

Rare Cholecystohepatic Duct Encountered during Cholecystectomy: A Report of Two Cases

Kaushik Bhuyan Keot¹, Eunos Ahmed Barbhuiya¹, Rajesh Kumar², Dibakar Borthakur²

¹Department of General Surgery, Tezpur Medical College, Tezpur, Assam, India

²Department of Anatomy, All India Institute of Medical Sciences, New Delhi, India

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ABSTRACT

Introduction: cholecystohepatic duct (CHD) is one of the important but rare anatomical variations of extra hepatic biliary apparatus. It can get injured easily if proper care is not taken intraoperatively leading to prolonged bile leakage and post-operative complications. Two cases of this rare variation were found intraoperatively during cholecystectomy. CHD was arising from right hepatic duct and communicating with body of the gall bladder in both cases. These were type E6 accessory bile duct according to Goor's classification. In the present case, intraoperative identification of anomaly could avoid subsequent post operative complications due to prolonged bile leakage. Hepatobiliary surgeons performing surgery in the region of calot's or cholecystohepatic triangle should always keep in mind probable presence of CHD. A high index of clinical suspicion and vigilance can prevent subsequent grave complications.

Keywords: Accessory bile ducts; Cholecystohepatic ducts; Hepatobiliary surgical anatomy; Cholecystectomy.

Introduction

Accessory bile ducts (ABD) are one of the important but exceedingly rare congenital anomalies of the extrahepatic biliary apparatus (EHBA). Iatrogenic injuries to the EHBA are not uncommon even in well equipped set ups and in experienced hands during cholecystectomy. ABDs can get injured easily culminating in prolonged bile leakage and can complicate post-operative recovery with lengthy hospital stay. Bile leakage can also cause inflammation of EHBA and even hepatic abscess. Furthermore, it may necessitate an additional surgical procedure for management of bile leakage which is otherwise avoidable. Intra-operative conversion of laparoscopic cholecystectomy to open cholecystectomy is also required sometimes¹. It is recognized that EHBA anomalies are associated with more occurrences of acute and chronic biliary diseases². Variable incidence of ABD including Luschka's subvesical variant has been reported which ranges from 14% to 28% in autopsy studies and upto 46.1% in cholangiographic studies³ intraoperative radiologic contrast methods, ERC, CT and NMR.

The ABDs are believed to be aberrant ducts responsible for drainage of at least a portion of one of the liver segments. The ABD can be seen as an obvious separate biliary duct parallel to the main channel. It is possible that this drainage pathway is the only route of bile secretion from a particular portion of a hepatic segment as intercommunications are not a typical feature in biliary tract drainage. The cholecystohepatic duct (also known as hepatocholecystic duct) is a

subtype of ABD which typically traverses through or along the gallbladder wall in most occasions to reach the main biliary channel⁴. At times it can also be seen terminating in to the gallbladder. According to the Goor's classification the cholecystohepatic ducts (CHD) are those variant of ABDs that communicate between one of the major hepatic ducts, usually of the right hepatic duct but not draining any particular hepatic segment exclusively². An iatrogenic injury to the CHD might serve as a possible route for bile leak. We are describing here two cases of acute calculus cholecystitis wherein CHDs were identified during cholecystectomy without any injury and consequent uneventful post operative recovery. One CHD was detected during open cholecystectomy which communicated with the right branch of hepatic duct and the other CHD was encountered at laparoscopic cholecystectomy that communicated with a deeper branch of right hepatic duct.

Case presentations

Case 1: A 45 year old women was presented with 2 days history of abdominal pain. The pain was localized to the epigastric and the right hypochondriac region, non-radiating in nature, colicky in character, appearing on and off and aggravated on taking food. She also gave history of one episode of non bilious vomiting. However no history of fever, diarrhoea, constipation could be elicited. Medical and surgical history was non-significant except that she had undergone appendectomy for appendicitis at 22 years of age. Her weight and height were 75 kg and 156 cm

respectively. On examination, she was normo-tensive with normal vital signs. Abdomen was soft on palpation, localized tenderness was present over epigastrium and right hypochondrium. Rebound tenderness could not be elicited. Complete blood counts were normal. Plain X ray of abdomen taken in erect posture was normal, abdominal ultrasound revealed single gallbladder stone of 18 mm size. She underwent an open cholecystectomy after adequate pre operative preparation. Intra-operatively we observed an ABD type E5 which was confirmed to be CHD. Gallbladder was dissected off from the gallbladder fossa, cystic duct, cystic artery and remnant of CHD was ligated. Hospital stay during the peri-operative period was uneventful. An abdominal drain was kept in situ for 24 hours which revealed minimal bile collection and then removed.

