A Study On The Morphological Variations Of The Human Liver And Its Clinical Implications In Gujarat Region

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Abstract: Background: liver is a soft, friable and largest gland in the body, occupying the upper part of the abdominal cavity just beneath the right diaphragm. The greater part of it is situated under cover of the ribs, extending to the left to reach the left diaphragm. Objective: to determine gross anatomical variations of liver and their clinical and surgical implications. To study variations in lobes, fissures and accessory lobes were observed. Material And Methods: a total of 50 formalin-fixed adult human livers, irrespective of the sex, were studied over a period of three years from Dr M K shah medical college. These livers were specifically observed for any variant or anomalous surface morphology. Result: out of 50 specimens, 16 were considered normal without any ac-accessory fissures, lobes, or presence of a pones hepatis. 34 livers had one or more morphological variations. 14 liver has accessory fissure, 10 liver are present with riedel's lobe present in liver, 10 liver are present with pons hepatic. Conclusion: liver being the largest abdominal organ, the knowledge of its normal and variant morphology is essential for the clinicians. In general, accessory hepatic fissures/sulci are potential sources of diagnostic errors during imaging. On ultrasound or computerized tomography, any collection of fluid in these fissures may be mistaken for a liver cyst, intrahepatic hematoma, or liver abscess, which would require further radiologic workup. [Chaudhari M Natl J Integr Res Med, 2022; 13(1):97-100, Published on 26/01/2022]

Key Words: Liver, Hepatic Variation, Hepatic Morphology, Riedel's Lobe, Pons Hepatic, Ac -Accessory Lobe, Fissure, Sulci

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Introduction: Liver is a soft, friable and largest gland in the body, occupying the upper part of the abdominal cavity just beneath the right diaphragm. The greater part of it is situated under cover of the ribs, extending to the left to reach the left diaphragm.

It is divided into anatomical right large and left small lobes by the attachment of the peritoneum of the falciform ligament. The right lobe is further divided into quadrate and caudate lobes by the presence of the gallbladder, the fissure for the ligamentum teres, the inferior vena cava, and the fissure for the ligamentum venosum.

The fundus of the gallbladder usually projects beyond the inferior border of the liver ,a thorough knowledge of both the normal and anomalous or variant surface features of the liver is essential while dealing with a case of an unknown abdominal mass. Hepatic anomalies can be due either to defective development or excessive development of the liver. The latter leads to formation of accessory lobes and fissures on the hepatic surface. Morphological variations of the liver are irregularities in the form, occurrence of one or more accessory lobes or presence of cyst, accessory hepatic fissure, sulci., accessory lobes can occur in numerous places.

The exact reason for the origin of accessory lobe of liver in man is still unknown. In most cases, the accessory lobe is found in the infra-hepatic position. Riedel's lobe is the best known example of a sessile accessory lobe. Accessory lobes may also trigger tumor.

Material & Methods: A total of 50 formalin-fixed adult human livers, irrespective of the sex, were studied over a period of three years from Dr M k shah medical colleges and other medical collage of Gujarat region. These livers were specifically observed for any variant or anomalous surface morphology like accessory lobe, accessory fissure and any projection from lobes of liver.

Results: Results are as follows.

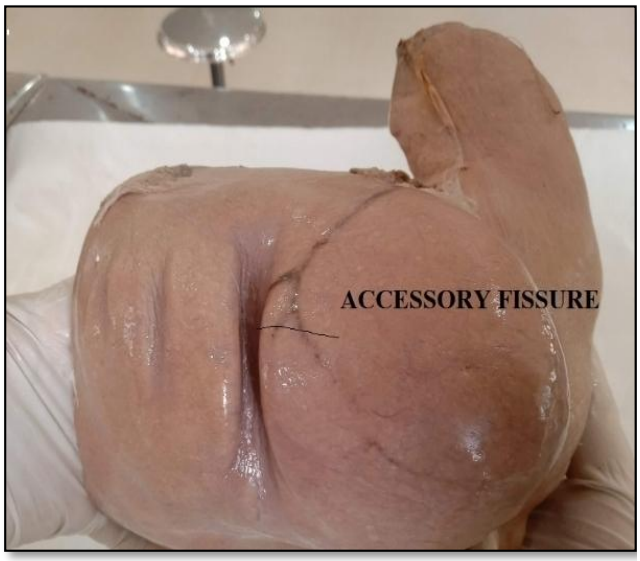
Table 1: Morphological Variation

Morphological Variation	Specimen Number	Percentage
Normal	16	32%
Accessory Fissure	14	28%
Riedel's Lobe	10	20%
Pons Hepatis	10	20%

Discussion: Discussion are as follows.

Accessory hepatic fissures/sulci: Various studies have described diaphragmatic sulci, which is the primary hepatic sulci that can be found in 40% of all liver observations [1,2,3](Figure 1).

Figure 1: Accessory Fissure



In comparison, only 28% of the livers in this study contained a measurable fissure or sulci, which could be attributed to the small sample size. Traditionally, it was understood that diaphragmatic sulci resulted from hypertrophic diaphragm muscle bands, which created variable resistances and thus promoted uneven hepatic parenchymal growth[2].

