Case Report

ANOMALOUS PERITONEAL FOLDS OF LIVER WITH INCOMPLETE FISSURE FOR LIGAMENTUM TERES - A CASE REPORT

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ABSTRACT

Liver is the largest organ in the human body occupying right hypochondrium, epigastrium and left hypochondrium. The organ develops in the ventral mesogastrium dividing the latter into a cranial part which forms the falciform ligament and lesser omentum and the caudal part which normally degenerates but may persist occasionally in the form of accessory fissures, ligaments and folds. The present case report describes the occurrence of exceptional and multiple abnormal peritoneal ligaments extending between the liver, diaphragm and abdominal wall. In concurrence, an incomplete fissure for ligamentum teres hepatis is reported which resulted in a communication between the left lobe and quadrate lobe of liver. The knowledge of the normal and the variant anatomy of such peritoneal reflections of liver is of colossal significance for surgeons performing the segmental resection of the liver and radiologists interpreting radiological findings related to liver.

Keywords: Hepatophrenic ligament, Hepatocolic ligament, Peritoneal folds, Ligamentum teres hepatis, Quadrate lobe, Left lobe

INTRODUCTION

The peritoneum is the most extensive and an intricately arranged serous membrane of the abdomen. It invests the viscera partially or completely resulting in the formation of various peritoneal folds and spaces which include ligaments, omenta and mesenteries. Functionally these modifications allow mobility and serve as a channel to carry neurovascular

structures to the viscera and give some mechanical support to them. These folds and ligaments determine the route of spread of intraperitoneal fluid and serve as conduit for various disease processes [1]. Persistence of remnants of embryonic mesenteries which usually disappear may result in the formation of the abnormal peritoneal folds.

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Liver is the largest gland of abdominal cavity which develops in the ventral mesogastrium. It occupies right hypochondrium, epigastrium and a part of left hypochondrium. The organ is divided into anatomical right and left lobes by the attachment of falciform ligament anteriorly, fissure for ligamentum venosum posteriorly and fissure for ligamentum teres inferiorly [2,3]. The anatomical right lobe includes caudate lobe superiorly, quadrate lobe inferiorly along with porta hepatis lying transversely between the two lobes transmitting portal triad which includes bile duct, hepatic artery and hepatic portal vein. Each segment drains independently by either secondary or tertiary branch of portal triad respectively [4]. This classification is also accepted by the federative committee on anatomical terminology [5,6]. Segmentation of right and left lobes of liver pave way for the surgeons to resect the diseased segments independently without damaging other segments [4].

Anomalies of liver may present as agenesis of lobes, absence of segments, decrease in the size of lobes, lobar atrophy, hypoplastic lobes, transposition of gall bladder, Riedels lobe, deformed lobes and abnormal peritoneal folds. The presence of accessory lobes and fissures might result in clinical misdiagnosis and give a picture of internal trauma during post mortem study [7].

CASE REPORT

During a routine cadaveric dissection hall teaching of medical students at the Department of Anatomy, Vardhman Mahavir Medical College, New Delhi, the authors came across multiple anomalous peritoneal folds, incomplete

fissure for ligamentum teres and an unusual communication between the quadrate and the left lobe of liver. One of the peritoneal folds was inverted 'Y' shaped having a stem, medial limb and a lateral limb [Fig. 1]. The stem, 1.8 cm in length was superior and attached to the visceral surface of right lobe of liver at the junction of right and inferior borders. The lateral limb of the fold measured 2.1 cm and formed the lateral hepatophrenic ligament which was attached to the lateral abdominal wall and the diaphragm. The medial limb measured 3.3 cm, enveloped the hepatic flexure of colon and was named as hepatocolic ligament. Another interesting, slender, cylindrical peritoneal fold measuring 1.9 cm in length and 1.6 cm in diameter was observed on the right side of the falciform ligament [Fig. 2]. This fold was 3.5 cm from the inferior border of the liver/cystic notch in the midclavicular line. It connected the anterior surface of right lobe of liver to the undersurface of diaphragm and was named as anterior hepatophrenic ligament. The position and size of gall bladder were customary. The course and relations of common bile duct were configured normally. The other peritoneal reflections of the liver were not significant.

Another striking finding in this cadaver was that the ligamentum teres was partially embedded in the liver parenchyma making the fissure for ligamentum teres incomplete [Fig. 3]. The distance travelled by the ligamentum teres from the inferior border of liver to the porta hepatis was 5.6 cm. However, the fissure for ligamentum teres measuring 2.8 cm was seen only in the inferior part of visceral surface, rest of the ligament was embedded and sunk into the hepatic parenchyma up to the porta hepatis

for a distance of 2.8 cm. By virtue of the above presentation of incomplete fissure for ligamentum teres, the parenchyma of quadrate lobe was directly in continuation with the parenchyma of left lobe [Fig.3].

