

Gallbladder Duplication: Case Report of a Rare Clinical Entity

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Abstract:

We report the rare case of a duplicated gallbladder in a 67-year-old male patient. The patient underwent laparoscopic cholecystectomy, a single cystic duct and two cystic arteries could be identified, all divided between clips. By pathology, a V-shaped duplicated gallbladder according to Harlaftis type 1 with chronic cholecystitis was confirmed.

Surgeons should be aware of this abnormality during the patient's preoperative work-up. The classification of Harlaftis discriminates the types 1 to 4. Further informations about the gallbladder duplication is provided below through the literature.

Key words: gallbladder duplication; cholecystectomy

Highlights...

- Duplicated gallbladder is a congenital malformation of the biliary system, identified by the presence of two separate gallbladders.
- The existence of duplicated gallbladder requires particular attention, as it is related to an increased risk for complications, including injuries of the biliary and arterial structures.
- The classification of Harlaftis discriminates types 1 to 4.
- Preoperative imaging is of utmost importance when duplicated gallbladder is suspected.
- Minimally invasive cholecystectomy is the surgical treatment of choice.
- If intraoperatively detected only or altered biliary anatomy is suspected, intraoperative cholangiogram may clear up and help to prevent injuries.

Introduction

Gallbladder duplication is relatively rare congenital malformation of the biliary system with an incidence of only 1:4000 according to autopsies [1]. Most cases are found unexpected during the surgical treatment or less often during the work-up of a gallbladder disease. It has not been found a sex predominance [2]. Which part plays a determining role during the organogenesis to the pathogenesis of gallbladder duplication is so far ambiguous. Among theories, it has been reported that additional buds are created during the 5th to 6th week of embryogenesis from the hepatic antrum. Following the normal degeneration, these extra buds must be

absorbed; the persistence of one of these would lead to the development of duplication of the gallbladder [3], [4]. The existence of duplicated gallbladder requires particular attention, as it related to an increased risk for complications, including injuries of the biliary and arterial structures. For this reason, preoperative imaging is of utmost importance when duplicated gallbladder is suspected. Minimally invasive cholecystectomy with intraoperative cholangiography remains the surgical treatment of choice [3]

Case Presentation

We report the rare case of a double gallbladder type 1 according to Harlaftis [7] in a 67-year-old male patient admitted with wall thickening of the gallbladder and cholelithiasis, detected by endosonography during the work-up of recurrent pancreatitis and suspected IPMN. On physical examination, the abdomen was flat, and the gallbladder was not palpable. Preoperative imaging with MRI Cholangiography (**Figure.1,2**) detected gallbladder duplication with cholelithiasis. The patient underwent laparoscopic cholecystectomy and a double gallbladder (**Figure.3**) was confirmed. After dissection of the Calot's triangle, a single cystic duct and two cystic arteries (**Figure. 4**) could be identified, all carefully divided between clips. Intraoperatively the cystic duct was clearly identified, so an intraoperative cholangiogram was not performed. Cholecystectomy was completed laparoscopically. Gallstones were revealed, but only in one of the two gallbladders (**Figure. 5,6**). By pathological analysis, a V-shaped duplicated gallbladder according to Harlaftis type 1 [7] with chronic cholecystitis was confirmed. No malignancy was seen. The patient had an uneventful recovery and was discharged home on post operative day two.

