

Double gallbladder—intraoperative finding at laparoscopic cholecystectomy: Literature review

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Abstract

Duplication of the gallbladder is a rare entity. It is often appreciated at surgery and has a higher propensity for complications and conversion to open surgery. We report a case of laparoscopic recognition and removal of a duplicated gallbladder opening into the bile duct through separate cystic ducts, in a young male presenting with biliary colics. Both cystic ducts were clipped and divided, and cholecystectomy completed laparoscopically. Although uncommon, awareness of this anomaly may contribute to minimising iatrogenic bile duct injuries.

Keywords

Duplication of the gallbladder, laparoscopic cholecystectomy

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Introduction

Duplication of the gallbladder is a rare congenital anomaly. Although autopsy studies show an incidence of 1 in 4000, reports of symptomatic cases are rare.¹ The anomaly results from the division and formation of an extra gallbladder primordium during the embryonic period.¹ In true duplications, both gallbladders may share a common cystic duct or have their own duct. Anatomical variations of the extrahepatic biliary tree may contribute towards iatrogenic bile duct injuries (IBDI). Furthermore, a missed accessory gallbladder may result in recurrent symptoms after cholecystectomy.^{2,3} Laparoscopic cholecystectomy for double gallbladders has been previously reported.^{4–6} We report on a case of laparoscopic cholecystectomy for gallbladder duplication recognized intraoperatively.

Case presentation

A 41-year-old male presenting with recurrent biliary colics of 6 months was booked for a laparoscopic cholecystectomy. Physical examination was normal except for right upper quadrant tenderness, and liver biochemistry was normal. Abdominal ultrasonography reported a thick-walled gallbladder with gallstones. Laparoscopic cholecystectomy was commenced using a conventional 4-port technique. Dense peri-cholecystic omental adhesions were taken down

(Figure 1). As dissection progressed around the cystohepatic triangle, it became apparent that there were two gallbladders (Figure 2) draining separately into the bile duct through separate cystic ducts. Both cystic ducts were clipped and divided and both gallbladders removed laparoscopically (Figure 3). The patient was discharged the following day after an uneventful recovery and remains well 3 years after surgery. Histopathology showed chronic cholecystitis in both gallbladders.

Discussion

The first description of a duplicated gallbladder was in a sacrificial victim of Emperor Augustus in 31 BC, and Boyden¹ was first to describe it and its variable anatomy in 1926. Sherren⁷ documented the first case of a double gallbladder

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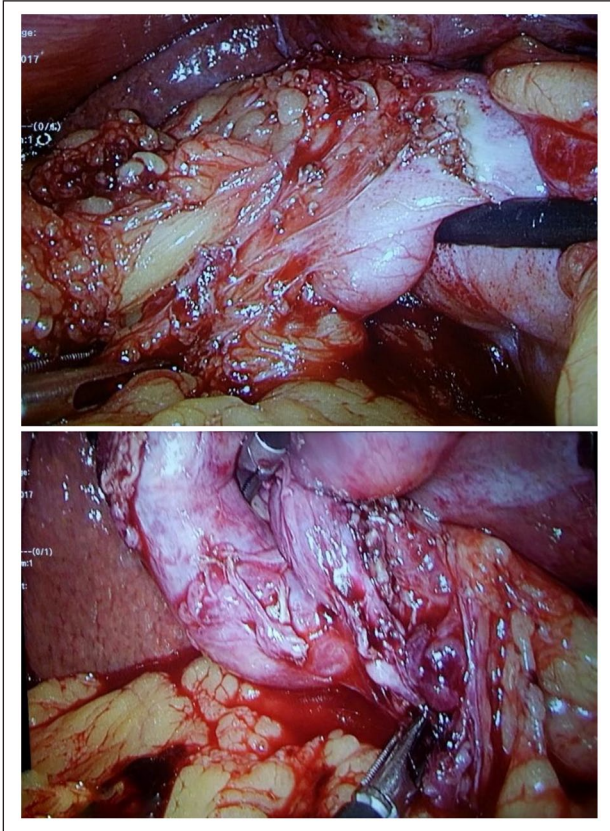


Figure 1. Dense omental adhesions around the gallbladder area.