DISCUSSION

The liver develops in the ventral mesogastrium during third week of intrauterine life dividing it into a cranial part which forms the falciform ligament (extending from the liver to the ventral body wall) and the lesser omentum (extending from oesophagus, stomach and upper portion of duodenum to the liver). The caudal part usually gets degenerated [8, 9] but rarely it may fail to degenerate and persists as accessory fissures, ligaments and folds [1].

The present case report describes the presence of such accessory folds including hepatocolic, lateral and anterior hepatophrenic ligaments along with the presence of incomplete fissure for ligamentum teres. Hepatocolic ligament extended between the visceral surface of right lobe of liver to the hepatic flexure of colon. The authors also observed lateral and anterior hepatophrenic ligaments. The former extended between the visceral surface of right lobe of liver near the junction of right and inferior borders to the lateral abdominal wall and merged with the diaphragm. The latter was observed to stretch between the anterior surface of right lobe of liver to the undersurface of diaphragm. In the previous studies, peritoneal folds have been reported extending between greater omentum and falciform ligament [10], jejunum to the root of mesentery [11], inferior surface of liver to the gastropylorus junction [12]. Though such folds

Fig. 1. Liver showing LHPL- Lateral Hepatophrenic Ligament. HCL- Hepatocolic Ligament.

Fig. 2. Right sided abdominal cavity showing liver along with various ligaments. AHPL-Anterior Hepatophrenic Ligament. HCL- Hepatocolic Ligament. FL- Falciform Ligament.

Fig. 3. Inferior view of liver showing direct continuity (*) of liver parenchyma between quadrate lobe and left lobe. LL- Left Lobe. *- Pons Hepatis. QL- Quadrate Lobe. LT- Ligamentum Teres Hepatis.

have been reported in previous studies, but the presence of multiple peritoneal folds in the same subject has not been reported thus far to the best of the knowledge of authors making the present case report unique. The presence of accessory lobes and fissures is common in the perinatal age group, thereafter the organ undergoes postnatal reformation with the increasing age, so the occurrence of such lobes and fissures in the elderly is very rare [13].

The major folds and fissures related to liver are in use as important landmarks during hepatic imaging techniques for interpretation of anatomy of lobes and pathologies related to them. When occurring anomalously, these may act as source of errors in understanding radiologic images [14]. Hepatic imaging helps us to locate primary or metastatic liver diseases [15]. As the procedures like laparoscopic thermal ablation and hepatic resection for hepatic tumors has been increasing recently, sound knowledge of normal and variant anatomy of the folds of liver is of immense importance for the surgeons [16].

Occasionally these folds might carry blood vessels and may encircle the intestine causing obstruction as reported in a case of duodenal constriction by Low [17]. Further, collection of fluid in such fissures and folds may be misdiagnosed for a cyst, liver abscess or intrahepatic hematoma. Abnormal fissures may be misdiagnosed as pathologic liver nodules on computerized tomography [14]. These folds help us to differentiate pathological constrictions due to ulcerations from anatomical constrictions caused by such folds [1].

The current case also reported the occurrence of an incomplete fissure for ligamentum teres that never reached uphill the porta hepatis, this fact resulted in a communication between the quadrate and the left lobe of liver by a transversely placed tissue of liver parenchyma termed as pons hepatis [18].

The ligamentum teres contained in the free margin of falciform ligament is a fibrous remnant of left umbilical vein carrying oxygenated blood from the placenta to the fetus. The fissure for ligamentum teres ascends backwards and upwards from inferior border to the left end of fissure for ligamentum venosum separating the quadrate lobe from the left lobe. Incomplete fissure leads to a communication between quadrate and the left lobe as observed in the present study. The authors correlated this communication with segmental anatomy of the organ. There was noted a direct communication between the segments II (left lateral superior), III (left medial inferior) and IV (left medial superior) as classified by Couinaud in the year 1957 [4, 19]. Knowledge of segmental variations of liver is important for surgeons in planning liver transplant surgeries, Laparoscopic hepatectomy and thermal ablation. To improve the postsurgical outcome in patients with hepatocellular carcinoma, the segmental resection of liver is indicated. The latter involves the removal of the whole segment containing the tumor along with the vasculature invaded by the tumor [20, 21, 22, 23]. As in the present case report, there is a communication between III and IV segments it will pose a threat to the surgeon for removing the segments in isolation.

CONCLUSION

The present case report emphasizes on the presence and clinical aspect of anomalous peritoneal folds of liver with incomplete fissure for ligamentum teres. This knowledge may be utilized by anatomists and morphologists for reporting new anomalies, embryologists for developmental variations, surgeons for scheduling of hepatic surgeries and radiologists for preventing misdiagnosis of CT and MRI. Further such information is a prerequisite for safe surgical approaches and diagnostic imaging.

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