Original Article

An Unusual Variation of Extra Hepatic Biliary Ductal System: Hepaticocystic Duct

Anatomy Section

SHARMILA ARISTOTLE, CHRISTILDA FELICIA, SUMATHILATHA SAKTHIVELAVAN

ABSTRACT

Aim: The aim of this study was to focus on the variations occurring in the formation of extra hepatic biliary tract. These variations can occur from the gallbladder, cystic duct, hepatic ducts, common bile duct. Most of these variations are due to aberrations in the normal embryological development.

Materials and Methods: The study was carried out in 25 foetal specimens of 7 to 9 months gestational age collected from the obstetrics and gynaecology department, Madras medical college, Chennai. Gallbladder was identified and dissection was carried out from the neck of gallbladder. Cystic duct, right hepatic duct, left hepatic duct, common hepatic duct and common bile duct were traced out. The relation of hepatic artery to the duct system was also noted.

Result: This study reports an unusual variation in a foetal specimen out of 25 foetal specimens studied by dissection. In one of the specimen the common bile duct was absent. A small common hepatic duct from the liver entered directly into the neck of gallbladder. Further drainage of bile from the gallbladder was carried out by a long cystic duct which opened into the duodenum. The right and left hepatic ducts united intra hepatically to form the common hepatic duct.

Conclusion: The variation noted here has been reported less in the literatures. knowledge of this congenital variation along with variations in cystic duct, common hepatic duct, common bile duct and the surrounding vessels is necessary to avoid iatrogenic ductal injuries and inadvertent complications during biliary surgery.

Key Words: Common bile duct; Common hepatic duct; Cystic duct; Extra hepatic biliary tract

INTRODUCTION

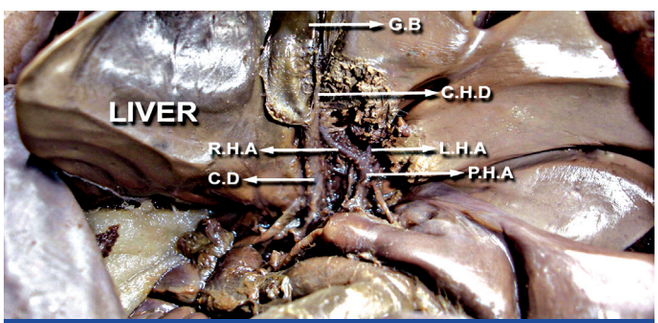
Many congenital anomalies of extra hepatic biliary tract have been reported. Of this, congenital absence of common bile duct namely the hepticocystic duct or cholecystohepatic duct is the rarest and less frequently reported anomaly. Lamah et al described that the incidence varies between 0.58 % and 47.2 percent [1]. In this, the common bile duct is absent. The right and left hepatic ducts unite together to form the common hepatic duct. This common hepatic duct drains directly into the gallbladder or the right and left hepatic ducts directly drain into the gallbladder. Further drainage of the bile from the gallbladder to the duodenum is carried out by a long cystic duct [2].

MATERIALS AND METHODS

The study was carried out in 25 foetal specimens of 7 to 9 months gestational age collected from the obstetrics and gynaecology department, Madras medical college, Chennai .The dissection was carried out by opening the abdomen in midline through a vertical incision extending from the xiphisternum to umbilicus. Incision was extended laterally, from xiphisternum along the costal margin. Rectus sheath was cut in the midline. Peritoneum was opened and entered into the abdominal cavity. The stomach was reflected to the left side. Liver along with the gallbladder, duodenum, free margin of lesser omentum, epiploic foramen were identified. Dissection was started from the neck of the gallbladder and cystic duct was traced out till it meets the common hepatic duct. Further dissection was done to identify all the structures in the hepatoduodenal ligament. Common hepatic duct, right and left hepatic ducts, common bile duct were dissected. The boundaries of calot's triangle were defined. Apart from this the relation of hepatic artery to the duct system was noted.

RESULTS

This variation was noted in a 37 week's old dead born male foetus. The liver and gallbladder were seen in the normal position. The right and left hepatic ducts united to form the common hepatic duct intra hepatically. The common hepatic duct emerged from the liver was very short and it opened directly into the neck of gallbladder at the point of origin of cystic duct. Formation of common bile duct by the union of the common hepatic duct and cystic duct was absent. The cystic duct that emerged from the neck of gallbladder was long. It descended downwards and entered directly into the second part of duodenum. Apart from this, the proper hepatic artery was noted to the left of cystic duct. It divided into right and left hepatic arteries. The right hepatic artery ran a course upwards and passed posterior to the cystic duct [Table/Fig-1]. All the other foetal specimens were normal in their anatomy.



[Table/Fig-1]: Fetal specimen with liver and gallbladder showing common hepatic duct from the liver drained directly into the neck of gallbladder. Cystic duct was long and opened directly into duodenum. GB-gallbladder; CHD-common hepatic duct; CD-cystic duct; PHA-proper hepatic artery; LHA- left hepatic artery; RHA- right hepatic artery.