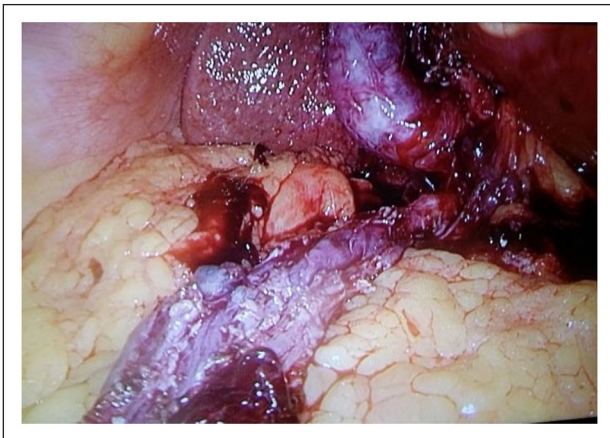


Figure 2. Two separate gallbladders with two cystic ducts.

removed surgically in 1911. Since then, cases of double gallbladders and their laparoscopic removal have been documented, as summarised in Table 1.^{3-6,8,9-25}

Duplication of the gallbladder has an incidence of approximately 1:4000 births.¹ The incidence in adults at postmortem and radiology is approximately 0.02% and 0.03%, respectively, with an equal distribution between genders.^{8,26} The true incidence is likely to be higher since only those who



Figure 3. Surgical specimen of two gallbladders.

became symptomatic and are imaged or are detected during surgery are reported.

Morphological and positional anomalies of the gallbladder include multiple gallbladders, malformation, deformation, ectopias, intrahepatic position, and the presence of heterotopic mucosa. Gallbladder duplication is a morphological anomaly, variations of which are described by Gross,²⁷ Boyden, and Harlaftis classifications. The Harlaftis classification and its modification²⁶ categorize true duplication into H- and Y-shaped subtypes. The H subtype has two cystic ducts that open separately into the bile duct, while the Y subtype has two cystic ducts that join prior to entering the bile duct²⁸ Figure 4. The Y subtype is less likely to result in conversion to an open procedure than the H subtype.^{3,4}

Non-regression and persistence of supernumerary buds and accessory vesicles originating from the hepatic antrum during the fifth to sixth week of embryogenesis,¹ bifurcation of the cystic primordium and accessory cystic primordium²⁸ and formation of two separate cystic primordia from the bile duct²⁸ are mechanisms proposed for gallbladder duplication.

Gallbladder anomalies often go undetected on abdominal ultrasonography and in addition, may be mistaken for a choledochal cyst, gallbladder diverticulum or Phrygian cap.⁴ Magnetic resonance cholangiopancreatography and, to a lesser degree, endoscopic retrograde cholangiopancreatography, though diagnostic, are not usually performed in patients with uncomplicated symptomatic cholelithiasis.²⁹ Where intraoperative cholangiography is routinely performed during cholecystectomy, it may reveal this anomaly, but there are no reports on its utility.^{30,31} As in our case, gallbladder duplication is mostly recognised intraoperatively during laparoscopic cholecystectomy.

Conclusion

This case illustrates the possibility of unexpectedly encountering rare anomalies of the biliary tract at laparoscopic cholecystectomy. Awareness of these anomalies and the knowledge

Table 1. Summary of laparoscopic cholecystectomy on double gallbladders.

