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# Laparoscopic cholecystectomy for overlooked duplicated gallbladder. A case report and review of the literature.



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# Laparoscopic cholecystectomy for overlooked duplicated gallbladder. A case report and review of the literature.

INTRODUCTION: Duplicated gallbladder is a seldom surgical finding that frequently eludes detection on routine preoperative imaging and in some circumstances it might be even overlooked during surgery. Identification of this anomaly and its various types is important in order prevent post operative complications and recurrent symptoms after cholecystectomy.

PRESENTATION OF CASE: We present a female patient with biliary simptomatology who had previous cholecystectomy. Preoperatory imaging (MRCP) suspects a duplicated gallbladder which was confirmed intraoperatory and cholecystectomy was performed. The postoperative recovery was uneventful.

DISCUSSION: There are a very small number of reported cases with laparoscopic cholecystectomy for overlooked gallbladder duplication. Preoperative diagnosis holds a major contribution in planning surgery and preventing potential biliary injuries or re-operation if accessory gallbladder has been overlooked during initial surgery.

CONCLUSION: Accessory gallbladder is a uncommon congenital anomaly that demands particular consideration. Duplicated gallbladder is associated with increased operative difficulty and risks, including conversion to open cholecystectomy common bile duct injury or second cholecystectomy due to overlooked accessory gallbladder.

KEY WORDS: Duplicated gallbladder, Laparoscopic cholecystectomy, Overlooked accessory gallbladder, Reoperation.

## Introduction

Accessory gallbladder is a rare congenital malformation encountered in 1 in 4000 births <sup>1</sup>. Congenital anomalies and anatomical variations of the gallbladder are correlated with an increased risk of complications during laparoscopic cholecystectomy. A duplicated GB is rarely

Pervenuto in Redazione Luglio 2020. Accettato per la pubblicazione Settembre 2020 recognized preoperatively, frequently overlooked, requires reoperation or conversion and might increase surgical difficulty and risk for biliary injuries. We describe a challenging laparoscopic cholecystectomy for a duplicated GB in a woman who presented with biliary colic at 9 years after initial cholecystectomy.

#### Case report

A 47 year old female patient presented at the emergency department with recurrent upper right quadrant abdominal pain, nausea, vomiting and bloating started 24 hours ago after a fatty meal. Physycal examination revealed abdominal surgical scars, tenderness without guarding or Murphy's sign. She had a history of laparoscopic colecistectomy 9 years ago for gallbladder lithiasis with no

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other known disease. Her blood tests were normal including complete blood count, liver function test and bilirubin. Abdominal ultrasound (US) showed a 30/35/30mm subhepatic saccular structure; the common bile duct is visible and has normal diametre (7mm) being



Fig. 1: Colangio-MRI that shows anterior to the common hepatic duct the duplicated gallbladder (long arrow) and the cystic stump from previous cholecystectomy (short arrow).



Fig. 2: Duplicated gallbladder with wall cholesterolosis (long arrow) and short cistic duct between the saccular structure and the main bile duct (short arrow)



Fig. 3: Cystic stump with titanium clip and gallbladder bed from previous cholecystectomy (short arrows), cystic stump with clips from second cholecystectomy for duplicated gallbladder (long arrow)

situated posteriorly of the described structure. Taking into consideration the fact that the patient has a history of colecistectomy and that an emergency was excluded an colangio-MRI was performed that showed normal calibre of the intra and extrahepatic biliary tree with good contrast flow; anterior to the common hepatic duct there is a thinn wall saccular structure(30/32/28 mm) that is connected to the main biliary tree and the cystic stump from previous cholecystectomy (Fig. 1).

During laparoscopic surgery multiple adesions were found between the saccular structure, liver, duodenum and transvers colon which were divided. As the dissec-



Fig. 4: Accessory gallbladder specimen



Fig. 5: Microscopic findings that identified a muscular layer (long arrow) with an epithelial lining (short arrow).

tion proceeded the liver bed and the prior titanium clip placed on the cystic duct were identified. Furthermore a short cistic duct between the saccular structure and the main bile duct and an cistic artery were found (Fig. 2) The intraoperative aspects and the imagistic data at disposal advocates for an gallbladder duplication, ductular type 2 (Harlaftis classification), rather than choledochal cyst or bile duct diverticulum. Surgery was done by clipping the cistic duct and artery with no other incidents (Fig. 3). Postoperatory recovery with no complains and the discharge was done on postoperative day 2. Final histopathology revealed an 3/2.5cm accessory gallbladder with wall cholesterolosis and mild chronic cholecystitis (Fig. 4). Microscopic findings identified a muscular wall with an epithelial lining wich is characteristic for gallbladder duplication (Fig. 5).

### Discussion

Duplication of the gallbladder is a uncommon congenital malformation encountered in 1 per 4000 persons. The duplication of the gallbladder is referred to as a bifurcation of the gallbladder primordium during the 5th or early 6th week of embryonic life <sup>1</sup>.

The gall-bladders emerge either from a single primordium or from two separate ones. A accessory gallbladder arises from two distinct primordia on the biliary tree and have a separate cystic duct <sup>2</sup>.

Duplicated GBs can be classified into 3 categories based on there embryological development: type I (split primordial gallbladder), type II (accessory gallbladder group) are separate gallbladders with their own cystic ducts and type III, triple gallbladders draining by 1 to 3 separate cystic ducts. In type II malformation, the most frequent form, two distinct GBs drain into the common bile duct through independent cystic ducts (H-type or ductular type), or one of the cystic ducts drains into the right or left hepatic duct (trabecular type) <sup>3</sup>.

