



Unusual Cystic Duct Anatomy with Single Gallbladder Encountered During Laparoscopic Cholecystectomy: A Rare Case Report

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Abstract

Introduction: Anatomical variations of the biliary tree are a well-recognized cause of bile duct injury during laparoscopic cholecystectomy. Among these, duplication of the cystic duct associated with a single gallbladder is an extremely rare congenital anomaly and is often diagnosed intraoperatively due to limitations of preoperative imaging.

Case Presentation: We report a case of a 37-year-old female who presented with intermittent epigastric and right upper quadrant pain for one year. Ultrasonography revealed multiple gallbladder calculi. During laparoscopic cholecystectomy, a single gallbladder with double cystic duct anatomy was identified intraoperatively.

Discussion: Duplicated cystic ducts significantly increase the risk of bile duct injury if unrecognized. Although imaging modalities such as magnetic resonance cholangiopancreatography and intraoperative cholangiography may aid in delineating biliary anatomy, they may fail to detect rare ductal anomalies. Careful dissection and adherence to the critical view of safety remain essential.

Conclusion: This case highlights the importance of awareness of rare biliary anatomical variations and meticulous intraoperative assessment to prevent bile duct injury during laparoscopic cholecystectomy.

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Keywords: Double cystic duct, biliary anatomy, laparoscopic cholecystectomy, bile duct injury, anatomical variation

Introduction

Anatomical variations of the biliary tree are common and constitute a major cause of technical difficulty during hepatobiliary surgery. Variations involving the cystic duct are particularly significant, as failure to recognize these anomalies may result in bile duct injury, bile leakage, and increased postoperative morbidity during laparoscopic cholecystectomy^[1].

A single gallbladder with a double cystic duct is an extremely rare congenital anomaly of the biliary system^[2]. In most reported cases, the diagnosis is made intraoperatively, as preoperative imaging techniques frequently fail to demonstrate this variation clearly^[3]. Double cystic ducts are classified into three types based on their site of drainage into the biliary tree, which further complicates intraoperative identification^[1].

Despite advances in imaging modalities such as ultrasonography, magnetic resonance cholangiopancreatography (MRCP), and intraoperative cholangiography (IOC), the sensitivity and specificity of these investigations in detecting rare cystic duct anomalies remain limited^[2]. Therefore, surgeons must maintain a high index of suspicion and strictly adhere to safe surgical principles, including meticulous dissection and achievement of the critical view of safety.

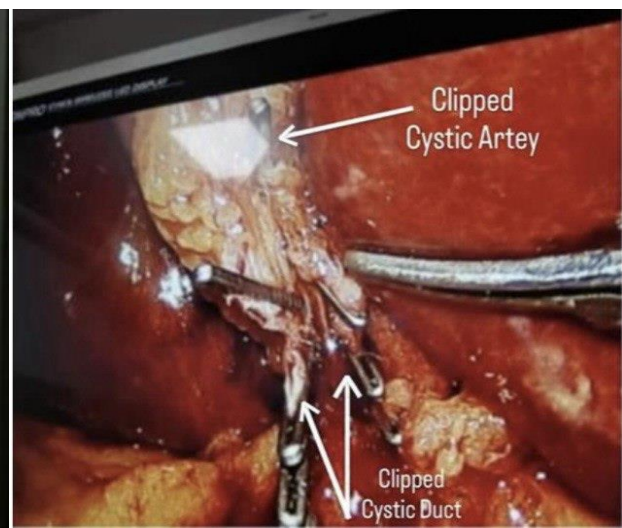
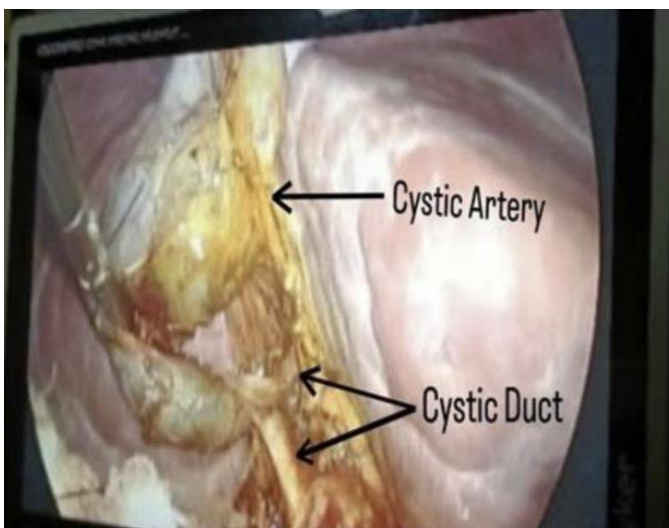
We report this rare case of a single gallbladder with double cystic duct anatomy encountered during laparoscopic cholecystectomy to emphasize the importance of intraoperative vigilance and awareness of biliary anatomical variations.

Case Report

A 37-year-old female with no known comorbidities presented with intermittent abdominal pain for one year, predominantly in the epigastric region and right upper quadrant, associated with nausea and occasional vomiting. There was no history of fever, jaundice, previous abdominal surgery, or endoscopic intervention.

On physical examination, mild tenderness was present in the epigastric and right hypochondrial regions. Murphy's sign was negative, and there was no icterus. Other systemic examinations were unremarkable.

Ultrasonography of the abdomen revealed multiple gallbladder calculi, with the largest measuring approximately 10.5 mm. The common bile duct and intrahepatic biliary radicles appeared normal. The patient was planned for elective laparoscopic cholecystectomy. During surgery, a single gallbladder with double cystic duct anatomy was identified intraoperatively.



Discussion

Bile duct injury remains one of the most serious complications of laparoscopic cholecystectomy and is frequently related to misinterpretation of biliary anatomy^[1]. Anatomical variations of the cystic duct significantly increase this risk, and duplicated cystic ducts are among the rarest described anomalies^[3].

Preoperative imaging modalities are often insufficiently sensitive to detect such rare ductal variations². Although MRCP and IOC may assist in delineating biliary anatomy, normal imaging findings do not exclude the presence of anomalies^[1]. Therefore, surgeons must avoid blind clipping or division of structures and ensure complete anatomical clarification before ligation.

Strict adherence to the critical view of safety and careful dissection within Calot's triangle remain the most reliable methods to prevent bile duct injury, particularly in the presence of unexpected anatomical variations^[1].

Conclusion

This case underscores the fact that, despite advances in imaging technology, certain biliary anatomical variations may still evade preoperative detection. A thorough understanding of possible anomalies and meticulous intraoperative assessment are essential to prevent bile duct injury during laparoscopic cholecystectomy.

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