

A Study of the Anatomic Variations in Extrahepatic Bile Ducts in 50 Adults Referred to Kerman Forensic Medicine Organization

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Abstract

Anatomic variations in forensic extrahepatic bile ducts is common. Knowledge of extrahepatic bile duct variations is important for surgeons in order to prevent iatrogenic damage during surgery. This study aims to determine the variations in extrahepatic bile ducts among 150 cadavers located at the Kerman Medicine Organization.

We performed autopsies on 150 cadavers. Bile ducts were exposed and studied to determine their anatomic variants and diameters.

We observed anatomic variants of the biliary tree in 7 cadavers (4.6%). In 3 (2%) cadavers, the right hepatic duct was missing, in 2 (1.33%) the left hepatic duct was missing and 6 (4%) did not have a common hepatic duct. In one case the common bile duct was absent.

We may conclude that the Variation of bile duct is different in multiple population.

Keywords: Anatomic variation, Bile ducts

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Introduction

Extrahepatic bile ducts include the right and the left hepatic duct, the common hepatic duct, the cystic duct, and the common bile duct or ductus choledochus. The bile secretion of liver into small intestine by biliary ducts [1]. The common hepatic duct is formed of the right and left hepatic ducts. The right hepatic duct usually lies vertically and the left hepatic duct horizontally [2]. The common hepatic duct is 1-4 cm in length and diameter is 4 mm [1]. The cystic duct onset than posterior and left the neck gallbladder part and joins to the common hepatic duct by an acute angle to form the common bile duct or ductus choledochus [2]. The length of the cystic duct is approximately 3-4 cm and the ductus choledochus is approximately 7-11 cm. The diameter of the choledochus is 5-10 mm [3]. The upper third (supraduodenal) of the choledochus lies on the right side of the hepatic artery and anterior to the portal vein, in an unattached margin of the hepatoduodenal ligament. The mid-third (retroduodenal) lies posterior to the duodenum and to the right of the hepatic artery and portal vein. The lower third (pancreatic section) lies in the posterior groove of the pancreatic head and forms the Vater ampulla by the pancreatic duct and into the duodenal space. This classic, normal structure of bile ducts is observed in only one-third of individuals [4]. The majority of variations that have been reported in these ducts were related to the cystic [5] and right hepatic ducts [6] and detected during chole-cystectomy.

Anatomical variations in cystic ducts are asymptomatic; this variation is observed in 18%-23% of cases [3,6] and varies among different races [4]. Different anatomical positions reported for the cystic duct include the

following: absence of the cystic duct, two cystic ducts, the cystic duct tributary of the right hepatic duct, junction of the left side into the common hepatic duct, or the cystic duct and the common hepatic duct were parallel to one another [7-9].

This is important goal that quickly and violent diagnoses of malformation because bile pathology likes bile ducts inflammatory, gallstone and bile ducts cancer in bile crudity are very incident [4]. This is possible dissection or occlusion bile ducts crudity during surgery operation and creation imposition as such bile leakage, fistula or narrow [10]. Assessment of extrahepatic bile duct variations is important for surgeons to determine in order to prevent iatrogenic damage during surgery. Anatomical survey of biliary ducts is possible by ultrasonography, cholangiography and MRI [11-13].

Because this issue is important and due to a lack of statistics in Kerman Province, we have attempted to evaluate the variation in extrahepatic bile ducts among in cadavers at Kerman Medicine Organization. In this study we determine the length, diameter and anatomical variation of the cadavers' bile ducts.

Materials and Methods

This study was performed on 150 cadavers that were located in the Kerman Medicine Organization. Ethically, consent was obtained from the cadaver's family and the appearance of the cadaver was maintained during the autopsy. In this study we assessed the anatomic variant, length and diameter of the cadavers' bile ducts. All procedures were performed as noted previously with regards to surgical technique, incision location, and anatomic description [1,2].

Initially, we opened the abdominal wall with an 8-10 cm midline incision inflicted by a bistoury knife. Next, we removed the first duodenum and lesser omentum that were located in the right superior abdominal quadrant. We dissected the right and left hepatic ducts, common hepatic duct, cystic duct and choledochus (supraduodenal, retroduodenal and infraduodenal) and noted any anatomic variants, as well as the lengths and diameters of the bile ducts. This information was recorded in the cadaver's medical form.

Windows SPSS version 18 was used to perform statistical analyses.

Results

Of the 150 cadavers studied the anatomic positions of the bile ducts were normal in 95%. Of these, three did not have a right hepatic duct, two did not have a left hepatic duct, and there was no common hepatic duct in six cadavers. In one, the right and left hepatic duct were joined and the cystic duct in one point and formation the choledochus, namely in this place, the common hepatic duct was absent. The cystic duct was observed in all samples and joined to the common hepatic duct in normal shape and don't observed the accessory bile duct. In one case was the choledochus was absent; the common hepatic duct and cystic duct were joined to the vater ampulla at one point near the duodenum.

