

Case Report

DOUBLE CYSTIC DUCT

Alizadeh Shabanali ¹, Darabi Mohammad Reza ^{*2}, Ahrari Khadijeh ³, Baazm Maryam ⁴, Alizadeh Mohammad Reza ⁵.

¹ Assistant Professor, Department of Surgery, School of medicine, Arak University of Medical Sciences, Arak, Iran.

^{*2} Associate Professor, Department of Anatomy, School of medicine, Arak University of Medical Sciences, Arak, Iran.

³ Scientific Member, Department of Obstetrics, Eslamic Azad University of Arak, Iran

⁴ Assistant Professor, Department of Anatomy, School of medicine, Arak University of Medical Sciences, Arak, Iran.

⁵ Student of medicine, School of medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

ABSTRACT

Different radiological methods can be used for visualization of cystic duct and its variations. It can be optimally and directly visualized with cholangiography. Unrecognized abnormality of the biliary apparatus may cause confusion on imaging studies and complicate subsequent surgical treatment. Malignancy or inflammatory processes can be secondarily involving the cystic duct. The cystic duct may be primarily involved by calculous disease, neoplasia, fistula, biliary obstruction and sclerosing cholangitis. If a portion of cystic duct is left behind during cholecystectomy many complications may be seen postoperatively. These complications include leakage and stones in cystic duct. Redundant cystic duct, impacted cystic duct stone or a tortuous cystic duct may confuse with a mass or tumor. So accurate diagnosis can familiarize the physicians and surgeon with the imaging appearance of anatomical variation of cystic duct and its related disease processes.

KEYWORDS: Cystic Duct, Cholangiography, Biliary Apparatus, Neoplasia, Fistula, Ligation.

Address for Correspondence: Mohammad Reza Darabi, Department of Anatomy, Arak University of medical sciences, Arak, Iran Tel: +988634173502 Fax: +988634173526.

E-Mail: m.darabi@arakmu.ac.ir

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INTRODUCTION

Variations in the anatomy of gallbladder, bile ducts and the arteries that supply them and liver are important to the surgeon because failure to recognize them may lead to inadvertent ductal ligation, biliary leaks and strictures after laparoscopic cholecystectomy [1,2].

When a bile duct injury is suspected, for example, by the presence of a double lumen in the duct, intraoperative cholangiography is

useful for determining whether this feature results from the transection of the bile duct or is an anatomic variation. Although routine investigations for gall stone disease do not detect all cases with variable anatomy.

The extrahepatic bile duct is connected to the gallbladder by cystic duct. A wide variety of disease processes may involve the cystic duct.

There are many studies about the normal anatomy of the biliary tract and its diseases but

as the best of our knowledge few studies have focused on the double cystic duct in our country. Usually there aren't any clinical signs for cystic duct variations. It must be noted that one of the reasons for confusion on imaging studies is undetected variant anatomy. Many modalities included Computed tomography, direct cholangiography (percutaneous transhepatic cholangiography [PTC], ultrasonography and retrograde endoscopy permit recognition of the normal anatomy of the cystic duct as well as its disease processes. Although it is possible to visualize the cystic duct dilation by computed tomography or ultrasonography but the measurement of the cystic duct caliber may be difficult to determine using these modalities. Similarly it is difficult to detect the tortuosity and its small caliber of the cystic duct with US and axial CT but the long axis of the cystic duct can be seen by injection of contrast material into the biliary ductal system in direct cholangiography [3,4].

It is reported that the congenital abnormalities of the extrahepatic biliary duct system are usually the most frequent variations of the human body [5]. However, a double cystic duct is extremely rare and poses a challenge for surgeons during an operation. Diagnosis of this condition is usually confirmed during laparoscopic cholecystectomy [6]. Awareness among the surgeons regarding this anatomic anomaly could help in avoiding converted laparotomy and reduce the risk of complications [7].

