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Original article

A postmortem study of length and internal diameter of the cystic duct

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Abstract:

The cystic duct arises from the neck of the gallbladder and ends by joining with the common hepatic duct to form the common bile duct. Gallstones are frequently squeezed into the cystic duct and leads to spasm of the duct wall producing severe biliary colic. So, length and internal diameter of the cystic duct is very important for the surgeon for better management. This is an observational, descriptive type of study which was carried out in the Department of Anatomy, Sir Salimullah Medical College, Dhaka from July 2010 to June 2011. The number of sample was 62 postmortem human gallbladder with cystic duct which were collected from unclaimed dead bodies of the morgue of Dhaka Medical College and Sir Salimullah Medical College. The samples were divided into three different age groups. i.e. group A (10-20 yrs), group B (21-40 yrs) and group C (41-70 yrs). Morphological study was carried out on all samples by fine dissecting method. Statistically significant difference were found when values were compared between different age groups except the internal diameter of the cystic duct when group B was compared with group C, the result was found not significant (P>0.05). There was change in length and internal diameter of the cystic duct in relation to age.

Keywords: Cystic duct, length, diameter

Introduction:

The cystic duct is about 3-4 cm long connects the neck of the gallbladder to the common hepatic duct to form the common bile duct[11]. Its lumen is usually 1-3 mm in diameter[12]. Within the cystic duct the mucosa forms a series of 5-10 crescent shaped folds, known as the spiral valve of Heister[10]. These mucosal folds are generally prominent in the proximal part of the cystic duct but these folds flatten out to form a circular lumen at the distal end[1]. The human cystic duct functions as a single conduit for the transport of bile during both emptying and filling of the gallbladder[1]. The spiral fold helps keep the cystic duct open and prevent excessive distention or collapse of the gallbladder changes in cystic duct pressure[9]. The mucosal folds in the cystic duct provide a common site of entrapment of gallstones due to its small caliber & spiral conformation[11]. If the stone blocks the cystic duct, it produces intense spasmodic pain called biliary colic and inflammation of the gallbladder occurs due to bile stasis[6]. Therefore, length and internal diameter of the cystic duct is clinically very important structure for proper diagnosis and management. The present study was performed to find out the gross features of the cystic duct and correlation with age.

Materials:

The sixty two (62) samples of human cystic ducts were collected from unclaimed dead bodies that were under examination in the Department of Forensic Medicine of Dhaka Medical College, Dhaka and Sir Salimullah Medical College, Dhaka from July 2010 to June 2011. At the time of collection, each sample was given a sample number. For the convenience of study of various changes in relation to age the collected samples were divided into three age groups i.e. group A (10-20 years), group B (21-40 years) and group C (41-70 years) (Table 1).

Table-1: Age distribution of different study groups (according to Sarkar[7], 2010)

Group	Age range (years)	No. of samples (n=62)
A	10-20	14
B	21-40	30
C	41-70	18

Methods:

The length and internal diameter of the cystic duct were measured by fine dissecting method. At first 10% formol saline solution fixed samples were washed with the running tap water to wash out the formalin to avoid irritation to eyes and nasal mucosa and also for softening of fixed tissue during dissection. Then the samples were taken in a wax tray and the unwanted tissues were removed carefully with the help of sharp scissor, fine dissecting forceps and BP blade to expose the cystic duct for the aid of measurements.

Morphological parameter:

Length of the cystic duct

Internal diameter of the cystic duct

Procedure of measurement of length of the cystic duct (Fig 1)

At first the peritoneal covering was removed carefully from the cystic duct then it was fixed on a wax tray by two pins, one at the junction of neck & cystic duct and another at the junction of cystic & common bile duct. The length of the cystic duct was calculated in cm by measuring the distance between the two pins with the help of digital slide calipers.