An early diagnosis is the first challenge of duplicated gallbladder. There is no solid proof of a clear relation between multiple gallbladder and other embryologic anomaly, no other malformation may help to diagnose an aberrant gallbladder <sup>4</sup>.

No specific symptoms can alarm the surgeon to the existence of gallbladder duplication. For this reason, the pathology may pass unobserved or undiagnosed. When symptoms are present, gallbladder duplication may go unnoticed because of the uncommon nature of the malformation or the insensibility of diagnostic tests <sup>5,6</sup>.

Duplicated gallbladder may be mistaken with more ordinary conditions such as folded gallbladder, pericholecystic fluid, Todani II bile duct cyst (bile duct diverticulum), Phrygian cap, vascular band, or focal adenomyomatosis <sup>6</sup>. There is no possible way to differentiate preoperatively an accessory gallbladder from a Todani II bile duct cyst. The only radiological evidence for a

Todani II bile duct cyst would be the existence of a pancreatico-biliary maljunction, but this finding is very rare <sup>7</sup>. Alone the assessment of the operative specimen can validate the diagnosis; there is no muscular layer in the upper third part of the main bile duct in case of Todani II cysts, while it is a permanent finding in the gallbladder wall <sup>2,8</sup>.

The duplicated gallbladder is predisposed to identical pathology as the primary gallbladder involving cholecystitis, empyema,cholecystocolic fistula, perforation,papilloma, and carcinoma <sup>2,9</sup>.

The rate of diagnosis of duplicated GBs is rising in accordance with the development of the imaging tests, but still there have been case reports of duplicated GBs overlooked on routine preoperative imaging <sup>10,11</sup>.

Abdominal ultrasound and Computer tomography generally cannot provide enough data of the biliary tract to identify duplicated gallbladders reliably, while magnetic resonance cholangiopancreatography (MRCP) is appropriate when multiple gallbladders are suspected <sup>12,13</sup>.

MRCP is represents the initial imaging test for the biliary tree, with endoscopic retrograde cholangiopancreatography (ERCP) reserved for therapeutic methods. MRCP has the advantage of being a non-invasive tool, uses no radiation, requires no anesthesia ,is cheaper and less operator dependent <sup>14</sup>.

Similarly to ERCP, intra-operative cholangiogram (IOC) can be applied to determine the biliary tract anatomy and help detect other aberrant structures, particularly if MRCP has not been performed and an anomaly is encountered during laparoscopic cholecystectomy <sup>15</sup>.

In our case, we did not perform intra-operative cholangiogram (IOC), because MRCP prior identified duplicated gallbladder with evidence of former laparoscopic cholecystectomy being done. Intraoperatively no important atypical biliary anatomy was encountered and dissection of the gallbladder was accomplished without any concern of biliary injury.

For a surgeon without any preoperative suspicion, diagnosis of a second gallbladder may be missed during surgery. Aspects that can cause the overlooking of the diagnosis include non-specific signs and symptoms, lack of awareness of the anatomic variations and insufficiency of the imaging techniques. Some intraoperative presentations of duplicated gallbladder may be more difficult to identify than others <sup>3,16</sup>.

The duplicated gallbladder may be localized adjacent to the normal organ in the gallbladder fossa, which is typically the case in type I, or it may be intrahepatic, subhepatic, or within the gastrohepatic ligament, as seen usually in the type IIA or the ductular type <sup>1,17,18</sup>. In our case the localtion of the duplicated gallbladder was subhepatic. When the H-shaped subtype is present, the chance of injury to the bile duct and hepatic artery is high <sup>19</sup>.

In a recent review done by Darnis B. et al, from 181 cases with gallbladder duplication, 22 patient (13%)

required a second cholecystectomy due to overlooked accessory gallbladder. All overlooked accessory gallbladers at this patients, were classified type 2 (ductular subtype= 17 cases; trabecular subtype=5) <sup>4</sup>.

Whenever detected preoperatively or during surgery, the data from the literature indicate benefit to excision of all gallbladders at a single operation to prevent recurrent or persistent symptoms <sup>20-24</sup>.

Disorder may exist in one or both gallbladders and can display differences in disease between the separate gallbladders. Roeder et al. reported a patient with a triplicated gallbladder, where one had cholelithiasis and cholecystitis, a second had papillary adenocarcinoma, and a third was intrahepatic without disease <sup>25</sup>.

Whereas any presumption of type II double gallbladder cannot be distinguished from a Todani II bile duct cyst (bile duct diverticulum), prophylactic removal is recommended due to the risk of malignancy. Apart from that, resection of both duplicated gallbladders should be carry out only in case of symptomatic gallstone-related disease <sup>4</sup>.

When gallbladder duplication is overlooked by preoperative and intraoperative evaluation, persistent or recurrent biliary symptoms are probable. In this context, a high degree of suspicion for persistent duplicated gallbladder must be considered.

#### Conclusion

There are a small number of reported cases with laparoscopic cholecystectomy for overlooked gallbladder duplication. Accessory gallbladder is a uncommon congenital anomaly that demands particular consideration.

Preoperative and intraoperative recognition can be challenging for the surgeon who should be familiar with the anatomical variants of the gallbladder and biliary system. Duplicated gallbladder may represent a predisposing factor for postoperative complications, recurrent symptoms or reoperation if accessory gallbladder has been overlooked during initial surgery after cholecystectomy.

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