



An Anatomical Study of Biliary Ductal Variations

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ABSTRACT

Biliary ductal variations are congenital and small in size often to identify. These variations can lead to complications during & after surgery if remain unidentified. Purpose of this study was to identify this kind of variations in term of presence of aberrant bile duct, or aberrations of Cystic Duct, Common Hepatic Duct & Common Bile Duct. Study was conducted on 60 cadavers in the Dept. of Anatomy, S.M.S. Medical College & hospital, Jaipur (Raj). Ethical clearance was obtained from the ethical committee of the S.M.S. medical college & hospital, Jaipur.

Results: 6.67% cases of accessory hepatic duct (AHD) were observed during the study. Joining of CD with CHD was angular, parallel, anterior spiral, posterior spiral type. CD inserted on anterior aspect of CHD in 6.67% cases, posterior aspect in 25% cases and medial insertion in 1.34% cases. Looped course of CD was found in 3.34% cases. No variation was found in CBD termination.

Conclusion: Biliary ductal variations were found in 6.67% cases in the present study with one rare variation of bile duct. Type of insertion of CD was highly variable in this study. Consecutive research is required to report new variables.

Clinical significance: Knowledge of bile duct variation is crucial in during hepatic surgery and liver transplantation to prevent postoperative complications.

Keywords: Accessory bile duct, Common Hepatic Duct, Cystic Duct

INTRODUCTION

Variations in biliary duct system are frequent finding. It is considered as a rule rather than anomaly. Most of variations are asymptomatic and most challenging to identify as these variation are small in size. They often lead to post operative complication.

Biliary variation includes presence of accessory hepatic duct, aberrant bile duct, and aberrant cystic duct. Anatomical variations in the biliary structure are result of complex embryological development.

^[1]These variations may result from persistent foetal connection between hepatic and cystic duct or disproportional growth ^[2] of biliary system. Present

study is an attempt to find new variations in the bile duct system. It is important to have thorough knowledge about biliary tract for detection and proper management of treatment to decrease morbidity and mortality during Hepatobiliary surgery. ^[3]

MATERIAL & METHOD:

This was an observational study conducted on 60 cadavers, carried out in department of Anatomy, S.M.S. medical college & hospital, Jaipur (Rajasthan). Ethical clearance was obtained for the same from ethical committee of the institute.

The study was followed by cadaveric dissection of Hepatobiliary area. Precise meticulous dissection was done to prevent injury to the duct system. All variations were noted and photographs were taken for the same. Measurements were taken with help of measuring scale & Vernier caliper.

Area of interest involved aberration in course of CHD, CD, CBD & presence of anomalous duct.

RESULT

1. Confluence pattern of CHD-Tetraconfluence was found in 1.67% cadavers.
2. Accessory hepatic ducts were found in 6.67% cases in the present study
3. In 1.67% cases, accessory hepatic duct joined RHD also, in addition to CHD. Thus a biliary arcade was formed between accessory duct, RHD and CHD.(Fig1)
4. In another 1.67% cases, the accessory hepatic duct joined RHD.(Fig.2)
5. Accessory hepatic duct arose from cystic fossa and joined CD in 1.67% cases. it was 19mm long & 1.2mm wide.(Fig 3)
6. In another 1.67% cases, aberrant duct arose from right lobe of liver behind CHD. It coursed downward. After winding round RHA it goes upward and re-entered in the right lobe of liver. It winds around RHA just before origin of CA. At its (duct's) origin it was lying behind extrahepatic part of left hepatic Duct. It was 42 mm long and 1.4mm wide. (Fig 4)
7. Cystic duct insertion-angular insertion was found in 80% cases, parallel in 6%cases. Spiral insertion was found in 6.67%% cases and looped course was found in 3.34% cases. Anterior spiral union was noted in 1.67% whereas posterior spiral union was observed in 5% cases.
8. In majority of the case (66.67%) CD joins right side of CHD. 6.67% cases

CD joined anterior aspect of CHD, whereas 25 % cases had posterior union of CD. Only one case had CD joined the CHD from its left side.(Fig.5)

DISCUSSION:

Variations in the morphological characteristics of the extra-hepatic biliary system are numerous. It has been stated that the extra-hepatic biliary system has more anomalies in one cubic centimeter of the space around the region of the cystic duct than any other part of the body ^[1,4]

Common hepatic duct is formed by confluence of right & left hepatic duct slightly below the porta hepatis usually. Accessory duct may join RHD and LHD to form CHD.

4 hepatic ducts at porta hepatis were reported by Rajguru J. et al ^[5] in 1% cases. Similar pattern of confluence was found in the present study. These all duct were forming CHD. Three of them arose from right lobe of live in the study.

Extrahepatic biliary duct system develops from pars cystica mainly. RHD, LHD & CHD developed from pars cystica and intrahepatic ductal plate both. During 5th week funnel shaped CHD lies in direct contact with developing liver. It also connected with small ductule developed in ductal plate through anastomosing channel ^[6]. This funnel shaped CHD is related to porta hepatis through multiple folds. ^[7] Failure of remodeling of these folds may result into multiple branching confluence of CHD.