Due to complex embryological development, 10% of biliary collecting systems have anatomical variations [8]. Ninety percent of bile duct anomalies are found close to triangle of Calot. If these anomalies are not detected during surgery or preoperatively they may result in bile leak. This causes significant morbidity and has been reported to occur in 0.2–2% of cases after laparoscopic cholecystectomy [9]. Surgeons should consider the possibility of anomalies such as double cystic ducts, awareness of which could minimize the risk of complications. We present a case report of a patient with symptomatic cholelithiasis with double cystic duct.

Normal Anatomy

The gallbladder is a pear shaped organ situated in a fossa on the liver undersurface and is connected to the extrahepatic bile duct by the cystic duct. Its position in relation to liver may vary. The gallbladder is divided into a fundus, a body and a neck or infundibulum. The Hartman's pouch an outpouching of the wall in the region of the neck is recognized more as an outcome of pathology in the form of dilation or presence of stones. A large Hartman's pouch may obscure the cystic duct or bile duct. The cystic duct joins the gall bladder to the bile duct and is one of the important structures needing proper identification and division during a standard cholecystectomy. The cystic duct may run a straight or a fairly convoluted course. Its length is variable and usually ranges from 2-4 cm [5]. Around 20% of the cystic ducts are less than 2 cm, hence there may be very little space to put clips or ligatures. True absence of cystic duct is extremely rare and if the duct is not seen is more likely to be hidden.

The insertion point of cystic duct to the extrahepatic bile duct marks the division between the common bile duct and the common hepatic duct. However, the junction of the cystic duct and extrahepatic bile duct is variable, ranging from low at the level of the ampulla to high at the level of the porta hepatis.

The cystic duct usually lies parallel to the extrahepatic bile duct for a short distance and may spiral around the bile duct to connect medially. The junction between cystic duct and the extrahepatic bile duct is approximately midway between the ampulla of Vater and the porta hepatis. The cystic duct contains prominent concentric folds known as the spiral or Heister valves. The course of cystic duct is usually tortuous or serpentine course. The diameter of the cystic duct is variable, normally between 1 to 5 mm [10].

Calots triangle

This famous triangle was described as bound by the cystic duct, the bile duct and the cystic artery in its original description by Calot in 1981. In its present interpretation the upper border is form-

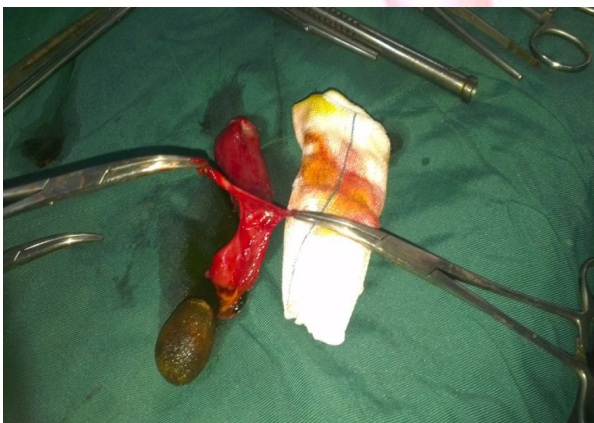
ed by the inferior surface of the liver with the other two boundaries being the cystic duct and the bile duct. Its contents usually include the RHA, the cystic lymph node, connective tissue and lymphatics. Occasionally it may contain accessory hepatic ducts and arteries. It is this triangle space, which is dissected in a cholecystectomy to identify the cystic artery and cystic duct before ligation and division. The left (or medial) boundary of the triangle formed by the bile duct is the most important structure, which needs to be safeguarded [10, 11].

CASE REPORT

Here, we report the case of a 50-year-old woman referred to Vali-Asr Hospital of Arak University of medical sciences. She had a 3-month history of postprandial epigastric discomfort. On admission, the patient had normal and stable vital signs and on physical exam there was right upper quadrant pain and tenderness to palpation and symptoms of biliary colic for 2 years with no previous surgical history and no peritoneal signs.