Case 2: A 39 year old women presented with 4 days history of pain abdomen in the right upper abdomen. Pain was sudden in onset, intermittent in nature, colicky in character, aggravated on eating food. She also complained of 3 episodes of non bilious vomiting. There was past history of similar episode about 3 months back which was managed in a local clinic as acid peptic disorder. No other significant past medical and surgical history was obtained. Her weight and height were 82 kgs and 132 cm respectively. She was normotensive with stable vital signs. Abdomen was soft with localized tenderness over right hypochondrium and epigastrium. No rebound tenderness could be elicited. Hematological examination revealed leucocytosis with neutrophilia. Plain abdominal X ray was normal, however USG of whole abdomen revealed single gallbladder stone of 13 mm size with increased gallbladder wall thickness (>4mm). A pre-operative diagnosis of acute calculous cholecystitis was made and planned for laparoscopic cholecystectomy as per patient's wish. Intraoperatively we identified CHD. Gallbladder was dissected and the cystic artery and cystic duct, CHD were clipped and ligated. Post operative drain was kept in situ for 24 hours which had minimal bile collection. Perioperative period was uneventful and the patient got discharged on day 3.

Discussion

Anatomical variation of the EHBA is a common concern for surgeons operating in that region. Apart from the main hepatic ducts, other inconstant connections between the liver and the gallbladder or between the gallbladder and the primary hepatobiliary channels are often described. One of these perigallbladder EHBA ductal anomalies is CHD. Various authors used the term CHD and cystohepatic ducts interchangeably. Cystohepatic duct term is more appropriate for denoting those aberrant channels connecting the right liver with cystic duct⁵. Hence we restricted ourselves to describe the anomalies

found in our cases as CHD. In comparison to the other anomalies of the EHBA, CHD occurrence is much less as 0.07% to 1.2% observed in a large data obtained through surgical and cholangiographic data^{4,5,6,7}. Our case when compared with the original Goor's classification system of accessory biliary duct can be categorized either into the Type E5 or E6; where the CHD sprouts out either from the liver parenchyma or the right hepatic duct; but with a patent primary major biliary drainage pathway. Since the description of the anomalous CHD by Nuhof H *et al.* in 1945, this entity has been a matter of debate among surgeons⁸. Different views were propounded with respect to its origin, course and eventual drainage. Luschka *et al.*, Foster *et al.*, Healy *et al.*, Sterling *et al.* had the opinion that though CHDs appeared to be connected to the gallbladder, but actually they drain into one of the main hepatic ducts. Opposite views were suggested by contemporary researchers like Braash *et al.*, Schachner *et al.*, Mentzer *et al.*, Williams *et al.*, Moosman *et al.*, etc. who believed direct drainage of CHDs into the gallbladder².

The presence of EHBA anomaly might not increase the risk of iatrogenic injuries but also can cause significant problem during exploration in the vicinity especially following inflammation and adhesion. Though CHD *per se* is not a common cause of injury to the bile duct, many instances were noted where CHD got injured during cholecystectomy^{9,10,11,12}. Such inadvertent damage was encountered primarily due to non-recognition of the anomaly either pre-operatively or intra-operatively. In most cases these anomalies get noticed in a retrograde manner when prolonged postoperative bile leak led complications gave clue that aberrant ducts might get severed. As the chance of occurrence of acute as well as chronic diseases of the biliary tree are common in EHBA anomalies, it is obvious that one should always attempt to rule out ABDs with an intravenous cholangiogram or at least with an oral cholecystogram. Excluding ABDs and other biliary tree anomalies definitely minimize inadvertent EHBA injuries during surgery. We were fortunate that in our case no peri-operative complications were seen probably because we could detect the biliary tract aberration intra operatively and have taken enough measures not to injure the same. Laparoscopic cholangiography has also been utilized for intraoperative detection of ABDs¹³. The gold standard investigation of choice is magnetic resonance retrograde cholangiography (MRCP); otherwise ERCP and other CT guided imaging modalities can also be helpful. The two cases presented here illustrate and reiterate the importance of intraoperative identification of ABD (Figures 1A, 1B and 1C). Although rare and difficult to visualize with modern preoperative imaging techniques, sound knowledge of this rare anatomic variation is imperative to avoid inadvertent intraoperative ABD injuries which can

lead to significant morbidity. As we operated on our two cases in emergency basis, we did not have the luxury of a pre-operative diagnosis beforehand. But as we anticipated it from our previous experience, we could not only detect the same but managed it without any complications. Hence we recommend that being aware and vigilant can be a good idea not to miss such entity. Especially in laparoscopic cholecystectomy, a meticulous dissection in the inner subserosal layer as recommended by Honda G *et al.* can be followed¹⁴. Erstwhile surgeons dealing with such

cases suggested adopting safety surgical measures in cholecystectomy. All these suggested measures stressed upon preventing bile leakage by ligation of the severed ducts and appropriate reconstruction¹⁵. The method of choice is dependent on the type of ABD encountered. There can be modifications as per the situation and local imaging modalities available. In these two cases, without ascertaining the exact drainage area, we ligated the remnant of CHD stumps. No bile leakage in the immediate postoperative period was seen.

