

A variant of the double gallbladder. A possible cause of cholelithiasis?

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Congenital duplication of the gallbladder is a rare anatomical malformation, which is usually discovered as an incidental finding during cholecystectomy. We report a case of a double gallbladder in a 45-year-old woman, which was discovered during laparoscopic cholecystectomy for symptomatic cholelithiasis. As it was not possible to identify the anatomical structures safely, the procedure was converted to open cholecystectomy. Inspection of the resected gallbladder showed that it consisted of 2 chambers with separate cystic ducts, which communicated through an ostium. Both chambers contained multiple gallstones. The inadequate drainage of the second chamber could be considered as a pre-disposing factor for the development of cholelithiasis in this case.

Key words: congenital, double gallbladder, cholelithiasis, cholecystectomy

INTRODUCTION

Congenital anomalies of the extra-hepatic biliary tree are important in clinical practice because they may cause a number of clinical, surgical and diagnostic problems.

Congenital malformations are considered one of the most important predisposing factors for iatrogenic bile duct injuries during cholecystectomy, especially in the era of laparoscopic cholecystectomy [3, 4, 6, 8]. Furthermore, some of these malformations could be associated with the development of cholelithiasis, since they result in inadequate drainage of the bile.

Duplication of the gallbladder is a relatively rare congenital malformation of the gallbladder, which is usually encountered as an incidental finding during cholecystectomy.

We describe a case of a double gallbladder discovered during cholecystectomy and consisting

of 2 chambers which communicated through a narrow ostium and drained through 2 separate ducts.

CASE REPORT

A 45-year-old woman was admitted to our hospital for surgical management of symptomatic cholelithiasis. The patient mentioned that she had suffered 2 episodes of cholecystitis, as well as several episodes of biliary colic during the previous year. The pre-operative sonogram of the upper abdomen revealed, apart from the presence of multiple gallstones within the gallbladder, the presence of a cystic formation in the left lobe of the liver in close proximity to the gallbladder but no other abnormality. No dilatation of the intra or extra-hepatic bile duct was noted.

The patient was scheduled for laparoscopic cholecystectomy. After establishment of the pneumoperitoneum it was noticed that the gallbladder was

covered with dense adhesions to the surrounding tissues as a result of the preceding inflammation (cholecystitis). The adhesions were meticulously separated. After the preparation of the corpus of the gallbladder it was noticed that the gallbladder appeared to consist of 2 chambers. The one chamber was in the expected anatomical location of the gallbladder, whereas the second lay medially to the first, covering the superior surface of the liver (Segment IVb) and reaching to the *ligamentum falciformis*. In addition, the left liver lobe was greatly enlarged, covering the cystohepatic triangle (of Calot). Since it was not possible to identify the anatomical structures safely, the procedure was converted to open cholecystectomy. The abdominal cavity was reached through a right subcostal incision. The preparation of the cystohepatic triangle (of Calot) revealed the presence of one short cystic duct, as well as a second, very narrow, "aberrant" duct connecting the gallbladder to the right hepatic duct. The cystic artery, which was relatively large in diameter, followed a course parallel to the common bile duct and then anterior and inferior to the cystic duct. The cholecystectomy was completed without further problems.

Inspection of the resected gallbladder revealed the presence of 2 chambers, which communicated through a 5-mm round opening. Both chambers of the gallbladder contained multiple gallstones. The aberrant narrow bile duct seemed to enter the second chamber of the gallbladder (Fig. 1, 2).

The postoperative course of the patient was uneventful.

Histopathological examination of the gallbladder revealed the presence of chronic inflammatory changes in both chambers of the gallbladder.

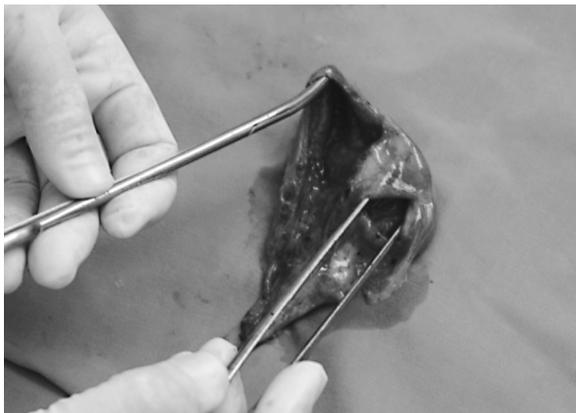


Figure 1. Resected gallbladder showing the presence of 2 separated chambers.

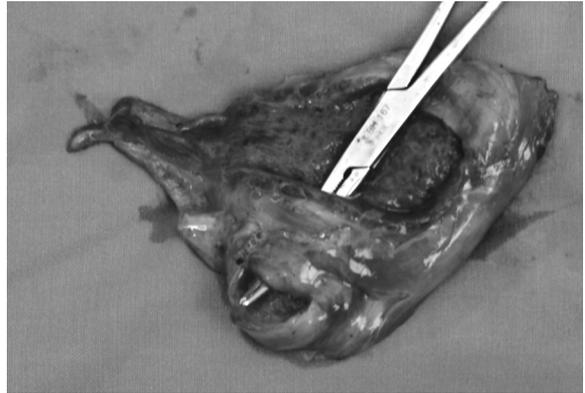


Figure 2. The 2 chambers communicated through an ostium.