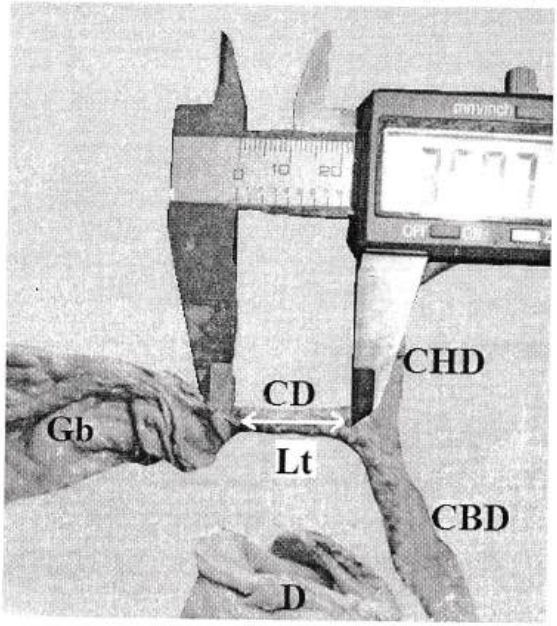
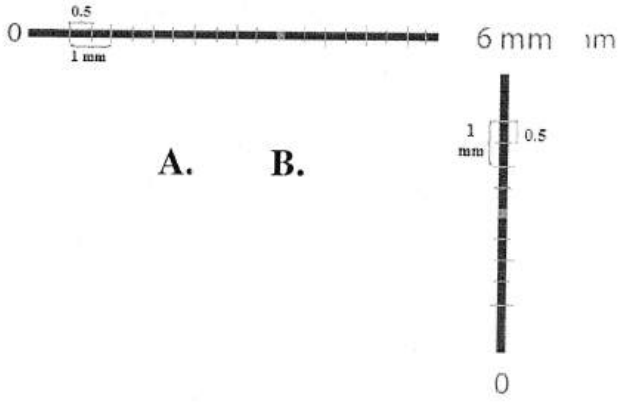
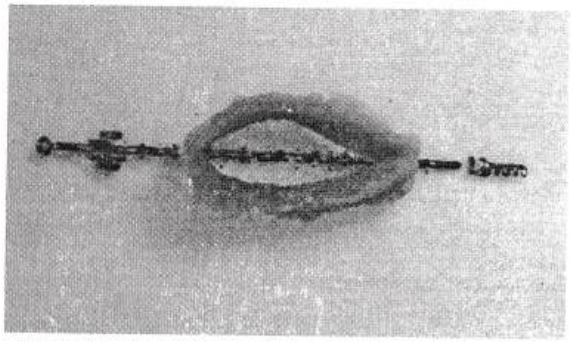


Fig 1 Measurement of length of the cystic duct distance between the two red pins marked by white line with the help of digital slide calipers. Gb-gallbladder, CD-cystic duct, Lt-length, CHD-common hepatic duct, CBD-common bile duct, D-duodenum

Procedure for measurement of internal diameter of the cystic duct (Fig 2)

At first two mm scale was made by a software named Adobe illustrator 10 versions. One scale was 12 mm horizontal & another was 6mm vertical in which 0.5mm and 1mm distance were marked. Then it was printed on a transparent sheet. The cystic duct was cut transversely with fine and sharp BP blade as thin as possible and three sections were taken from proximal, middle and distal portion (according to Shahriah[8], 2007). The cut sections were placed over the scale like that the center of the lumen was placed approximately over the center of the scale. Then with the help of electric magnifying glass, the internal diameter of the cystic duct was calculated in mm by taking average of transverse and vertical measurements.





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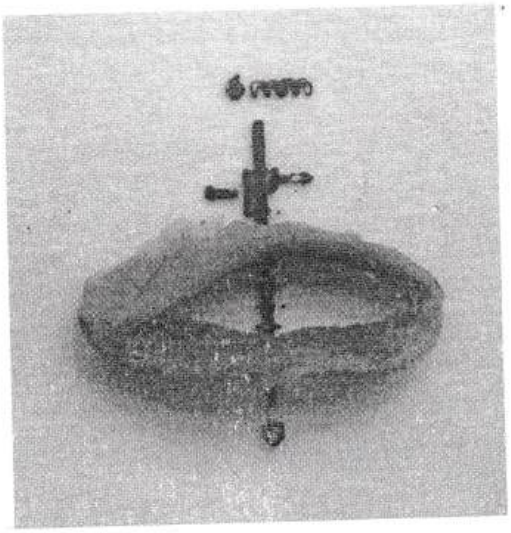


D.