No.	Authors	year	Type of duplication	Presentation	Diagnostic modality	Procedure	Post op/Histology
1	Yorganci et al. ¹⁰	2001	Accessory GB	RUQ pain	Intraoperative	LC	Uneventful/chronic cholecystitis
3	Goel et al. ¹¹	2003	Accessory GB	RUQ pain + dyspepsia	US/MRCP/ERCP	LC	Uneventful/cholesterolosis
4	Shirahane et al. ¹²	2003	Accessory GB	RUQ pain	US/ERCP	LC + Endoscopic nasobiliary tube to identify biliary tree anatomy	Uneventful/-
5	Hishinuma et al. ⁸	2004	Accessory GB	Epigastric pain	ERCP/MRCP	LC	Uneventful/cholecystitis
6	Sasaki et al. ¹³	2005	Accessory GB	Epigastric pain	ERCP/CT	LC	Uneventful/chronic cholecystitis
7	Vijayaraghavan and Belagavi ¹⁴	2006	H type (ductular)	RUQ pain	Intraoperative	LC + IOC	Uneventful/pyocele of GB + cystadenomatous changes
8	Desolneux et al. ¹⁵	2009	Y Shaped GB	RUQ Pain, fever, nausea, vomiting	MRCP	LC + IOC	Uneventful/NA
9	Causey et al. ¹⁶	2010	Bilobed GB	RUQ pain	Intraoperative	LC	Uneventful/chronic cholecystitis
10	Guajardo-Salinas et al. ¹⁷	2010	H type	RUQ pain + vomiting	intraoperative	LC + IOC	Uneventful/chronic cholecystitis
11	Smelt et al. ¹⁸	2011	H type GB	RUQ pain	MRCP	LC	Uneventful/NA
12	Walbolt and Lalezarzadeh ¹⁹	2011	Trabecular	GS Pancreatitis	Intraoperative	LC + IOC	Uneventful/chronic cholecystitis
13	Bulus et al. ²⁰	2012	Accessory GB	RUQ + Epigastric pain	Preoperative	LC	NA
14	Ghosh ²¹	2014	V type GB	RUQ pain, fever	Preop USS/MRCP	LC + IOC	uneventful
15	Pillay ²²	2015	Y type GB	biliary colic	Preop US/CR/MRCP	LC	uneventful
16	Al Rawahi et al. ⁴	2016	Y type GB	RUQ pain, nausea, vomiting	Preop CT/MRCP- confirmed intra op (Intra hepatic 2 nd GB)	LC	Uneventful/chronic cholecystitis
17	Yu et al. ³	2016	H type	Epigastric + RUQ pain	Perop CT/MRCP	LC + Lap CBD exploration	Uneventful/chronic cholecystitis
18	Musleh et al. ⁵	2017	H type	Recurrent RUQ pain	Preop CT/MRCP	LC	Uneventful/chronic cholecystitis
19	Painuly et al. ⁶	2018	H type	Recurrent acute cholecystitis	Intraoperative	LC	Uneventful/acute cholecystitis
20	Vezaikis et al. ⁹	2019	Y type	Acute cholangitis	Preoperative ERCP, USS, MRCP	LC	Uneventful/chronic cholecystitis and adenomyomatosis
21	Zhou et al. ²³	2020	H type	Upper abdominal pain, nausea	Preop MRCP	LC	Uneventful/chronic cholecystitis
22	Alsharedah et al. ²⁴	2020	H type	Biliary colic	Intraoperative	LC + IOC	Uneventful/NA
23	Singh ²⁵	2020	Y type	Epigastric pain	Intraoperative (preop CT done)	LC	Uneventful-chronic cholecystitis

GB: gallbladder; LC: laparoscopic cholecystectomy; ERCP: endoscopic retrograde cholangiopancreatography; OIC: intraoperative cholangiography; MRCP: magnetic resonance cholangiopancreatography; USS: ultrasound scan; RUQ: right upper quadrant; CBD: common bile duct.

