



Duplicated Gallbladder: A Case Report of a Previously Unreported Variant

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Keywords: Biliary surgery; Gallbladder; Cholecystectomy; General Surgery.

Abbreviations: GB: Gallbladder; USS: Ultrasound; MRI: Magnetic Resonance Imaging; MRCP: Magnetic Resonance Cholangiopancreatography.

Background

Variations in biliary anatomy are frequently encountered. Of these, a Double Gallbladder (GB), with or without duplication of cystic duct is a very rare surgical encounter, with an incidence of approximately 1 in 4000-5000 population [1]. 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 [2].

Abstract

Background: Variations in biliary anatomy are frequently encountered. Of these, a Double Gallbladder (GB), with or without duplication of cystic duct is a very rare surgical encounter, with an incidence of approximately 1 in 4000-5000 population. There are multiple different subtypes of gallbladder duplication and knowledge of these is essential for diagnosis and operative management. We report a case of a previously unreported variant that lies outside of the current accepted classification.

Case presentation: 28-year-old female presented with 24 hrs of right upper quadrant pain and raised inflammatory markers. Ultrasound showed abnormal mass adjacent to an inflamed gallbladder requiring further investigation with MRI. Once duplicated gallbladder was confirmed, patient proceeded to surgery, which was uncomplicated but confirmed abnormal anatomy requiring slight alternation of standard surgical technique.

Conclusion: Duplicated gallbladder and other biliary anatomical variants are rare but important abnormalities that can significantly impact surgical management. Variant anatomy is a significant predisposing risk factor for bile duct injury and intraoperative complication. Multimodal imaging pre operatively and preoperative planning are essential for adequate care. Other variants outside of the standard classification are important to add to the literature to further education and surgical knowledge.

Duplication of the gallbladder can be classified into 2 main types. The first is the bi-lobed gallbladder (*Vesica fellea divi-sum*), where a longitudinal septum or invaginating cleft separates the lumen into 2 chambers. The second is the double gallbladder (*Vesica fellea du-plex*), where there are 2 separate gallbladders with their own cystic ducts [2] (Figure 1).

We present a case of gallbladder duplication in a 28 year old female that does not fit into either of these two groups (Figure 2). She underwent uncomplicated cholecystectomy and made a full recovery.



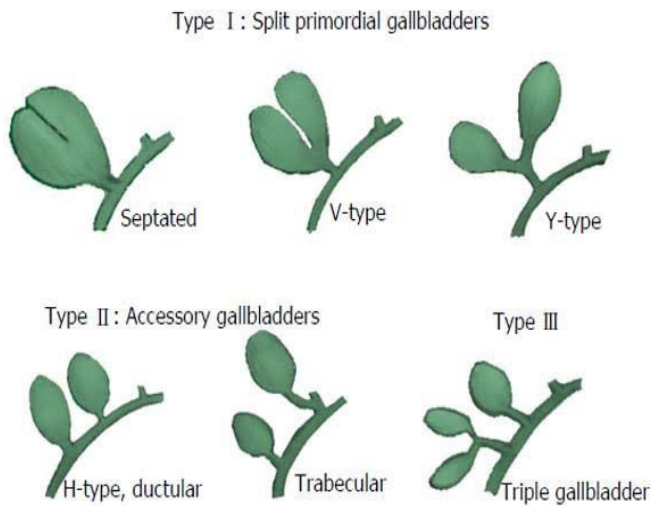


Figure 1: Boyden Classification of Duplicated Gallbladders, published online. <https://doi.org/10.1016/j.ijscr.2015.04.002>.

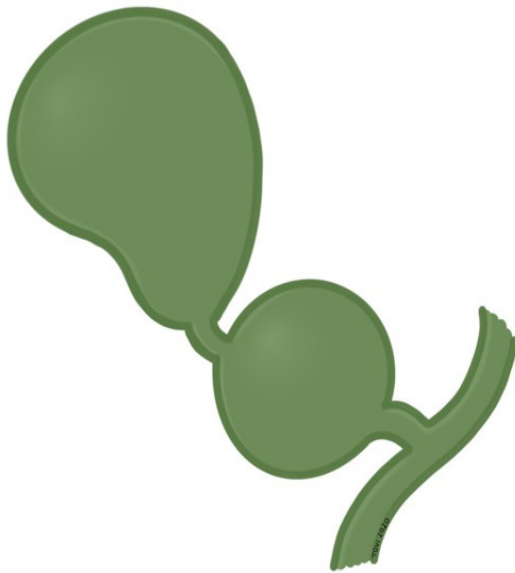


Figure 2: Illustration of described variant. Credit: Dr Tovi Vo.

Case presentation

The patient is an otherwise healthy 28 year old female who presented to the emergency department with 12 hours of right upper quadrant abdominal pain which developed after a fatty meal the night before.