DISCUSSION

Duplication of the gallbladder has an incidence of approximately 1:4.000 [3, 8, 10, 18]. However, the exact incidence of this rare anomaly cannot be accurately assessed, since the only cases which can be identified are those which become symptomatic or are encountered as incidental findings during laparotomy or imaging studies. It seems that a number of these cases remain asymptomatic and undetected throughout life.

Duplication of the gallbladder can be classified into 2 main types. The first is the bi-lobed gallbladder (*Vesica fellea divisum*), where a longitudinal septum or invaginating cleft separates the lumen into 2 chambers. In these cases both gallbladders share a common embryological origin (or primordium). The second is the double gallbladder (*Vesica fellea duplex*), where there are 2 separate gallbladders with their own cystic ducts. In these cases, we have to accept a double embryological origin (primordium). In our case, the gallbladder consisted of 2 separate chambers, which were connected through a narrow ostium. Both chambers shared a common cystic artery but the second chamber appeared to have a second narrow cystic duct, which drained to the right hepatic duct. We believe that the presence of the ostium between the 2 chambers may have led to the progressive obliteration of the draining cystic duct of the second chamber [3, 10].

This congenital anomaly of the gallbladder has great clinical significance, especially in the era of laparoscopic cholecystectomy. Although the successful laparoscopic removal of a double gallbladder has been reported in the literature [4–6, 8, 16], congenital anomalies of the extra-hepatic biliary tree still remain the most common cause of conversion of

a laparoscopic to an open cholecystectomy. On the other hand, it is known that congenital anomalies may predispose to iatrogenic injuries of the extra-hepatic biliary tract, leading to increased morbidity and mortality [4–6, 8, 16].

A double gallbladder has been described in association with other anomalies of the extra-hepatic biliary tree or the hepatic artery [1, 9, 22]. The development of heterotopic gastric mucosa within the gallbladder wall has also been described [2].

The double gallbladder must be differentiated from congenital choledochal cysts [12] or duplications of the duodenum [24], which may present with similar ultrasonographic findings.

It remains controversial as to whether or not the duplication of the gallbladder acts as a predisposing factor for the development of cholelithiasis. There are a number of clinical studies which indicate that the presence of congenital malformations of the extra-hepatic biliary tree may be associated with hypokinesia of the gallbladder and the development of cholelithiasis [13, 14, 19, 20]. Hardoff et al. [11] showed in a scintigraphic study that a bi-lobed gallbladder was associated with hypokinesia of the gallbladder in a teenager patient. Transient cholestasis associated with a double gallbladder was also reported by Urbain et al. [23], who examined the motility of the gallbladder with the use of endoscopic retrograde cholangiopancreatography prior to cholecystectomy. In our case, gallstones were present in both chambers of the bi-lobed gallbladder. We maintain that in our case the accessory chamber did not drain satisfactorily, since the second cystic duct was relatively narrow, while the presence of a relatively narrow ostium connecting the 2 chambers did not allow a regular flow of bile from the one chamber to the other.

The presence of a double gallbladder is not always diagnosed during routine pre-operative studies, which usually only include ultrasonography of the upper abdomen [7, 17]. While ultrasonography may easily diagnose the duplication, if the 2 chambers are separated, its accuracy is limited when the 2 chambers attach to each other, as in our case. Conditions that may imitate duplication of the gallbladder include compartmentalisation of the gallbladder as a result of focal adenomyomatosis, intraperitoneal fibrous bands, Phrygian caps or choledochal cysts.

Computed tomography (CT), endoscopic retrograde cholangiopancreatography (ERCP) or magnetic resonance cholangiopancreatography (MRCP) can

confirm the diagnosis, if suspected during ultrasonography [15, 17]. However, these imaging techniques are expensive or invasive (ERCP) and should be preserved only for specific indications, such as the necessity of detecting choledocholithiasis or excluding malignancy [7, 15, 17].

The presence of a double gallbladder may remain undetected even after laparotomy. Shapiro et al. [20] reported a case of the development of acute cholecystitis of the second gallbladder 2 years after cholecystectomy. Silvis et al. [21] reported a further similar case in which a second operation had to be performed because of the presence of a second or bi-lobar gallbladder that was not recognised in the primary laparoscopic cholecystectomy.

In conclusion, the presence of a double or bi-lobar gallbladder is a rare congenital anomaly, which could be associated with the development of cholelithiasis or may be encountered as an incidental finding during cholecystectomy. Knowledge of this anomaly may prevent the surgeon from causing severe intra-operative iatrogenic injuries to the extra-hepatic biliary tree.

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