A. Photograph showing the 12 mm horizontal scale

B. Photograph showing the 6 mm vertical scale

C. Photograph showing the cut section of the cystic duct placed over the horizontal scale printed on transparent sheet

D. Photograph showing the cut section of the cystic duct placed over the vertical scale printed on transparent sheet

Results:

In the present study, the mean (± SD) length of the cystic duct was 2.61 ± 0.45 cm in group A, 3.02 ± 0.33 cm in group B and 3.38 ± 0.28 cm in group C. The differences of length of the cystic duct were significant (P<0.01) between A vs B, highly significant (P<0.001) between A vs C and significant (P<0.05) between B vs C (Table 2 & 3 and Fig 3).

The mean (± SD) internal diameter of the cystic duct was 1.64 ± 0.34 mm in group A, 2.34 ± 0.27 mm in group B and 2.92 ± 0.37 mm in group C. The differences of internal diameter of the cystic duct were significant (P <0.01) between A vs B, highly significant (P<0.001) between A vs C and not significant (P>0.05) between B vs C (Table 2 & 3 and Fig 4).

Table-2: Mean (±SD) length and internal diameter of the cystic duct in different age groups

Age group	Length of the cystic duct in cm (Mean ± SD)	Internal diameter of the cystic duct in mm (Mean ± SD)
A	2.61±0.45 (1.51-3.19)	1.64±0.34 (0.98-2.05)
B	3.02±0.33 (2.51-3.82)	2.34±0.27 (1.41-2.32)
C	3.38±0.28 (2.98-3.81)	2.92±0.37 (1.97-3.05)

Table-3: Comparison of P value of length and diameter of the cystic duct in different age groups

	Length of the cystic duct	Internal diameter of the cystic duct
	P value	*P value*
A vs B	0.001^{**}	0.001^{**}
A vs C	0.0001^{***}	0.0001^{***}
B vs C	0.021^{*}	0.053^{ns}

Fig 3: Bar diagram shows length of the cystic duct in different age groups

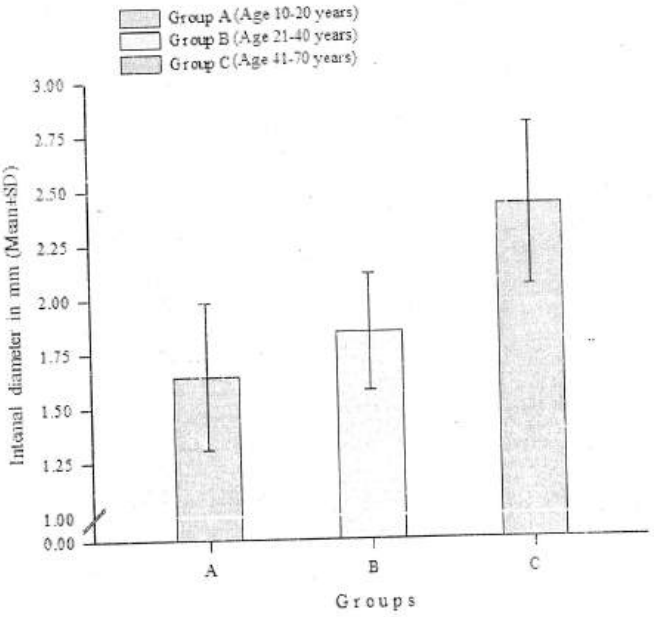
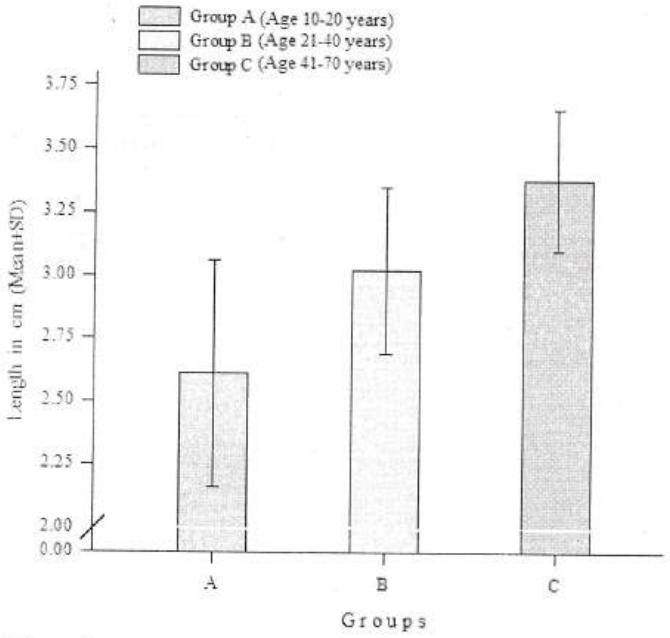


