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Brief Communication

Cysto-duodeno-colic ligament and its clinical relevance

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ABSTRACT

During a routine dissection class for the undergraduate students at All India Institute of Medical Sciences, New Delhi, a rare uncommon variation of the peritoneal ligament was found. Information regarding variation in such type of accessory peritoneal reflections is necessary for anatomists, surgeons, and radiologists. Normally there was no peritoneal reflection between gallbladder, duodenum and transverse colon, but in the present case report, it was present and termed as cysto-duodeno-colic ligament. Knowledge of such variation is necessary during gallbladder surgeries and liver transplantation surgeries.

The peritoneum constitutes largest serous cavity in the body. Developmentally all the abdominal viscera will project into the cavity of peritoneum and take the layer of peritoneum along with them. This process results in the formation of two layers of peritoneum i.e. parietal layer covering the body wall and visceral layer covering abdominal viscera [1]. Embryological origin of the peritoneum is from the lower portion of pericardioperitoneal canals and two layers of lateral plate mesoderm (somatopleuric and splanchnopleuric layers) associated with the gut. Due to further development of various viscera, peritoneum gains complexity [2]. The layers of peritoneum covering the surface of the liver is termed as ligament, layers enclosing small intestine termed as mesentery and similarly, the layers-enclosing colon is termed as mesocolon. Some of these ligaments enclose blood vessels and lymph nodes while others are avascular and just a connecting link between adjacent organs [3]. The peritoneal folds not only act as conduits for the passage of blood vessels and lymphatic's from the retroperitoneum to reach intraperitoneal organs but also provide a pathway for the spread of disease processes and sometimes limiting space for the spread of diseases [4,5]. The peritoneal folds also form boundaries of various peritoneal spaces or recesses and become well delineated by fluid collection or abscess formation affecting the spaces [6,7]. Usually, there is no peritoneal reflection between the gallbladder, duodenum, and transverse colon, but if present is termed as a cystoduodenocolic ligament. This ligament is a double-layered membranous structure. Sometimes due to

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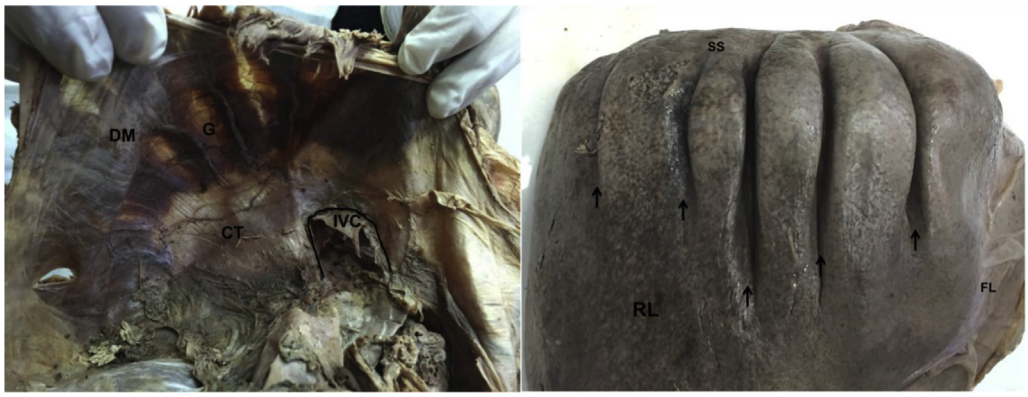

Fig. 1 – Photograph showing diaphragm and anterosuperior surface of liver. Abbreviations used: DM: diaphragmatic muscle; CT: central tendon; IVC: inferior vena cava; G: gap; SS: superior surface of liver; RL: right lobe; FL: falciform ligament. Black arrows represents diaphragmatic sulci.

its location, it acts as a gateway to the entry of lesser sac [8]. Accessory peritoneal ligaments are more common in a supracolic compartment of the peritoneal cavity. These accessory ligaments sometimes may be the reason for internal rotation, which may result in pain and strangulation [8].