In second case AHD communicated with RHD, in addition to CHD to form a biliary circle. (Fig.1) Injury to this circle at any place in the circle can lead to oozing of bile leading to polycholecystectomy. This kind of variation (biliary circle between RHD, AHD & CHD) has not been reported in best of our knowledge.

Third cases shown atypical branching pattern in which accessory hepatic duct drained into right hepatic duct, (Fig.2) which was similar to what Kang et al^[8] reported during ERCP that accessory cystic duct drained into the right hepatic duct.

Accessory hepatic duct draining into CD had been reported by Sofi AA^[9] in 4 consecutive patients during ERCP. Similarly accessory duct was noted in one case in present study (Fig.3). Surgeon must be

aware of this kind of variations while dealing with Calot's triangle to prevent postoperative complications.

Another case of looped accessory bile duct (Fig.4) was most probably first reported case for this kind of anomaly.

Cystic duct joins CHD making an angle usually but parallel or spiral joining also have been documented in literature.^[10,11]

Angular union was found in 80% subjects in present study which coincides with study done by Hameed O. et al^[12] et al.

Spiral union was observed in 6.67% cadaver which is similar to reported by Limthanakhom^[13] et al in 6.3% cases.

Anterior spiral union was seen in 1.67% cases in present study which is lesser than reported by Rajguru J at al^[14]. They reported 4% prevalence of anterior spiral union. Hayes^[15] documented lesser case (0.75%)

Parallel type of union was found in 10% subject in present study, which is similar to study done by Dandekar et al.^[16]

Looped CD reported in present study in 3.34% cases which has not reported in literature in best of our knowledge. This kind of variation may have occurred due to lack of space between long Ducts and neck of gall bladder so that CD has to adopt looped course to fit in the space. Looped course of CD can lead to biliary stasis because of its angular shape.

Right lateral insertion of CD was observed in 66.67% cases which is similar to documented by Sirisha^[17] et al. They reported 67.3% cases of right lateral insertion.

Anterior insertion was noted in 6.67% cases; this was similar to the study done by Bhaskaran L A^[18].

Posterior insertion in 25% cases, medial insertion was 1.66 %.(Fig .6) this was almost identical with study done by Puente SG^[19]

Surgical Dissection of the medial CD up to its end is considered hazardous and it is advised to leave a long stump of cystic duct.^[20]

Spiral insertion of CD occurs due to embryological malrotation of which is due to faulty transfer of the

chole-docho-duodenal junction during rotation of the duodenum. The twist of the duct during its formation may be either clockwise or counterclockwise causing the cystic duct to take a spiral course either anterior or posterior to the common hepatic duct^[21].but in present case it seems like gallbladder displaced left to porta hepatis in right lobe of liver.

Biliary variations are usual findings but knowledge of these variations is must for surgeon for performing Hepatobiliary surgery, hepatic resection or during liver implant as minute bile duct variation can be a cause of re exploration due to bile leakage

CONCLUSION:

Biliary variations are constant, so many variations have been reported in the literature still new variation needs to be updated time to time.

CLINICAL SIGNIFICANCE: Knowledge about all these possible variations is essential for surgeon to ensure safe and successful hepatic surgery and liver transplantation

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FIGURES:

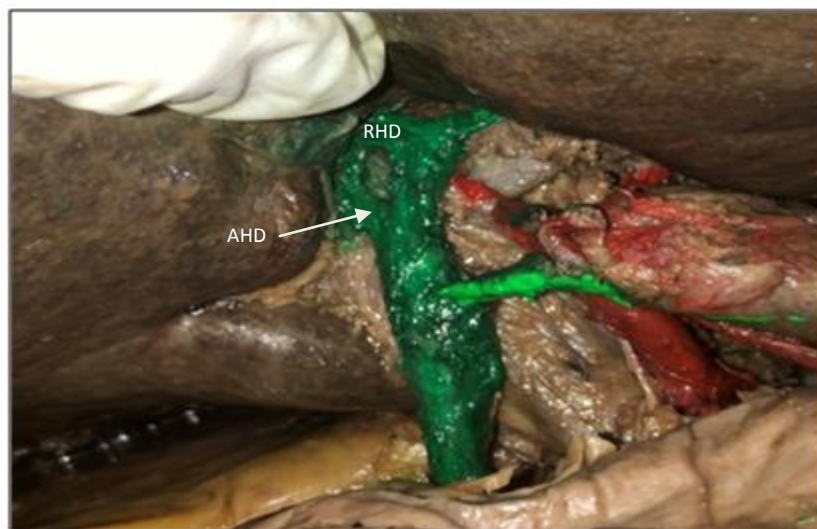


Fig.1 Accessory hepatic duct (AHD) joining CHD and RHD



Fig.2 Accessory hepatic duct (arrow) joining RHD



Fig. 3 Accessory hepatic duct joining the CD near GB



Fig. 4 Accessory hepatic duct following a looped course (arrow)

ABBREVIATIONS:

RHD- Right hepatic duct

LHD- Left hepatic duct

CHD- Common hepatic duct

CD- Cystic duct

CBD- Common bile duct

AHD- Accessory hepatic duct