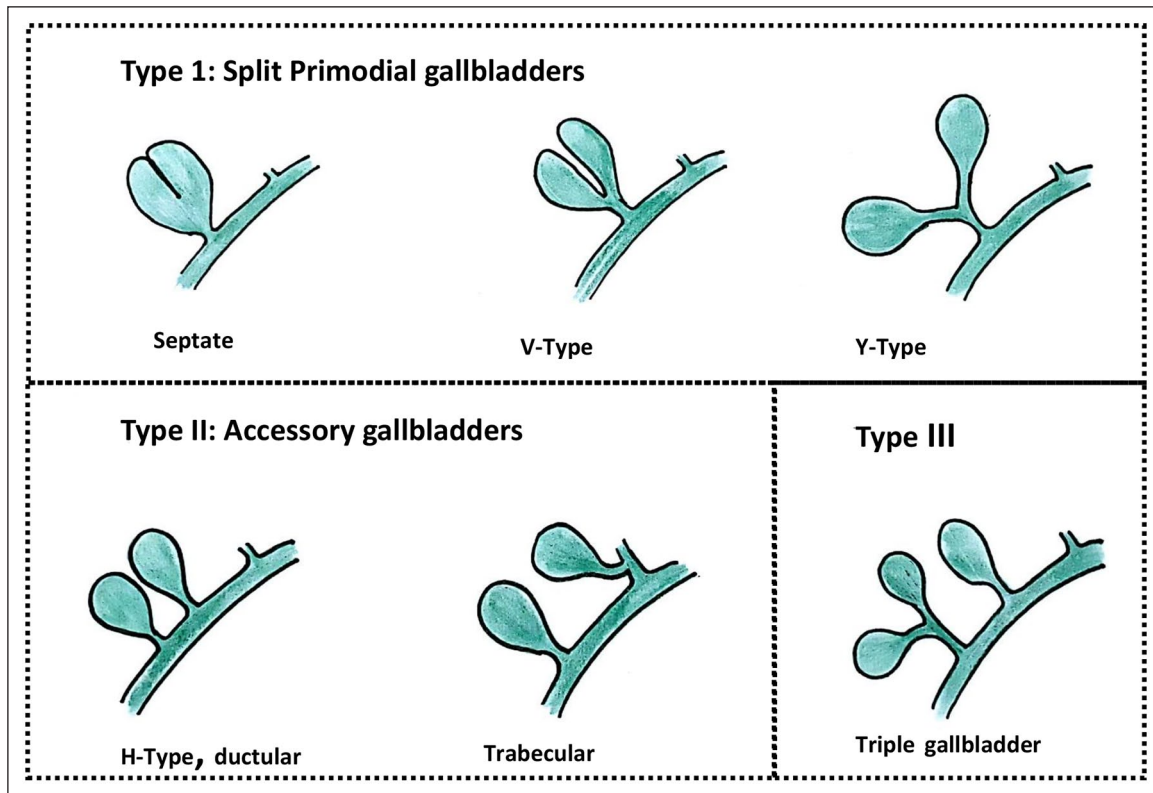


Figure 4. Classification of duplication of gallbladders.

of operative strategies help minimise the risk of iatrogenic bile duct injuries and reduce conversion rates. Imaging suggestive of a biliary tract anomaly should trigger a high index of suspicion for other biliary anomalies. The case also highlights how meticulous, careful dissection of the cysto-hepatic triangle, even in the absence of preoperative imaging or intraoperative cholangiographic recognition of an anomaly, ensures safe laparoscopic cholecystectomy.

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Author contributions

Conceptualisation: D.S. and S.S.. Data curation: D.S. Formal analysis: D.S. and M.H.G. Methodology: D.S. and M.H.G. Project administration: D.S., M.H.G., and S.S. Visualisation: D.S., M.H.G., and S.S. Writing—original draft: D.S. and M.H.G. Writing—review & editing: D.S. and S.S.

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Ethics approval

Our institution does not require ethical approval for reporting individual cases or case series.

Informed consent

Written informed consent was obtained from the patient(s) for their anonymised information to be published in this article.

Consent for publication

The patient has given her consent for the case report to be published. The written informed consent to publish this information was obtained from this patient.

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