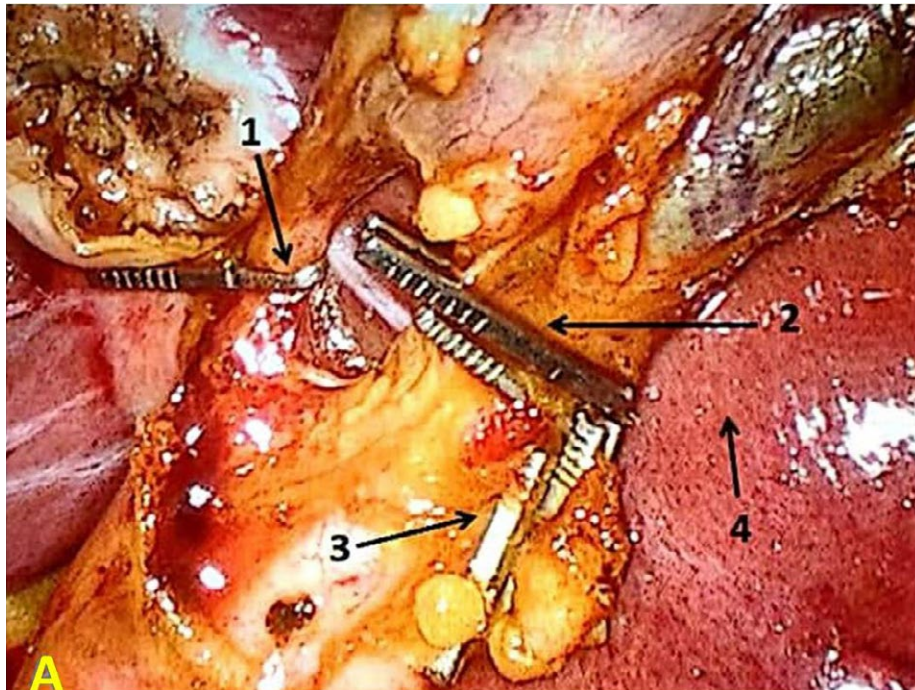


Figure 1 A. Image of the intra-operative field during laparoscopic cholecystectomy; 1- cholecystohepatic duct (accessory bile duct type E6), 2-cystic duct, 3- cystic artery, 4-liver.

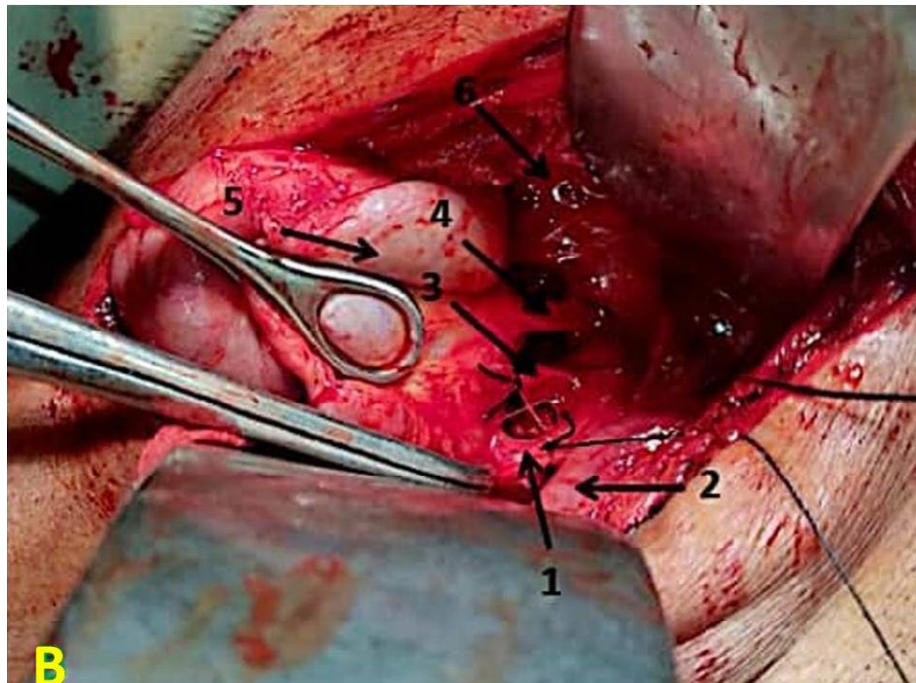


Figure 1 B. Image of the intra-operative field during open cholecystectomy; 1-cystic duct, 2-common bile duct, 3- cystic artery, 4- cholecystohepatic duct (accessory bile duct type E6), 5- gallbladder, 6- liver.