On examination, she was Murphy's positive with localised peritonism. The patient was afebrile and there was no tachycardia.

Routine blood tests found elevated white blood cell count and C-reactive protein. Bilirubin, liver function tests and lipase were normal. Due to ongoing pain, an abdominal ultrasound was requested and reported a non specific anatomical anomaly of the biliary tree, possibly a choledochal cyst or a neoplastic process (Figure 3).

MRI was performed to further delineate the abnormality. This demonstrated a duplicated gallbladder with signs of acute cholecystitis in the lateral gallbladder and no inflammation in

the medial gallbladder. MRI was unable to demonstrate connection of the inflamed structure to the normal gallbladder, however did show a normal, though tortuous, cystic duct from the medial gallbladder to the common bile duct (Figure 4).

Decision was made for laparoscopic cholecystectomy due to ongoing pain. The patient underwent an uncomplicated operation with intraoperative cholangiogram. Cholangiogram was performed by introducing the catheter to the lateral structure and filling both structures. This confirmed connection from the lateral to the medial structure and demonstrated clear flow to the CBD and duodenum without any filling defects or obstruction (Figure 5).

The patient made an uncomplicated recovery and was able to be discharged the next day.

Histological examination of the gallbladder confirmed duplicated gallbladder with acute cholecystitis in the lateral gallbladder and chronic inflammation in the medial gallbladder. The author attended the pathology department to assist with orientation and examination and was able to confirm that while there was a duct connecting the structures, the lateral gallbladder had no individual cystic duct (Figure 6 & 7).

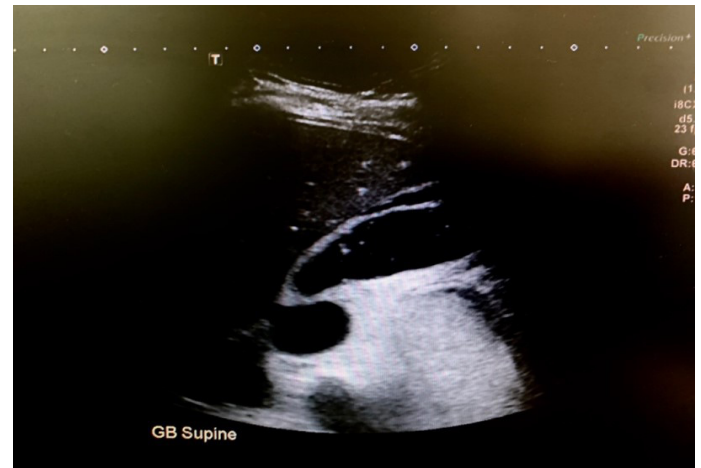


Figure 3: Ultrasound image of duplicated gallbladder.

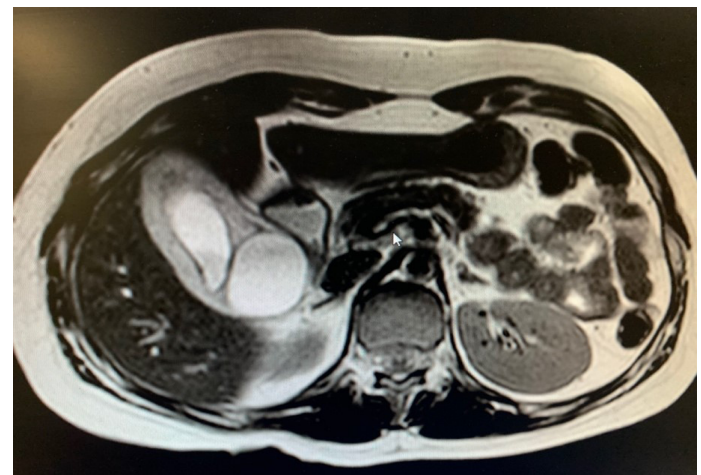


Figure 4: MRI of upper abdomen confirming diagnosis.

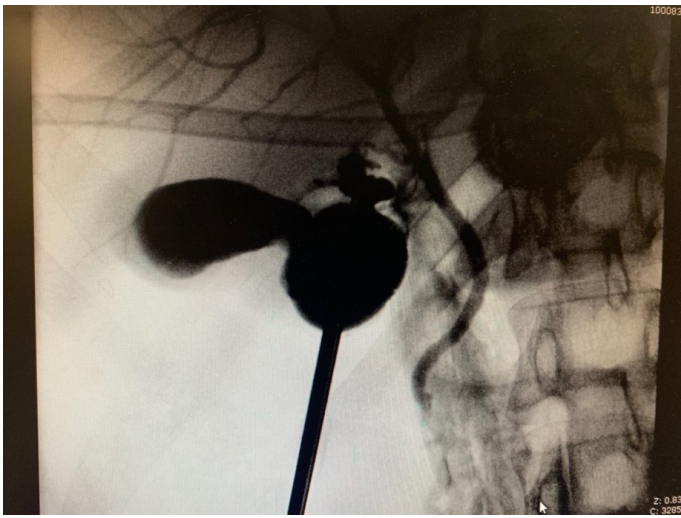


Figure 5: Intraoperative cholangiogram demonstrating communication between structures and single cystic duct.

