

Case Report

Laparoscopic cholecystectomy in duplicated gallbladder with symptomatic cholelithiasis – Surgical approach to a rare anatomical variation

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ABSTRACT

Gallbladder could have various abnormalities; however duplication of gallbladder is a rare variation. Different classification types of the gallbladder duplication have been identified. We reported the duplicated gallbladder in a 20-year-old male who was admitted with right upper quadrant pain. Abdominal ultrasonography revealed that the patient had two separated gallbladders and also had two cystic ducts with calculi and polyp; as a next process, laparoscopic cholecystectomy was applied successfully for the treatment. This anomaly is important in term of surgical approach.

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1. Introduction

The gallbladder is 7–10 cm long and it has also a capacity of 30–50 ml. It is located on the visceral surface of the liver in a shallow fossa. The gallbladder anatomically divided into parts which are termed as: fundus, body, infundibulum, neck, and cystic duct. The gallbladder of fundus is typically positioned at the angle between the ninth costal cartilage tip and the right border of the rectus sheath. It also lies closely to the left of the hepatic flexure of the colon and it projects beyond the lower border of the liver.¹

Gallbladder could have many diverse abnormalities. Some abnormalities such as the folded gallbladder, choledochal cyst, phrygian cap, pericholecystic fluid, gallbladder diverticulum, vascular band across the gallbladder and focal adenomyomatosis may mimic the gallbladder duplication.² It is important the determination of such anomalies that for avoiding from the complications before the laparoscopic cholecystectomy operations.³

Duplicated gallbladder has been reported that the cases are mostly asymptomatic. However, cholecystectomy should be

performed in symptomatic gallbladder duplication cases, which may cause acute or chronic cholecystitis.⁵

In this current case, we aimed to report the duplication of the gallbladder which underwent laparoscopic cholecystectomy.

2. Case report

A 20-year-old male patient was admitted to the surgery department with chronic intermittent right upper quadrant pain. Physical examination showed no abnormality. Abdominal ultrasonography revealed that the patient has two separated gallbladders and also has two cystic ducts. Exception of this anomaly a compatible view of probable polyp and calculi was detected with the gallbladder (Fig. 1). The patient was also evaluated by the magnetic resonance cholangiopancreatography (MRCP) preoperatively. The existence of double cystic canal was approved and a laparoscopic cholecystectomy decision was taken.

The laparoscopic cholecystectomy was performed following pneumoperitoneum by using the Hasson open technique and four trocars route of entry. When Calot's triangle dissection started, via peracute dissection peritoneal layer was separated and outlet points from the gallbladder in both of two cystic ducts were seen clearly. A single cystic artery was seen. Cystic ducts and cystic artery were clipped one by one. Laparoscopic cholecystectomy was completed successfully after the dissection of gallbladder from the

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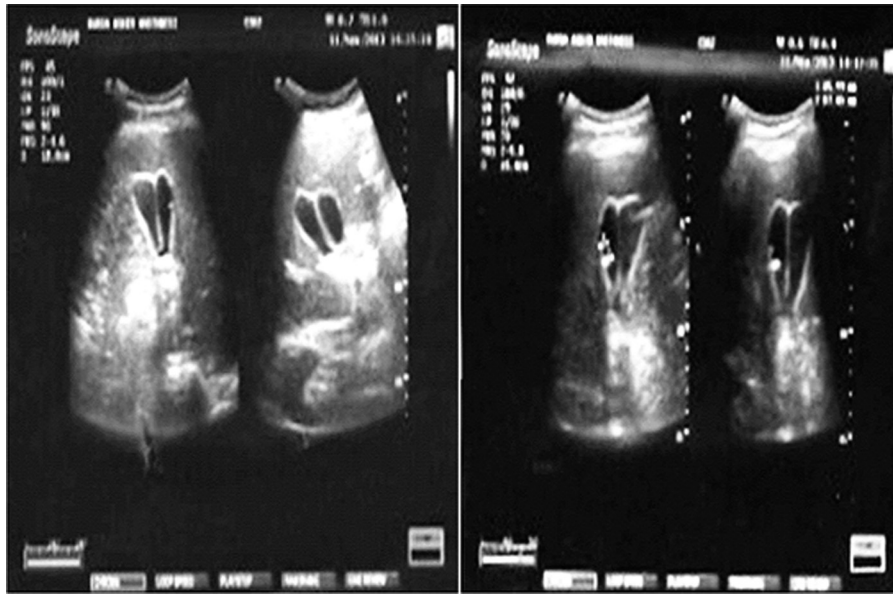


Fig. 1. Abdominal ultrasonography showed that the patient has two separated gallbladders and also has two cystic ducts.

liver bed. There were no complications on the postoperative term, and the patient was discharged at the second day after the operation.

