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STUDY OF MORPHOLOGICAL VARIATIONS IN CADAVERIC HUMAN LIVER AND ITS CLINICAL ROLE

Anatomy

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ABSTRACT

Accessory fissures and lobes of liver can be a source of error during various diagnostic radiological procedures and a correct diagnosis requires awareness about these and advanced imaging techniques. Moreover, variations like Riedel's lobe can undergo malignancy. This study was done on 75 cadaveric liver specimens in the anatomy department of RNT Medical College, Udaipur to study variations in fissures and lobes of liver. Accessory fissures, Riedel's lobe, a large left lobe enveloping spleen and small gall bladder fossa, hypoplastic left lobe, pons hepatis were the few variations noticed.

KEYWORDS

Liver Morphology, Accessory Fissures, lobes

INTRODUCTION

Three major and three minor fissures are present on the surface of liver. Three major fissures contain hepatic veins and are named as main, left and right portal fissure. Main portal fissure or Cantile's line (from midpoint of gallbladder fossa to that of inferior vena cava) divides the liver into right and left hemilivers. Left one divides left hemi liver into medial and lateral and right fissure divides right hemiliver into lateral and medial sectors. Minor fissures are umbilical (fissure for ligamentum teres), venous (fissure for ligamentum venosum) and fissure of gans or Rouvier's sulcus (behind gallbladder fossa)[1]. Minor fissures are visible as physical clefts while major ones are not visible on the surface of liver. Accessory fissures are rarely observed. Grossly liver has been divided on its external appearance into right, left, caudate and quadrate lobes. Accessory lobes are rare but presence of accessory lobes especially Riedel's lobe can mimic splenic haematoma at ultrasonograms. These accessory fissures and lobes if present can be a source of error during ultrasonogram and therefore advanced modalities are required for their correct diagnosis. So, knowledge of these fissures and lobes is essential not only for radiologists but also for operating surgeons.

Aim of this study was to observe incidence of accessory fissures and any variation in lobar pattern of liver in our region.

MATERIAL AND METHOD

The study was done on 75 adult cadaveric liver specimens obtained by routine dissection in the department of anatomy at RNT Medical College, Udaipur (Rajasthan) over a period of 5 years. Liver specimens were numbered and carefully studied. Accessory fissures and lobes or any other anomaly if observed were photographed and recorded.

OBSERVATIONS AND RESULTS

Total liver specimen studied - 75

1) Accessory fissures were observed on various lobes of liver (32%)

- On Right lobe in 12 livers, most of these were on anterosuperior surface (16%) (Fig-1).
- On inferior surface of left lobe of one liver (Fig-2).

Figure 1: Deep fissure on anterosuperior surface of right lobe of liver

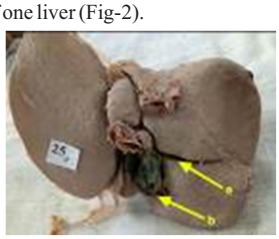

Figure 2: a) Fissure on inferior surface of left lobe of liver b) Small gallbladder fossa

- Caudate Lobe in 6 livers (8%) (Fig-3, Fig-4)
- Quadrate Lobe in 5 livers (6.7%) (Fig-3).

2) Small quadrate lobe was observed in 5 livers (7%) (Fig-4)

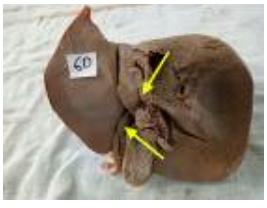

Figure 3: Fissure in caudate and quadrate lobe and small quadrate lobe

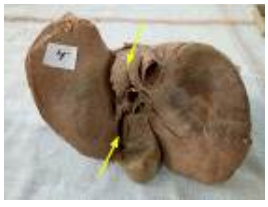

Figure 4: Fissure in caudate lobe and small quadrate lobe

3) Small gall bladder fossa was observed in 3 livers (4%) Here gall bladder does not reach up to the inferior border of liver (Fig-2).
4) Sessile Gall bladder was seen in 3 livers (4%) (Fig-5).
5) Left lobe of liver was seen as long and elongated tongue like projection in 5 liver specimens (7%) (Fig-6). In one liver specimen, left lobe was so much elongated that it reached up to the diaphragmatic surface of spleen in the left hypochondrium. No other congenital anomaly was seen in this cadaver.

Figure 5: Sessile gall bladder

Figure 6: Left lobe of liver reaching up to left hypochondrium and enveloping spleen

6) A ligament bridging left lobe and quadrate lobe (Pons hepatis) was seen in 6 specimens (8%) (Fig-7).
7) A ligament bridging right lobe and caudate lobe was seen in 8 livers (11%) (Fig-7).
8) Equal right and left lobe were observed in 3 liver specimens (4%) (Fig-8).