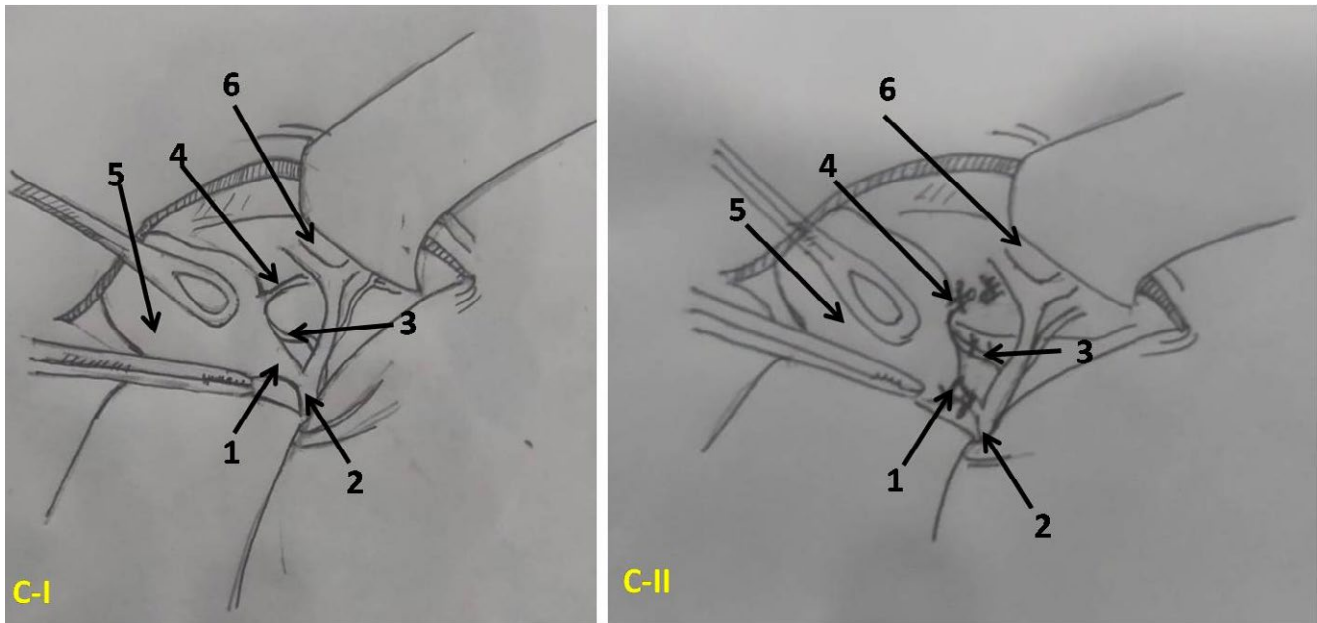


Figure 1 C. C-I showing schematic sketch of the intraoperative field during open cholecystectomy. C-II showing the same field after ligation of the cystic duct, cystic artery and cholecystohepatic duct; 1-cystic duct, 2-common bile duct, 3- cystic artery, 4- cholecystohepatic duct (accessory bile duct type E6), 5- gallbladder, 6- liver (the intraoperative sketches were drawn by the first author who also is the first operating surgeon).

Conclusion

CHD though rare can be incidentally detected during gallbladder surgery. Inadvertent injuries to CHD or other persistent aberrant EHBA channel might lead to bile leakage in the postoperative period and can complicate recovery. Also existing literature points towards an increased propensity of biliary tract diseases in persons with EBHA anomaly. As pre-operative imaging studies are not routinely performed and recommended, clinical judgement

remains a sole option to suspect and order relevant investigations. It is felt that awareness about this rare entity will definitely avoid iatrogenic injuries and post operative complications thereof. Hepatobiliary surgeons performing surgery in the region of calot's or cholecystohepatic triangle should always keep in mind probable presence of CHD. A high index of clinical suspicion and vigilance can prevent subsequent grave complications.

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Mini Curriculum and Author's Contribution

1. Kaushik Bhuyan Keot- Contribution- Conceived the study, operated on the patient as first surgeon, reviewed the literature and wrote the initial manuscript, extracted the schematic out of surgical image.
2. Eunus Ahmed Barbhuyan- Contribution-Assisted the surgery, reviewed literature, wrote the initial manuscript and photographed the case images.
3. Rajesh Kumar- Contribution-Reviewed the literature contributed to the manuscript. ORCID- 0000-0002-8743-7541
4. Dibakar Borthakur- MBBS, MD; Contribution- Conceived the study, reviewed literature, involved in protocol development and lab work, approved the final draft of the manuscript. ORCID- 0000-0001-6044-0743

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Corresponding author
Dibakar Borthakur
E-mail: dibakar.borthakur@gmail.com