Ultrasonography demonstrated a 1.8-cm stone in the neck of the gallbladder; gallbladder wall thickening was not observed. Physical examination and laboratory tests, including those for liver function, gave normal results.

Fig. 1: Gross pathological examination shows the 2 separate cystic ducts and gallstone.



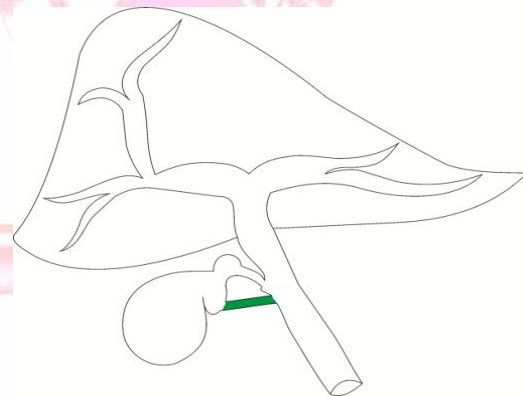
During the operation a double cystic duct was found with one gall bladder and two cystic arteries (Fig 1). The double cystic ducts were divided with meticulous dissection by right angle clump and scissors and subsequently, the surgery was completed. Postoperatively the patient was transferred to the recovery unit and

finally to the women surgical ward. She was tolerated liquid diet postoperatively. She was discharged from the hospital in 3rd days of operation to home. An examination of the excised gallbladder showed 2 separate ducts directly entering the gallbladder (Fig. 2 & 3). The patient recovered rapidly, and the postoperative course was uneventful.

Fig. 2: Gross pathological examination shows the 2 separate cystic ducts.



Fig. 3: Accessory cystic duct.



Microscopically the specimen serosal surface was smoothing shiny. Dissections contains bile and stones. Mucosa is obliterated in some parts. The gallbladder was anatomically normal with no septum. An accessory duct from the gallbladder was noticed which was attached to the common bile duct. The pathology report showed evidence of cholelithiasis and chronic cholecystitis.

DISCUSSION

Cholecystectomy is the treatment of choice for symptomatic gallstones because it removes the organ that contributes to both the formation of gallstones and the complications ensuing from them. The morbidity associated with cholecystectomy is attributable to injury to the abdominal wall in the process of gaining access

to the gallbladder (ie., the incision in the abdominal wall and its closure) or to inadvertent injury to surrounding structures during dissection of the gallbladder [12, 13]. Accessory ducts are common in the triangle of Calot [7] but less than 10% are found near the body or fundus [14].

Previous studies showed that the variant cystic duct are also classified into 'H' type where an accessory duct joins the right, left or common hepatic duct, trabecular type in which the accessory duct directly enters the liver substance and 'Y' type where both ducts meet and form a single duct [7].

A double cystic duct is an uncommon variation that poses a critical challenge. Cases of a single gallbladder with a double cystic duct (Fig. 3) have rarely been reported in the English and European literature [6,7,15].

To aid in the diagnosis the surgeon can use ultrasound, MRCP, ERCP and ultrasound. None of these tools are 100% sensitive and only in little more than 50% of the cases the diagnosis is made preoperatively [16].

Double cystic duct in this study is not a true gallbladder duplication [17] because it has only one gall bladder. Our case shows that the use of intraoperative cholangiogram confirms the diagnosis and helps to identify both cystic ducts. The evidence is anecdotal but as shown on this case report clearly seen two cystic ducts accurately diagnosed gallbladder duplication and prevented the surgeon from leaving an unidentified gallbladder which later can become a diagnostic enigma. According to our experience routinely it is recommended the use of intraoperative cholangiography when dealing with abnormal anatomy or congenital anomalies of the gallbladder. The evidence is anecdotal but as shown on this case report clearly seen two cystic ducts accurately diagnosed a gallbladder and prevented the surgeon from leaving an unidentified duct which later can become a challenging problem for surgeon also double cystic duct is very challenging due to laparoscopic cholecystectomy.

Conflicts of Interests: None

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