3. Discussion

Variations of the biliary tree have been admitted by researchers for years. After the advancement of the cholecystectomy in 1882, anatomy of the gallbladder has begun to discuss more intensely in the surgical area.⁶

During the embryological development, variations arise mostly from the aberrations.⁷ In the fourth week, the liver, gallbladder and biliary tree become as a ventral bud (hepatic diverticulum) from the most caudal part of the foregut.⁸ This development extends into the septum transversum and divides into two parts as that grows between the layers of the ventral mesentery: the larger cranial part (pars hepatica) is the primordium of the liver, and the smaller caudal part (pars cystica) expands to form the gallbladder. Hepatic diverticulum and the foregut narrows between connected parts from the bile duct. Duodenum changes its position and then, the entrance of the bile duct moves around to the duodenum's dorsal aspect. The gallbladder is a hollow organ which result of multiplication of its epithelial lining it becomes temporarily solid. By means of vacuolation of the epithelium formation of the definitive lumen (recanalization) occurs.⁶

Overall congenital anomalies of the gallbladder were previously observed in 17 of 10,016 prenatal sonographic examinations (0.15%) which are includes abnormal positions, agenesis, hypoplasias, duplication, hourglass configuration, septations, cysts, and others.⁹ Abnormalities of the gallbladder such as diverticula, gallbladder fold, Phrygian cap, choledochal cyst, pericholecystic fluid, focal adenomyomatosis, and intraperitoneal fibrous bands come into question during the differential diagnosis.⁴ The most frequent anatomical abnormality of the gallbladder is "Phrygian cap" – a partial folding of the fundus.¹ It was suggested that such gallbladder may be at higher risk for lithiasis.¹¹ Yet this has not been confirmed; so Phrygian cap has been considered as an unimportant anatomical variation in clinical practice.¹⁰

Boyden¹² has been reported 1 per 3800 duplication of gallbladder in his study, also in the literature. In other study surgeons observed in only 1 case of the total of 4000 autopsies and defined as an unusual abnormality.^{12,13} There have been several

suggested classifications for the gallbladder duplication. According to Boyden,¹² double gallbladder's connection of the cystic ducts is important for classification. There are different classes of connected gallbladder such as vesica fellea divisa and vesica fellea duplex or true duplicated gallbladder. Furthermore, the author described two types of vesica fellea duplex; Y-shaped type which cystic ducts conjoin before entering the common bile duct, also H-shaped type which cystic ducts enter separately into the common bile duct. The true duplication, which arises in the fifth and sixth week of embryonic life because of the bifurcation of the gallbladder primordium, is widespread.¹²

Harlaftis et al.¹⁴ described another classification which is more in use than others. In that classification, gallbladder is identified in two main groups based on morphology and embryogenesis also that includes a third mixed group. Type 1 is split primordium group have been divided into three groups; "septate gallbladder", "V-shaped" and "Y-shaped". These septate duplicate gallbladders arise when there is a single cystic duct and a septum that divides the two gallbladders. Type 2 is the accessory gallbladder type which can be identified ductular or H type otherwise trabecular type. Type 2 gallbladders which have separate cystic ducts can occur two separate primordium on the biliary tree¹⁴ (Fig. 2).

In our report, we classified the case according the classification of Harlaftis's which is more accurate and practical. Gallbladder evaluated by magnetic resonance cholangiopancreatography then it have been identified as H-shaped type that have 2 separate gallbladders and cystic ducts entering separately into the common bile duct.

Most of the gallbladder duplication cases are asymptomatic, thus to identify this variation is relatively difficult. It may found incidentally throughout surgery due to other abdominal pathologies.⁶ In our case, we detected that anomaly cause of pain that possibly linked to the cholelithiasis.