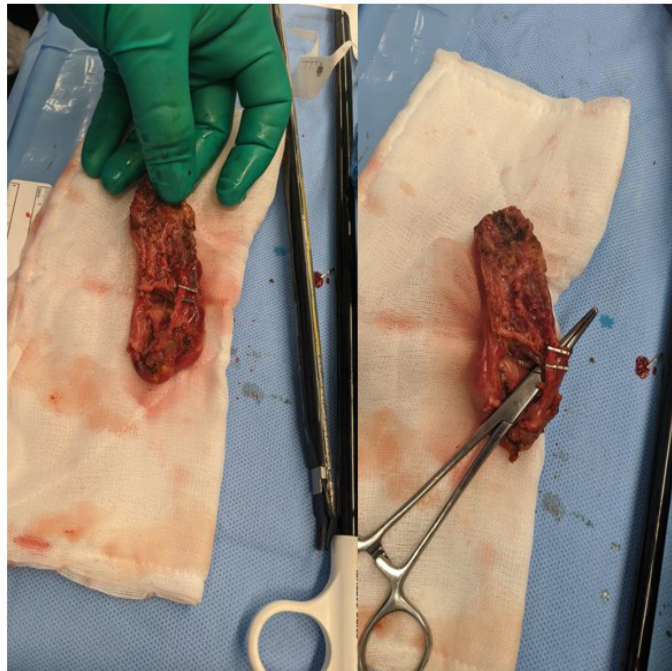


Figure 6: Specimen at time of operation. Two structures contained within single peritoneal fold. Clips applied to single cystic duct.

Discussion

Duplication of the gallbladder is a rare congenital anomaly; ever since Blasius et al. first description in 1675 few cases have been reported [1]. It is estimated that it occurs in every one of 3400 patients [1,3]. This type of anomaly has not predominance over gender, age or ethnical predominance, and is commonly reported during surgical procedures and autopsies [4]. Gallbladder duplication can develop from two separated origins. 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 (primordium). The second is the double gallbladder (*Vesica fellea du-plex*), where there are 2 separate gallbladders with their own cystic ducts [2].

These variants, outlined by Boyden in 1926 and demonstrated in Figure 1, describe the majority of biliary variants. The case



Figure 7: Specimen in pathology lab, forceps used to demonstrate duct communicating between structures.

presented above demonstrates an anomaly that is outside this classification system. Due to this, diagnosis required multimodal imaging and an adjustment in surgical technique to achieve adequate intraoperative cholangiogram and safe dissection of the cystic duct.

Clinically, there are no specific symptoms attributable to a double gallbladder and patient can be asymptomatic or symptomatic, depending on whether it was or not complicated. The clinical significance associated with complication is similar to those encountered in a single gallbladder [5]. Desolneux et al., reported that incidence of developing biliary diseases, such as acute or chronic cholecystitis, cholangitis or adenocarcinoma is the same of only one gallbladder [6]. But some authors reported that this malformation could be associated with the development of cholelithiasis due to inadequate bile drainage [2].

According to Goh et al., no published literature had reported an association between a duplicated gallbladder and other duplex structures [3].

Ultrasonography (USS) is generally the first imaging modality used in patients with suspected biliary disease. Although USS findings may suspect an anomalous biliary system, the precise details of cystic duct, common duct and vascular anatomy are not possible. MRI and/or MRCP is considered to be a standard, non-invasive imaging technique for the evaluation of patients with suspected anomalies of the biliary apparatus [7,8].

Combining intraoperative cholangiography with laparoscopic cholecystectomy is an appropriate strategy to minimise the risks of inadvertent injury to the biliary system. It is mandatory to dissect the hepatocystic triangle meticulously to obtain the critical view. In symptomatic patients, simultaneous removal of

both the lobes of gall bladder is strongly recommended during surgery even if the disease is present only in one lobe, to avoid cholecystitis and biliary colic in the remaining viscus [2,5,9,10].

Conclusion

Duplicated gallbladder and other biliary anatomical variants are rare but important abnormalities that can significantly impact surgical management. Variant anatomy is a significant predisposing risk factor for bile duct injury and intraoperative complication. Multimodal imaging pre operatively and preoperative planning are essential for adequate care. Other variants outside of the standard classification are important to add to the literature to further education and surgical knowledge.

Declarations

Consent: Consent was obtained from the patient at the time of surgery for use of imaging and pictures for publication.

Contributions: This article was written entirely by the author

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