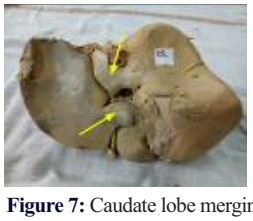

Figure 7: Caudate lobe merging with right lobe and quadrate lobe merging with left lobe

Figure 8: Equal right and left lobe

9) Riedel's lobe was seen in one liver (1%) (Fig-9)
10) Hypoplastic left lobe and absence of fissure for ligaentum teres was observed in 3 livers (4%) (Fig-10)

Figure 9: Riedel's lobe

Figure 10: Hypoplastic left lobe and absence of fissure for ligament teres

11) A deep fissure for ligament teres extending on antero superior surface in one liver (1%) (Fig-11)
12) Appendix left lobe and IVC passing through substance of the liver in one liver (1%) (Fig-12)
13) A large papillary process observed in 4 liver specimens (5%) (Fig-13).

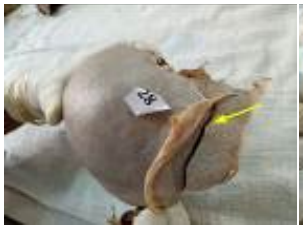

Figure 11: A deep fissure for ligament teres extending on antero superior surface

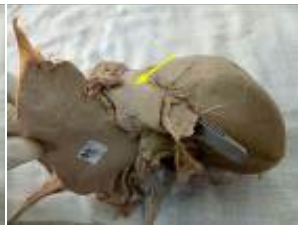

Figure 12: Appendix left lobe and IVC passing through substance of liver

Figure 13: A large papillary process and pons hepatis

DISCUSSION

In our study, accessory fissures on the surface of liver were observed in the frequency of 32%. Most of these fissures were observed on the anterosuperior surface of the right lobe. In only one specimen, fissure was observed on the inferior surface of the left lobe. Presence of accessory fissures have been reported in a frequency of 25% by Phad et al [2]and 31% by Tallapaneni etal [3]. Yong Ho Auh [4] also observed accessory fissures in a frequency of 25%. In their study commonest location was anterosuperiorly at the junction of right and left lobe. These fissures had invaginations of diaphragmatic muscle and sub diaphragmatic fat in obese persons, while in patients with ascites peritoneal fluid was observed. Fluid collection in fissures can give impressions of intrahepatic haematoma or cyst lobes. Multiple fissures are more common on left lobe and quadrate lobe. Here accessory fissures can be a source of error in diagnosis during ultrasonography and CT scan, as these can resemble a macronodular liver on USG and needs further evaluation by CT scan.

Uneven growth of the liver parenchyma due to the variable pressure by the different bundles of the diaphragmatic muscle can be the reason for development of fissures and weak zones of hepatic parenchyma are particularly susceptible to mechanical pressure of diaphragm .[5]

Grooves on the surface of liver can also be due to wearing corsets for cosmetic reasons or as a treatment for scoliosis[6]

Riedel's lobe is a rare morphological lobulation and its incidence varies from 3.3% to 14.5% depending on the diagnostic modalities used.[7]This is generally asymptomatic and is incidentally found during surgery, radiological examination, endoscopic procedure or autopsy. Though a rare anomaly, Riedel's lobe can undergo malignancy and torsion[8]. Savopoulos et al recommended that even asymptomatic patients need to undergo a follow up and monitoring for several months once the diagnosis is made.[7]

In one of the liver specimens, left lobe of liver was so much enlarged that it enveloped spleen in left hypochondrium. Such a variant of the left lobe of the liver can mimic a splenic haematoma on ultrasound examination and to differentiate for correct diagnosis, a CT scan is required. [9] Moreover defective development of the left lobe of liver can be associated with gastric volvulus. Enlarged left lobe of liver can be congenital or acquired. Acquired cause can be due to splenctomy[10]. In our case spleen was normal, and as such, extension is presumed to be congenital

Small gall bladder was observed in three of the livers. Gall bladder may be short or atrophic when there is presence of abnormal peritoneal folds like cystohepatocolic folds[5]. Gall bladder can be small or atrophied in recurrent infections due to gall stones.

A normal-sized or small papillary process may be misdiagnosed as enlarged porta hepatis nodes. An enlarged papillary process may look like a pancreatic body mass, if it extends to the left so much to displace the body of the stomach anteriorly.[12]

Pons hepatis was seen in six livers. Joshietal [13] has suggested that if normal visualisation of the fissure for ligamentum teres is disturbed due to presence of pons hepatis, dimensions of the right and the left lobes may be mistaken.

Absence of quadrate lobe was seen in two of the liver specimens. Such variation has also been reported by Dixit et al. Knowledge of agenesis of lobes is must for surgeons while planning for liver surgeries.[14]

CONCLUSION

Though accessory fissures and lobes are thought to be rare but if present they can cause error in diagnostic imaging and can have clinical implications. So, one should be aware of these during ultrasound scans and surgeries.

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