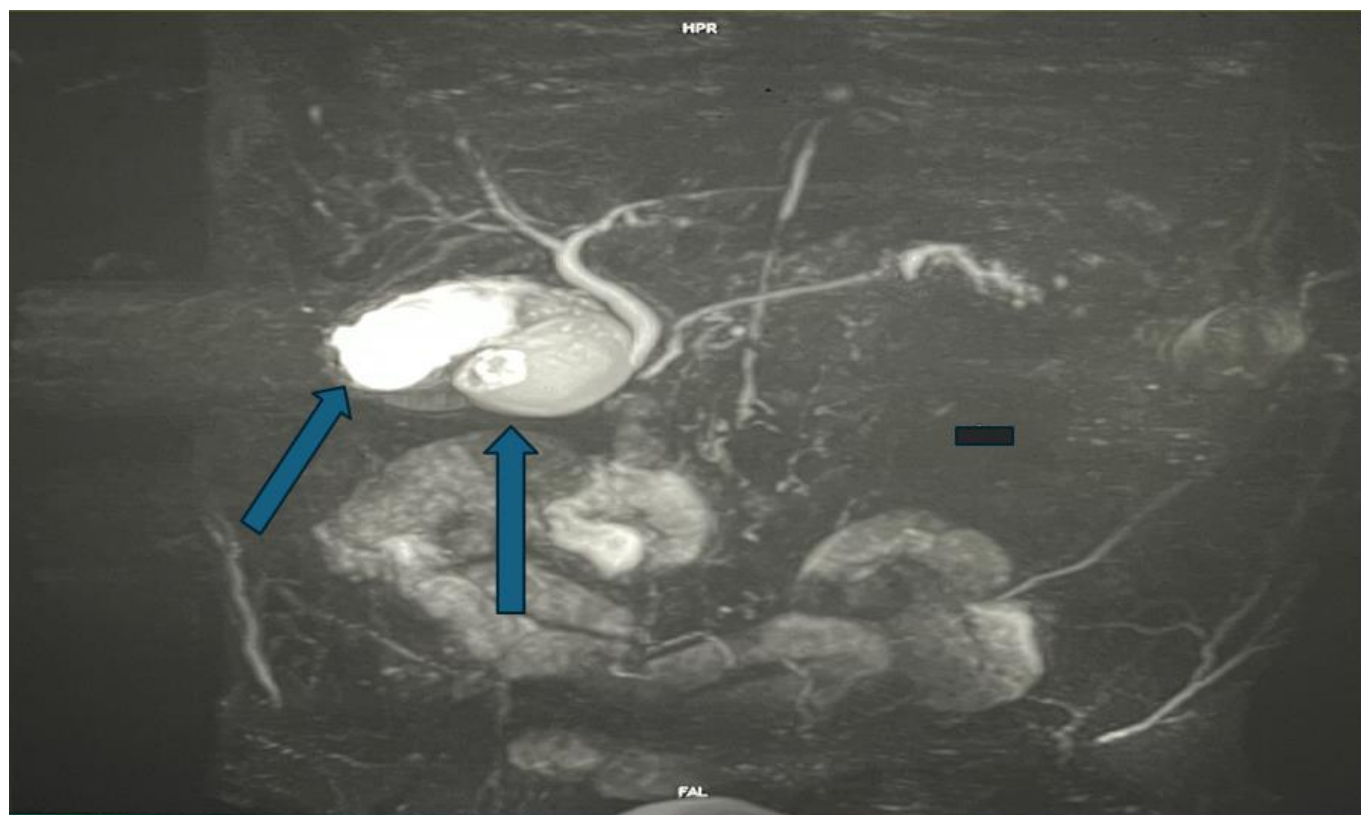


Figure 1: MRCP showing double gallbladder (arrows)