Recent radiological and corrosion cast studies, however, have also attributed the formation of sulci to the existence of weakened zones of hepatic parenchyma. Clinically, diaphragmatic sulci have been suggested to represent a useful landmark in surgery for surface projections of portal fissures with hepatic veins and their tributaries[4]. In general, accessory hepatic fissures/sulci are potential sources of diagnostic errors during imaging. On ultrasound or computerized tomography, any collection of fluid in these fissures may be mistaken for a liver cyst, intrahepatic hematoma, or liver abscess, which would require further radiologic workup[5]. In cases of abdominal trauma, imaging or direct palpation of sulcus prior to laparotomy may give a false impression of a liver laceration[6].

Accessory Lobes: Accessory lobes are composed of normal parenchyma in continuity with the main liver mass and are supernumerary in nature (Figure 2). This contrasts with ectopic liver lobes which do not have this continuity. Found commonly in the right intrahepatic region, accessory lobes have varied form, localization, size, and attachment[7]. Accessory lobes are grossly underreported as they are often asymptomatic, with various studies indicating a prevalence of 1-12% [8].

Riedel's lobe was described by corbin in 1830 and defined by riedel in 1888 as a "round tumor on the anterior side of the liver, the gallbladder, to its right" [9, 10, 11]. In our study, 24% of livers had a riedel's lobe (Figure 2).

Figure 2: Riedel's Lobe

The etiology of riedel's lobe has been widely debated, with studies sup-porting a congenital or acquired origin. The con-genital origin is supported by possible defects in the development of the hepatic bud, which can lead to the formation of infra-hepatic accessory lobes.

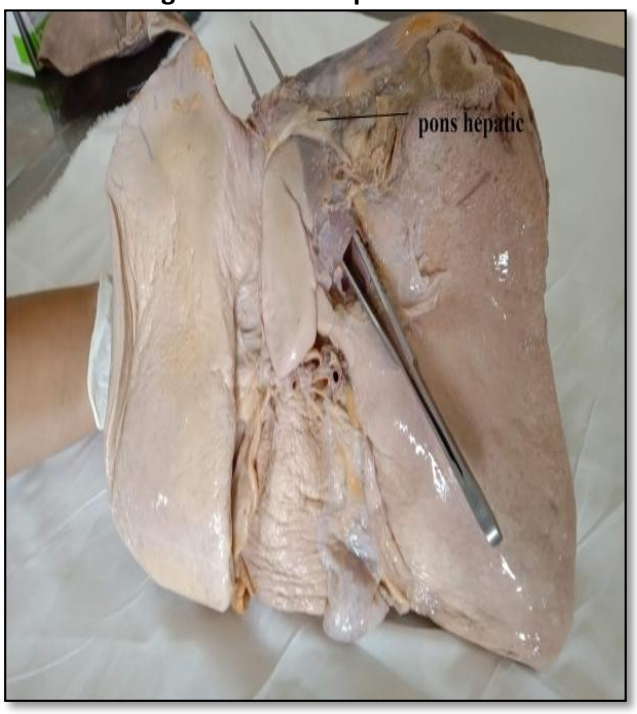
The acquired origin, however, has its roots with riedel, who attributed the lobe's presence to age-related hepatic modifications, secondary injury from surgical intervention, and intraperitoneal inflammation/chronic cholecystitis, especially with the gallbladder's anatomical relation[12]. No studies were found regarding livers that contain both riedel's lobe and other liver projections,

which could represent a unique finding that is not normally seen or diagnosed. Riedel's lobe and other liver projections are typically asymptomatic and clinically latent. Inflammation or torsion of these areas may elicit right hypochondriac and/or epigastric pain, which can easily be attributed to more common origins or be mistakenly attributed as idiopathic[12,13,14].

For definitive diagnosis, common tests include ultrasound, computerized tomography (CT), and magnetic resonance imaging (MRI). Radionuclide imaging and arteriography examination may also be appropriate to depict possible cancerous lesions and abnormal vascular/cystic features[15, 16].

Pons Hepaticus: First described by von haller in 1743, the pons hepatis (hepatic bridge or 'pont hepatique') is a segment of hepatic tissue connecting the quadrate lobe to left lobe over the ligamentum teres fissure[17]. In this study, the pons hepatis refers to hepatic tissue that surrounds the inferior vena cava. As seen in (Figure 3).

Figure 3: Pons Hepaticus



It has a wide range in morphology, which can complicate visualization and standardization of radiological reporting. Reflecting its seemingly benign nature, minimal information can be found on its prevalence, with reports ranging from 4-30%[18] in comparison, cadaveric observation in this study shows a slight increase in the prevalence of the pons hepaticus (20%), which may be due to fewer specimens analyzed in this study.

Originating from the pons hepaticus as well as harboring site of peritoneal disseminated tumor cells[19] it is also an important site and landmark for cry reductive surgeries of the liver [20, 21].

Conclusion: liver being the largest abdominal organ, the knowledge of its normal and variant morphology is essential for the clinicians. In general, accessory hepatic fissures/sulci are potential sources of diagnostic errors during imaging. On ultrasound or computerized tomography, any collection of fluid in these fissures may be mistaken for a liver cyst, intrahepatic hematoma, or liver abscess, which would require further radiologic workup.

Riedel lobe is a common anatomical variant of the liver to be aware of because it can simulate a mass. Its misidentification as a pathologic abdominal mass has led to surgery.

Pathology can also occur within it (e.g. Malignancy or even torsion) and cause atypical hepatic symptoms low in the pelvis. Accessory lobes may also trigger tumor.

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