Case report

During routine dissection classes, conducted for first-year Undergraduate students, a rare uncommon peritoneal reflection from the gallbladder to the duodenum and transverse colon was observed in 55 years female cadaver in the department of Anatomy, All India Institute of Medical Sciences, New Delhi, India. The cadaver had no pathological lesions, traumatic lesions, or marks of any surgical procedures in the abdominal region. The abdominal cavity was carefully dissected and then supracolic compartment was meticulously exposed. After reflecting the visceral surface of the left lobe of the liver, the supracolic compartment was properly visible. Anterosuperior surface of the liver mainly showed the presence of diaphragmatic sulci, which were multiple in number and variable in their length and depth. On examining the undersurface of the right side of the diaphragm, diaphragmatic musculature seems to be arranged in bundles, which were corresponding to the sulci on the liver [Fig. 1]. Lesser omentum, which was very thin, was attached to the lesser curvature of the stomach to the porta hepatis. The gallbladder was located along the inferior surface of the right lobe of the liver. In relation to the gallbladder and transverse colon, an accessory fold of peritoneum was present, which extended approximately from the half of the body of the gallbladder to hepatic flexure of the transverse colon and the first part of the duodenum. This accessory fold of peritoneum is termed as cysto-duodeno-colic ligament, which was approximately 4 cm in length and 1.5 cm in breadth in the present case report [Fig. 2]. There were no neurovascular structures within the ligament. This accessory ligament was differentiated from the peritoneal adhesions by tracing the two layers around the gallbladder, duodenum, and transverse colon. And this continuity confirms that it is not the peritoneal adhesions.

Fig. 2 – Photograph showing reflected part of liver and cysto-duodeno-colic ligament. FL: falciform ligament, Lthep: ligamentum teres hepatis, Rt. L: right lobe of liver, Lt. L: left lobe of liver, D: duodenum, LO: lesser omentum, S: stomach, TC: transverse colon, GB: gallbladder, Dp: diaphragm, P: pylorus of stomach.

Discussion

Developmentally single gut tube is formed attached to the body wall by ventral and dorsal mesogastrium, respectively. Ventral mesogastrium exists only in the upper part of the gut tube and complex changes occur in it due to stomach rotation. The lesser omentum and falciform ligament are derived from the ventral mesogastrium. Lesser omentum extends from the lesser curvature of the stomach and the first part of the duodenum to the porta hepatis of the liver [2].

The presence of cysto-duodeno-colic ligament between the body of the gallbladder and transverse colon attributes to the non-disappearance of ventral mesogastrium. Structural classification of cystocolic ligament depends on whether it is attached partially (type I) or completely (type II) to the body of the gallbladder [9]. The occurrence of the cystocolic ligament is associated with gallbladder anomalies and in the majority of cases, only type I cystocolic ligament is present, suggesting the role of these accessory ligaments in disruption of gallbladder anatomy and emptying of bile to the gastrointestinal tract causing GI disturbances [10]. Type I cystocolic ligament could produce differential possibilities of gallbladder shapes on ultrasonography such as the Phrygian cap, desquamated gallbladder mucosa, or extension of the spiral valve of Heister into the gallbladder neck region or polyploid cholesterolosis [11]. Sharma et al. mentioned about accessory ligament extending from inferior surface of right lobe of liver to the duodenum and hepatic flexure of colon, hence termed as hepato-duodeno-colic ligament [12]. In the present case, the ligament was extended between the gallbladder, duodenum, and the transverse colon, hence termed as the cysto-duodeno-colic ligament. The occurrence of the cysto-duodeno-colic ligament in this report is associated with a developmental anomaly of liver in the form of diaphragmatic sulci on the anterosuperior surface of the liver.

The walls of the gallbladder associated with variant peritoneal fold were reported to be thicker than those in normal cases and the reason was attributed probably to the resistance offered by the peritoneal fold during the distension of the gallbladder [10]. Sometimes, it is associated with the other developmental anomalous ligament, hampering the entry to lesser sac via epiploic foramen [12]. In the present case, the wall thickness of the gallbladder was appeared to be more and there were no other anomalous ligaments found.

Knowledge of this fold is important in gallbladder surgeries, intestinal surgeries, and liver transplantation surgeries. The occurrence of these types of anomalous ligaments is important in differentiating constrictions, resulting into internal herniation [13]. Akgur et al., in their retrospective study of eight patients, all of them presented with intestinal obstruction following anomalous peritoneal folds [14]. During laparoscopic cholecystectomy, the cystoduodenocolic ligament may obstruct the view during surgery. The presence of this ligament may cause difficulty in finding the cystic duct, which forms one of the boundaries of the Calot's triangle [15].

Conclusion

In this case report, the cysto-duodeno-colic ligament is present between the gallbladder, duodenum and the transverse colon along with diaphragmatic sulci in the liver. Knowledge of this ligament is important during gallbladder surgeries, liver transplantation, and laparoscopic surgeries.

Conflicts of interest

The authors have no conflicts of interest relevant to this article.

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