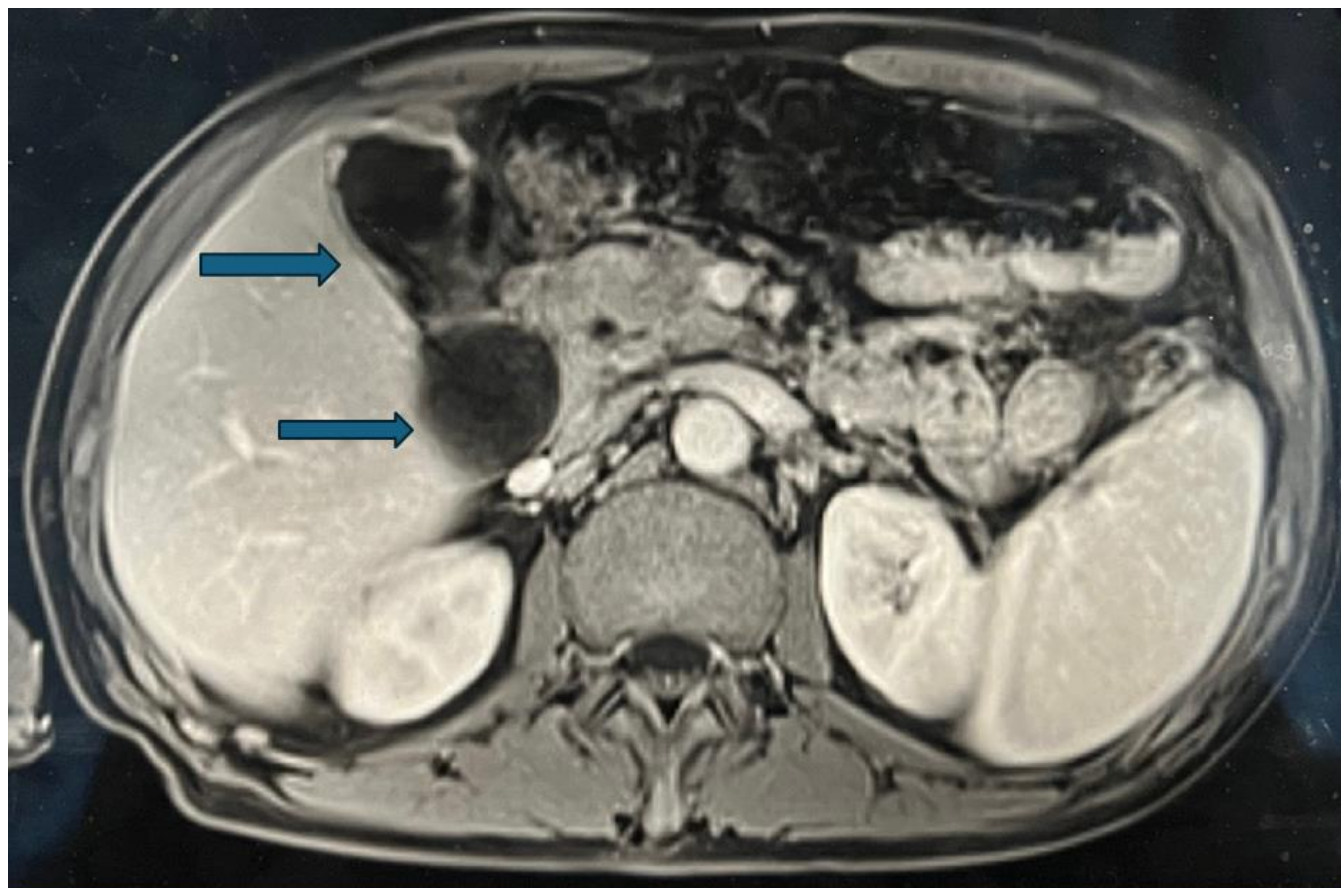


Figure 2: Axial MRT Abdomen showing gallbladder duplication (arrows)

