenital liver defects diagnosed?

Congenital liver defects that affect the flow of bile are usually diagnosed at birth or shortly afterward. In addition to a complete medical history and physical examination, diagnostic procedures for a congenital liver defect may include:
- **Laboratory tests (blood, urine and stool).**

- **Liver enzymes tests** (alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (AP), and gamma-glutamyl transpeptidase (GGT)). A series of special blood tests that can determine whether the liver is inflamed.

- **Liver function tests.** A series of special blood tests that can determine if the liver is working the way it should.

- **Liver biopsy.** A procedure in which tissue samples from the liver are removed (with a needle or during surgery) for examination under a microscope.

- **Computed tomography scan (CT or CAT scan).** A diagnostic imaging procedure using a combination of X-rays and computer technology to produce horizontal, or axial, images (often called slices) of the body. A CT scan shows detailed images of any part of the body, including the bones, muscles, fat, and organs. CT scans are more detailed than general X-rays.

- **Ultrasound.** A diagnostic imaging technique, which uses high-frequency sound waves and a computer to create images of blood vessels, tissues, and organs. Ultrasounds are used to view internal organs of the abdomen such as the liver, spleen, and kidneys and to assess blood flow through various vessels.

- **Magnetic resonance imaging (MRI).** A diagnostic imaging test that uses a combination of large magnets, radiofrequencies and a computer to produce detailed images of organs and structures in the body. MRCP (magnetic resonance cholangiopancreatography) is a special type of MRI that obtains pictures of the bile duct and internal organs.

**TREATMENTS**

Specific treatment for congenital liver defects will be determined by your child's doctor based on:

- Your child's age, overall health, and medical history
- Extent of the disease
- Your child's tolerance for specific medications, procedures, or therapies
- Expectations for the course of the disease
- Your opinion or preference

Treatment may include surgery to reconstruct or bypass the bile ducts. Sometimes, a liver transplant may be necessary.