Having knowledge of the anatomic variations of the biliary system is essential for not only the planning surgical operations but also for considering the abnormalities during applying laparoscopic cholecystectomy. To detect gallbladder variations, several imaging modalities can be useful such as computed tomography (CT), endoscopic retrograde cholangiopancreatography (ERCP), scintigraphy, oral cholecystography or magnetic resonance cholangiopancreatography (MRCP).³ The evaluation by preoperative MRCP seems to be the optimal modality to

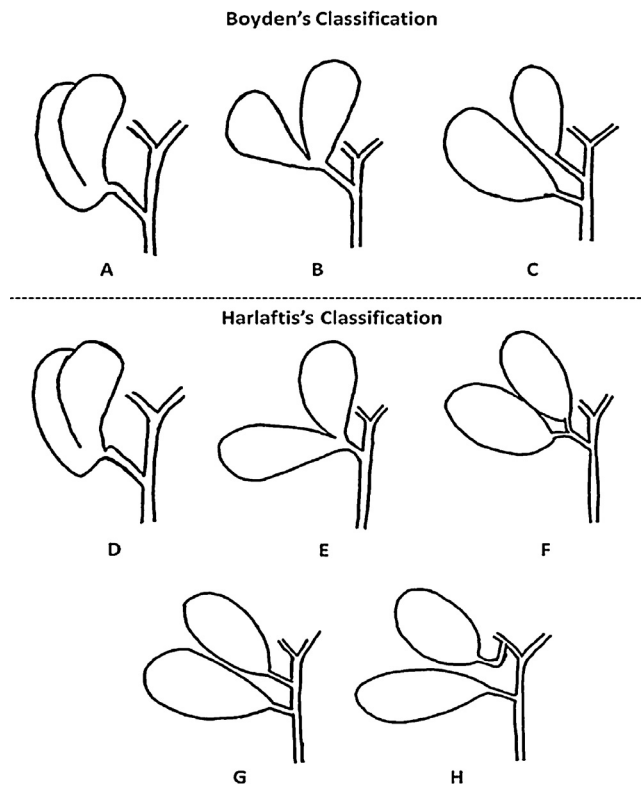


Fig. 2. Upper panel: Boyden's classification. (A) Bifid gallbladder with common neck, (B) Y-shaped and (C) H shaped. Lower panel: Harlaftis's classification. (D) Septate gallbladder, (E) V-shaped, (F) V-shaped, (G) H or ductular and (H) ductular.

demonstrate the intra and extra hepatic biliary anatomy and its variations. It is an optimal non-invasive radiological modality for 3-dimensional anatomical visualization of the whole biliary system. It is also non-invasive, cheaper, uses no radiation, requires no anesthesia and less operator dependent.² On the other hand, ultrasonography (USG) should be the first choice in all gallbladder pathologies.

Laparoscopic cholecystectomy is considered as a “gold standard” approach to symptomatic cholelithiasis. The advantages of laparoscopic technique are less postoperative pain, shorter stay in hospital, early recover, and better abdominal cosmetic outcomes. Nevertheless, laparoscopic cholecystectomy carries a slightly increased risk for biliary tract injury compared with conventional “open” surgery.¹⁵ According to reports for the laparoscopic gallbladder surgeries, bile duct injuries are seen one in a thousand.^{15,16} In case of clinically important gallbladder variations or symptomatic abnormalities, laparoscopic cholecystectomy should be performed.

As conclusion, gallbladder could have different aberrations; hepatopancreatobiliary surgeons should be aware about anatomical variations and/or abnormalities of the intra and extra hepatic biliary system before surgery. Variations are rare but may be challenging for clinicians. Additionally, duplication of gallbladder is significant due to it may cause some clinical and surgical problems. If it is not preoperatively diagnosed, during surgery it might cause symptoms or biliary complications. By demonstrating aberrant anatomy before surgery, the risk of the bile duct injury could be reduced, especially during the laparoscopic cholecystectomy. Although the USG should be considered as the initial modality, MRCP seems to be the best imaging tool for the biliary system in such patients. After the process of recognizing and interpretation, laparoscopic or open cholecystectomy should be performed in these patients.

Conflicts of interest

The authors have none to declare.

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