Fig 4: Bar diagram shows internal diameter of the cystic duct in different age groups



Discussion :

In the present study, the highest mean length and internal diameter of the cystic duct was found in group C and lowest in group A. The values were significant ($P<0.01$) when group A was compared with group B and highly significant ($P<0.001$) when group A was compared with group C. The mean length and internal diameter of the cystic duct in group B and group C differ with the findings of Khalil[4] (1993). He found that the mean length of the cystic duct was 4.35 cm which was slightly higher than the present study and the mean internal diameter was 1.03 mm which was lower than the present study. Limthanakhom T[5] in 2005 found that the length of the cystic duct was 1.42 cm which was lower than the present finding. This variation might be due to different procedure of sample fixation and different methods used for measuring the variables. The result of the present study consistent with the values of different text books edited by Simeone[9] (1999), Moore & Dalley[6] (2006), Sinnatamby[10] (2006), Standring[11] (2008) and Williams[12] (2008). The values of the study of Castelain M et al[2] in 1993 and Deenitchin GP[3] in 1998 also similar with the result of the present study.

Conclusion:

The study revealed an age related changes in the length and internal diameter of the cystic duct. To establish a standard data similar study with larger sample size in different age groups and using more advance methods including both sexes are recommended.

References:

1. Bird NC, Ooi RC, Luo XY, Chin SB, Johnson AG. Anatomy of the human cystic duct. Digestion 2005; 65(4): 220-6
2. Castelain M, Grimaldi C, Harris A G, Caroli-Bosc F, Hastier P, Dumas R, Delmont J. Relationship between cystic duct diameter and the presence of cholelithiasis. Digestive diseases and Science 1993; 38(12): 2220-4
3. Deenitchin GP, Yoshida J, Chijiiwa K, Tanaka M. Complex cystic duct is associated with cholelithiasis. HPB Surgery 1998; 11: 33-7
4. Khalil M. A comparative anatomical study of the extra hepatic biliary apparatus in goat, cow and men (M Phil thesis). Dhaka: University of Dhaka ; 1993.
5. Linthanakhont T, Khamnarong K, Dhudhisawasdi V. The Anatomical variations of cystic duct in Northeastern Thai population. The T J Sur 2005;26(3): 73-6
6. Moore KL, Dalley II AF. Clinically oriented anatomy. 5th ed. Philadelphia: Lippincott Williams & Wilkins; 2006. p. 301-4
7. Sarkar N. Role of ultrasonography in the diagnosis of common gallbladder problems (M Phil thesis). Dhaka: Bangabandhu Sheikh Mujib Medical University ; 2010.
8. Shahriah S.Histomorphological study of pancreas in Bangladeshi male (M Phil thesis). Dhaka: University of Dhaka ; 2007.
9. Simeone DM. Gallbladder and biliary tree anatomic and structural anomalies. In: Yamada T, editor. (Textbook of Gastroenterology vol 2). 3rd ed. Philadelphia: Lippincott Williams & Wilkins; 1999. p. 2244-53
10. Sinnatamby CS. Last's anatomy regional and applied. 11th ed. London: Churchill Livingstone; 2006. p. 273-6
11. Standring S.Gray's anatomy the anatomical basis of clinical practice. 40th ed. London: Churchill Livingstone; 2008. p. 1177-81
12. Williams NS, Bulstrode CJK, O'connel PR. Bailey & Love's short practice of surgery. 25th ed. London: Hodder Arnold; 2008.p.