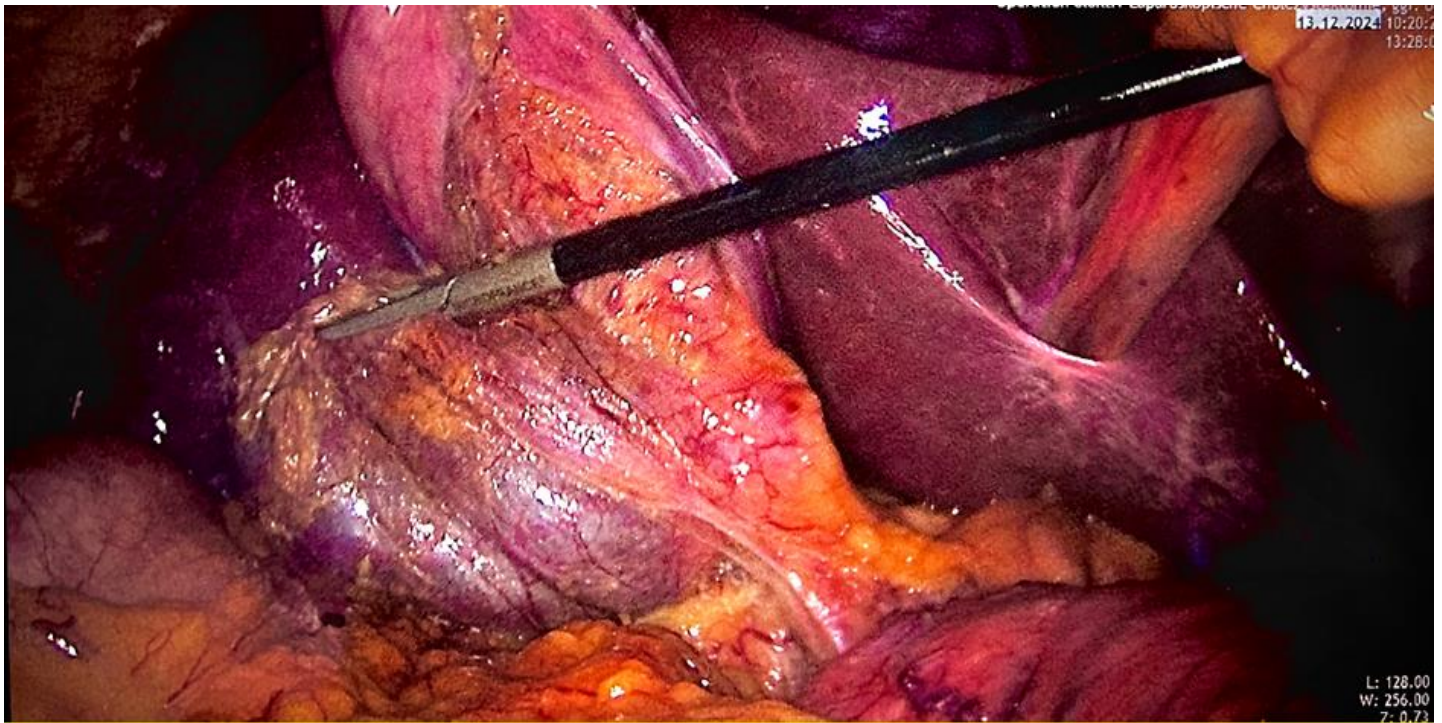


Figure 3: Laparoscopic view of duplicated gallbladder

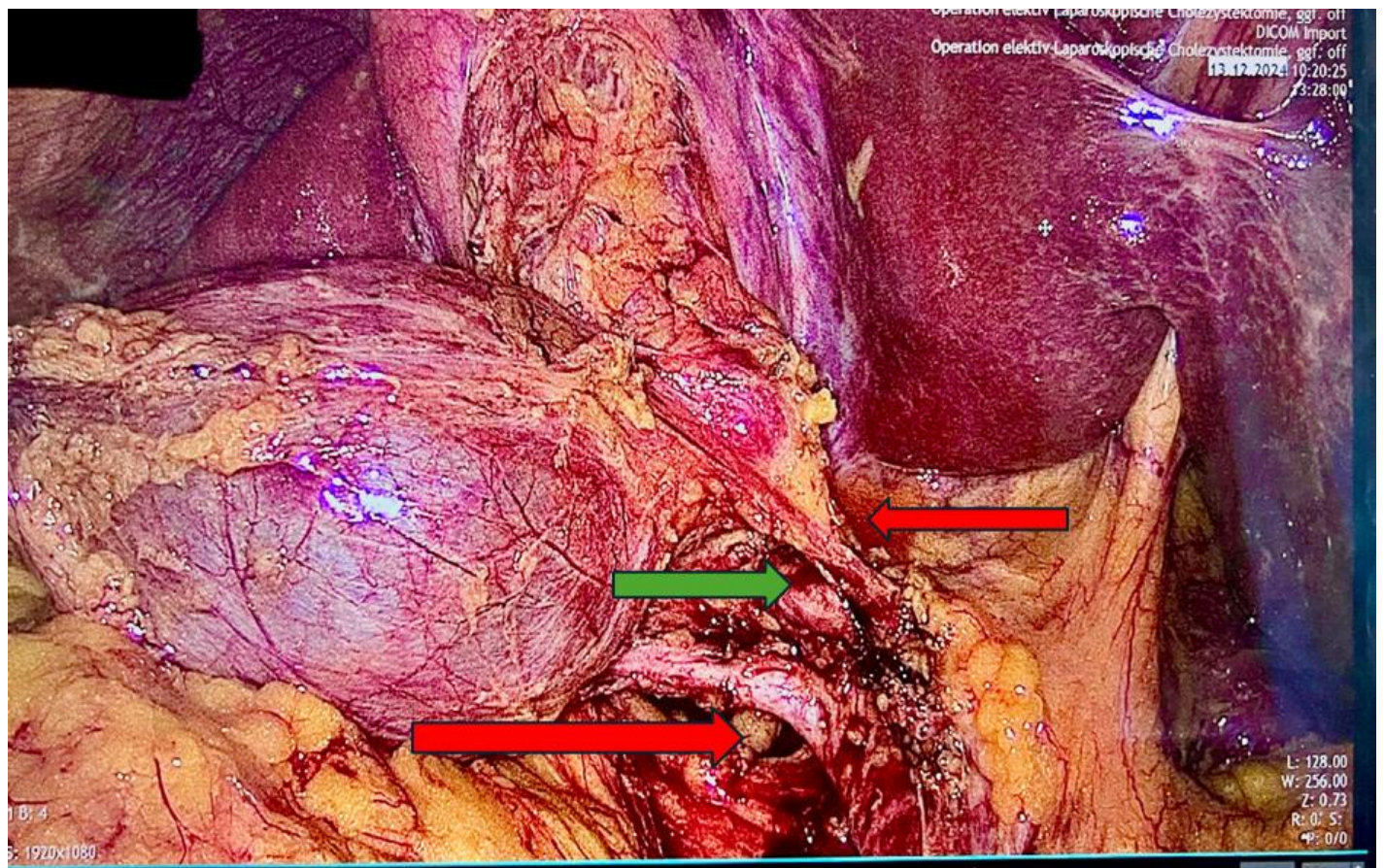


Figure 4: Laparoscopic identification of two separate gallbladders with one cystic duct (green arrow) and two cystic arteries (red arrows)