DISCUSSION

The extra hepatic biliary system develops from the hepatic diverticulum of foregut along with the liver during the 4th week of foetal life. This diverticulum rapidly proliferates into the septum transversum and divides into 2 parts namely pars cystica and pars hepatica. From the pars hepatica, liver and hepatic ducts develop and from the pars cystica, gallbladder and cystic duct develop.

Losanoff et al. and Adkins et al. stated that during the development of pars cystica, at the junction of cystic and hepatic duct, the cells proliferate to form the common bile duct [3, 4]. This is in a form of cylindrical mass that undergoes vacuolation to canalize and form a single continuous epithelium lined lumen. Failure of this normal pattern of development leads to various anomalies. One such anomaly is the hepaticocystic duct.

The probable hypothesis of those anomalies is failure of recanalisation of the ductal system with the persistence of the foetal communication between gallbladder and liver [5].

The other possible explanation by Walia et al is the delayed division of the hepatic antrum into cystic and hepatic diverticulum [6].

According to Losanoff JE et al. the various types of Hepaticocystic ducts are as follows [3]:

- Type I: In this the common hepatic duct was absent and the right and left hepatic ducts drain separately into the gallbladder.
- Type II: The right and left hepatic ducts unite upon entering the gallbladder.
- Type III: Common hepatic duct enters the gallbladder.
- Type III(A): Common hepatic duct enters the superior wall of gallbladder.
- Type III(B): Common hepatic duct enters the neck of the gallbladder.
- Type III(C): Common hepatic duct enters the posterior gallbladder wall.
- Type III(D): Common hepatic duct enters the fundus of gallbladder.

In our case the common hepatic duct entered the neck of gallbladder and could be described as variation of type III (B).

Abeysuriya et al reported that a communicating artery was seen between the right hepatic artery and left hepatic artery, and an accessory hepatic artery arising from the communicating artery [7]. In our specimen, the right hepatic artery was long and ran posterior to the cystic duct ·Studies revealed that it is difficult to evaluate biliary anatomy because of the complicated nature of the imaging modalities, so a clear knowledge of the biliary anatomy variations is a must for the persons operating in that area [8]. Presence of the Hepaticocystic duct is extremely rare.

So the study of the variational anatomy confirmed by intra operative cholangiography should be prompt for avoiding any serious complications during and after surgery. Hence this study will serve useful guidelines for the operating surgeons, gastroenterologist and radiologist working in that area.

REFERENCES

[1] Lamah M, Dickson GH. Congenital anatomical abnormalities of the extra hepatic biliary duct: a personal audit. *Surg Radiol Anat* 1999; 21:325-7.

[2] R. Kaushik & A. K. Attri : Hepaticocystic Duct: A Case Report. *The internet journal of Surgery*. 2005; 6:1

[3] Losanoff JE, Kjossev KT, Katrov E. Hepaticocystic duct-A Case Report. *Surg Radiol Anat* 1996;18:339-41

[4] Adkins RB, Chapman WC, Reddy VS. Embryology, Anatomy, and Surgical Applications of Extra hepatic Biliary System. *Surg Clin N Am*. 2000; 80:363-79.

[5] Olsha O, Steiner A, Rivkin LA,Sheinfeld A .Congenital absence of the anatomical bile duct. *Acta Chir Scand*.1987.;153:387-90.

[6] Walia HS, Abraham TK, Baraka A.Gallbladder Interposition: A Rare Anomaly of the Extra hepatic Ducts. *Int Surg*.1986; 71:117-21

[7] Abeysuriya V, Salgado S, Deen KI and Kumarage SK. Hepaticocystic duct and a rare extra-hepatic "cruciate" arterial anastomosis: a case report. *Journal of Medical Case Reports* 2008;2:37

[8] Ishiguro Y, Hyodo M, Fujiwara T, Sakuma Y, Hojo N, Mizuta K, Kawarasaki H , Lefor AT and Yasuda Y.2010. Right anterior segmental hepatic duct emptying directly into the cystic duct in a living donor. *World J Gastroenterol*. 2010 August 7; 16(29): 3723-3726.

AUTHOR(S):

1. Dr. Sharmila Aristotle
2. Dr. Christilda Felicia
3. Dr. Sumathilatha Sakthivelavan

PARTICULARS OF CONTRIBUTORS:

1. Assistant professor. Department of Anatomy, SRM Medical College Hospital and Research Centre, India.
2. Professor. Department of Anatomy, SRM Medical College Hospital and Research Centre, India.
3. Assistant professor. Department of Anatomy, Sri Ramachandra Medical College, India.

NAME, ADDRESS, TELEPHONE, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr.Sharmila Aristotle
SRM Medical College Hospital and Research Centre, Potheri
Kancheepuram, Tamilnadu, India - 603203
Phone: 00919790807674
E-mail: drsharmiaris@gmail.com

DECLARATION ON COMPETING INTERESTS:

No competing Interests.

Date of Submission: **Aug 04, 2011**
Date of per review: **Sep 04, 2011**
Date of acceptance: **Sep 20, 2011**
Date of Publishing: **Oct 05, 2011**