We assessed for variations in diameter and length of the bile ducts in addition to any anatomic differences. As noted in Tables 1- 2, the lengths of the bile ducts in this study were shorter than previously reported lengths, whereas the diameters were greater than diameters of the bile ducts that have been previously reported

[5,10]. The average, standard digression, and minimum and maximum lengths and diameters of the extrahepatic bile ducts are shown in Table 3.

Table 1. Frequency of length of biliary ducts in millimeters.

Duct	length of the duct	Frequency	Percent
The right hepatic duct	8-15	68	45.33
	16-23	59	39.33
	24-43	20	13.33
	Absent	3	2
The left hepatic duct	6-14	82	54.66
	15-22	52	34.66
	24-40	14	9.33
	Absent	2	1.33
The common hepatic duct	7-18	77	51.33
	19-26	47	31.33
	27-44	25	16.66
	Absent	1	0.66
The cystic duct	7-18	50	33.33
	19-25	75	50
	26-35	25	16.66
	Absent	0	0

Table 2. Frequency of diameter of biliary ducts in millimeters.

	Diameter of the duct	Frequency	Percent
The right hepatic duct	4-7	39	26
	8-11	100	66.66
	12-18	8	5.33
	Absent	3	2
The left hepatic duct	3-5	42	28
	6- 8	91	60.66
	9-12	15	10
	Absent	2	1.33
The common hepatic duct	5-8	38	25.33
	9-12	97	64.66
	13-15	14	9.33
	Absent	1	0.66
The cystic duct	4-7	36	24
	8-11	99	66
	12-14	15	10
	Absent	0	0

Table 3. Average, standard deviation and minimum and maximum extrahepatic bile duct sizes in millimeters.

Duct	Average	Standard deviation	Minimum	Maximum	Absent
1 Length of the right hepatic duct	17.15	6	6	43	3
2 Length of the left hepatic duct	14.75	5.75	6	40	2
3 Length of the common hepatic duct	19.91	7	7	44	1
4 Length of the cystic duct	20.55	5.33	7	35	0
5 Diameter of the right hepatic duct	8.63	1.92	4	18.8	3
6 Diameter of the left hepatic duct	6.61	1.58	3	12	2
7 Diameter of the common hepatic duct	9.75	2.07	5	15	1
8 Diameter of the cystic duct	8.91	1.93	4	14	0
9 Diameter of the choledochus	11.45	1.93	7	15	1

Discussion

In support of previously reported variants [3,4], this study has also shown observable variants in the extrahepatic bile ducts. We additionally observed the lack of bile ducts in some cadavers. In this study 95% of cadavers exhibited classic, normal bile duct structure however another study observed only 33.3% of cases that had normal bile ducts [5]. A previous study on 186 cholecystectomy cases noted no anomalies, with normal bile ducts [10]. Their results approximated the outcome of the current study. According to one study that evaluated 300 donor livers, the anatomic bile ducts were normal in 63% of cases [7].

In 3 (2%) cadavers the right hepatic duct was missing. The left hepatic duct joined to the cystic duct and formed the choledochus. In these occasion, 3 cadavers the common hepatic duct was also absent. In 2 (1.33%) the left hepatic duct was missing such that the right hepatic duct joined to the cystic duct and formed a choledochus, therefore the common hepatic duct was also absent. In 1 (0.66%) cadaver, the right and left hepatic ducts and the cystic duct joined in a point and formed a choledochus; the common hepatic duct was also absent. There wasnt common hepatic duct

observed in 6 (4%) cadavers. In a study conducted in London that was performed on 2080 cases, the researchers discovered anatomic variants in 12 cases; the cystic duct was missing in 3 cases, the cystic duct joined to the right hepatic duct in 2 cases and to the left hepatic duct in one case, a double cystic duct in one case was noted, and there were accessory bile ducts in 5 cases [14]. Another study of 500 cholecystectomy cases noted cystic variants in 52 cases [5].

In the current study the cystic duct was present in all cadavers; it joined the common hepatic duct in classic form and wasnt the accessory bile duct (Table 1). This was Considerable point in our studied that we found crudities than any one of other previous study. In other studies the most observed variant was related to the cystic duct [5,14-16] whereas in the current study the cystic duct had a normal structure. In a research performed in Canada on 170 cases, the cystic duct was located on the left side of the common hepatic duct in 22 (17%) cases and parallel in 31 (25%) cases [17]. These results were not in agreement with our observations. In all cadavers in the current study the cystic duct was located at the right side of the common hepatic duct and joined to it

by an acute angle.

Rare cases of bile ducts variants such as extrahepatic bile ducts [4] or double choledochus [11] have been reported. We did not observe these in our study according to the number of samples assessed. In only one cadaver we noted the absence of choledochus; it joined the common hepatic duct and the cystic duct in a point to the Vater ampulla in the duodenum.

This study also assessed the diameters and lengths of bile ducts despite anatomic variant of bile ducts. [18,19] The size of the bile ducts in the present study differed from previous reports [1,2]. We observed shorter duct

lengths and larger diameters compared to other sources [1,2], which must be related to the difference in race in the population studied. However, the results of our study have not been found in any previous study. Thus these variants are important as they are rare findings. These outcomes can be used to enable surgeons to have more accurate surgeries and decrease the risk of injury during surgery.

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