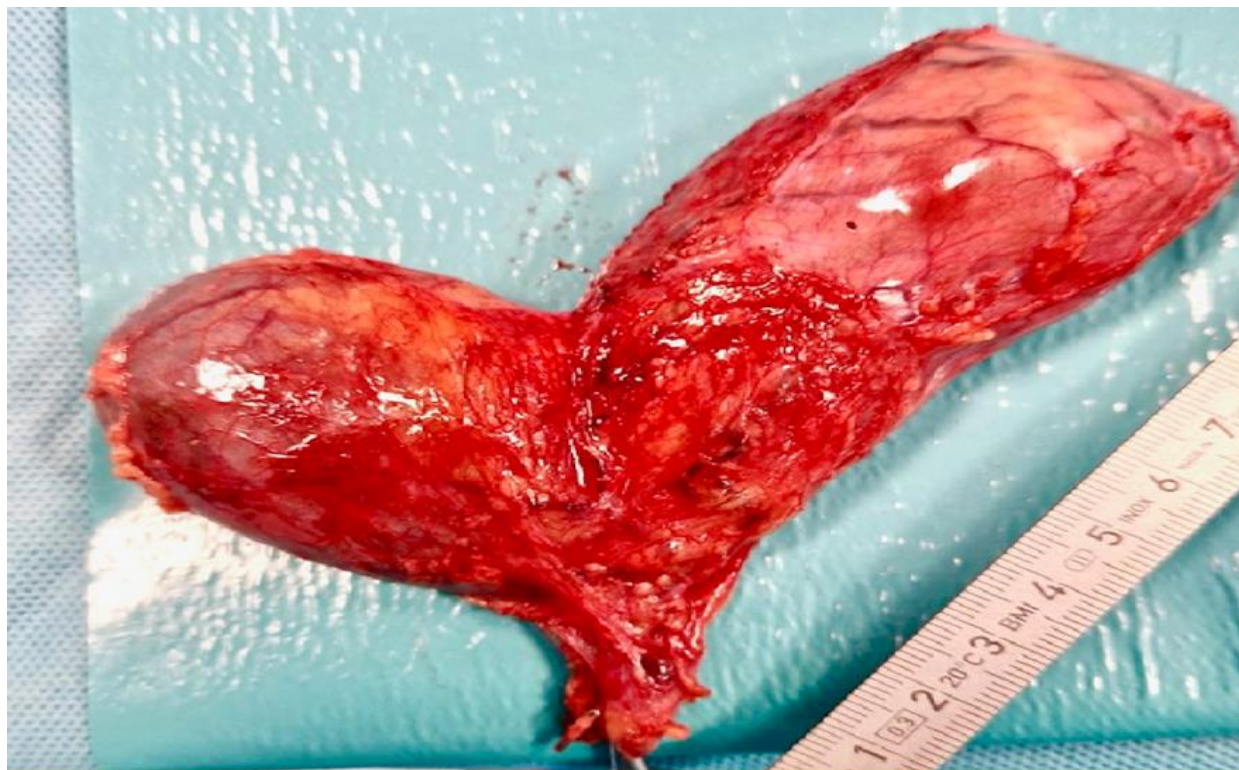


Figure 5: Macroscopic specimen of duplicated gallbladder



Figure 6: Opened specimen: gallstones were present in only one of the two gallbladders (arrow)

Discussion

According to clinical onset, there are no specific symptoms related to the duplication. Just like patients with a single gallbladder, most cases of duplicated gallbladder have an asymptomatic development or may present clinically with typical biliary colic or acute inflammation. Although it has been reported no considerable difference of developing a symptomatic disease progression in patients with duplicated gallbladder than the ones with a single gallbladder [5], many authors described higher incidence of cholelithiasis in patient with duplicated gallbladder because of the unsatisfying anatomical-based drainage of bile [6]. The differential diagnosis includes gallbladder diverticula, phrygian cap, choledochal cyst, and pericholecystic fluid.

The classification of Harlaftis et al. discriminates the types 1 to 4 based on the configuration of the cystic ducts and is the most accepted one. The type 1 characterized by a single cystic duct draining the common bile duct. Subcategories are the septated, the V-shaped and the Y-shaped duplicated gallbladder. The type 2, which is the most common one, identified by two cystic ducts each of them entering independently into the common bile duct. The type 3 includes anatomical variations that do not match types 1 or 2, such as triple gallbladder anomalies or other rare abnormalities. There is finally, a rare type 4, where is existed an accessory gallbladder without a cystic duct. [7]

Classification of multiple gallbladders

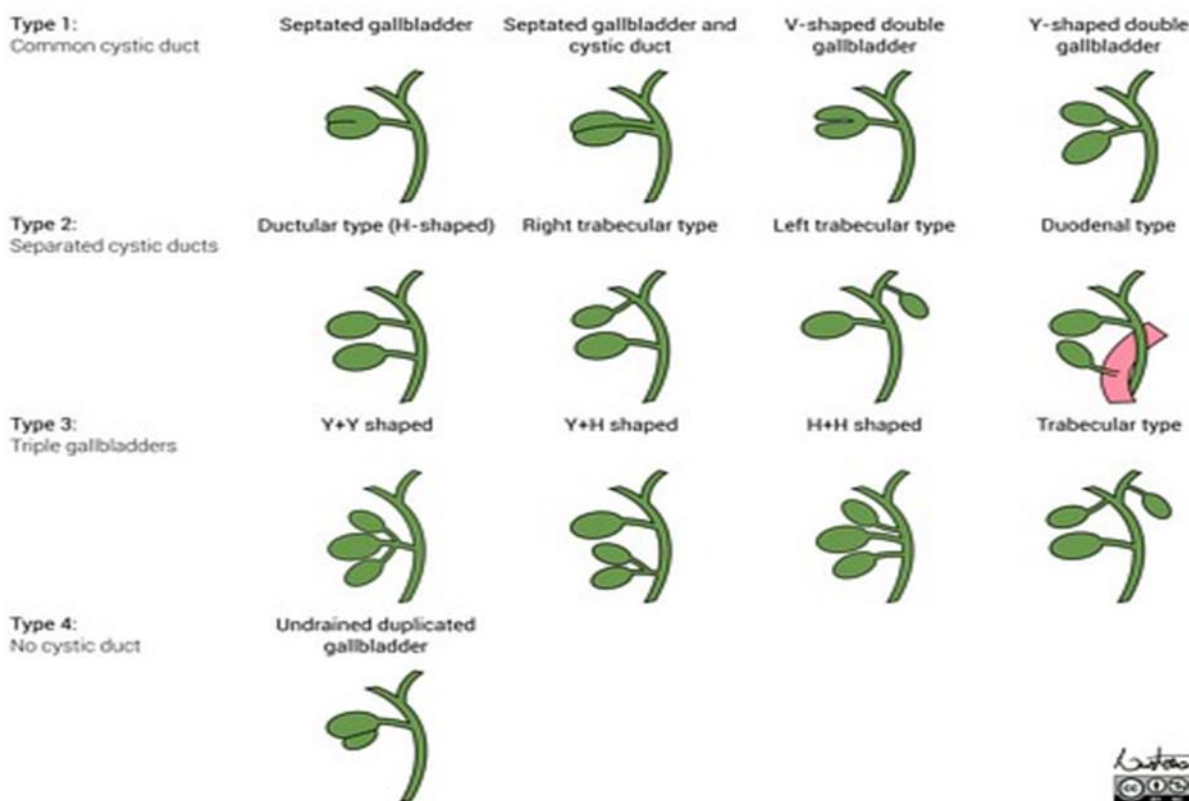


Figure 7: Variations of multiple gallbladders according to Harlaftis classification. Case courtesy of Dr. Bruno Di Muzio, Radiopaedia.org.; rID: 22597

Hepatobiliary ultrasound is a very reliable diagnostic non-invasive tool for gallbladder diseases. For identifying modified anatomy due to malformations of cystic ducts or bile ducts, however, the ultrasound has limited diagnostic accuracy. The resonance cholangiopancreatography (MRCP) is, according to many authors, a significantly better diagnostic imaging detecting the anatomic malformations of the gallbladder and biliary system with high precision. Endoscopic retrograde cholangiopancreatography (ERCP) can expose the anomaly too, however is part of the invasive procedures and should be avoided for the diagnostic workup of the duplicated gallbladder giving priority to the non-invasive MRCP [8], [9].

Therapy management of duplicated gallbladder including treatment selection is analogous to that of "normal" gallbladder disease. In asymptomatic patients, when duplicated gallbladder incidentally discovered, surgical treatment is not indicated because there is no significant evidence of increased risk of complications. However, if one

or both gallbladders cause symptoms, cholecystectomy should be performed for both gallbladders to avoid subsequent cholecystitis and following biliary colic in the remaining organ [10], [11]

Like in our case, laparoscopic cholecystectomy can be accomplished smoothly when a duplicated gallbladder is detected. The combination of a careful tissue dissection, revealing safely the anatomical details and a secure identification of each cystic duct-infundibular

junction is critical and of high significance to perform a risk-free cholecystectomy by patients with duplicated gallbladder. If intraoperatively detected only or unexpected and modified anatomy is suspected, the perform of an intraoperative cholangiogram is necessary to prevent injuries [12],[13]. Laparoscopic cholecystectomy with intraoperative cholangiography is the appropriate treatment in a symptomatic duplicated gallbladder.

Conclusion

Duplication of the gallbladder is a rare congenital malformation of the biliary system, which requires significant attention and emphasis to avoid surgical complications. Concomitant anomalies of the bile duct and the arterial blood supply are common. During the patient's preoperative workup and surgery, physicians should bear in mind this abnormality as congenital malformations are supposed to be critical risk factors for iatrogenic bile duct injuries during cholecystectomy. The classification of Harlaftis discriminates the types 1 to 4. Laparoscopic cholecystectomy remains the preferred method of treatment after clarifying the biliary anatomy by MRCP or ERCP. If intraoperatively detected only or modified biliary anatomy is suspected, intraoperative cholangiogram may clear up and help to prevent injuries.

Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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