

Study of Variations in External Morphology of Gall Bladder in Cadavers

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ABSTRACT:-

Background- In modern era increasing interventional and diagnostic procedures and laparoscopic cholecystectomy make study of variation in external morphology of gall bladder important. Variation of morphology of gall bladder commonly encountered during radiological investigation during surgeries. **Objective-** Aim of this literature was to study morphology of gallbladder in Gujarat region. **Material and method:-** Study was conducted on 50 gallbladders obtained from formalin fixed cadavers. Shape, length and transverse diameter of gall bladder studied. **Result:** - Commonest shape observed in this study was pear shaped in 84% cases. Average length of gallbladder was found to be 9.5cm. Mean diameter of gall bladder was 3.6 cm, folding of neck and fundus observed in 8% cases. **Conclusion:** - Variation in extra hepatic biliary is not uncommon. Knowledge of this variation is important for surgeon and radiologist to avoid iatrogenic injuries during procedures.

Key words: - Gall bladder, External morphology.

Introduction –

Gall bladder flask shaped blind end diverticula which are situated in contact with under surface of right lobe of liver. In the adult the gallbladder length is between 7 and 10 cm with a capacity of up to 50 ml¹. The gallbladder is described as having a fundus, body and neck. The fundus lies at the lateral end of the body and usually projects below the inferior border of the liver to a variable length¹. Variations in shape, size of gallbladder not uncommon. These variations frequently occur during imaging of gallbladder and during surgical procedure like laparoscopy and cholecystectomy. Normally gall bladder found in right upper quadrant but may be found rarely in retro duodenal, retro pancreatic or within falciform ligament, intra hepatic or retro placed (retro hepatic)².

Agenesis of gallbladder without any abnormalities of biliary tract reported by Chopra PJ et al³. Joliat J.R et al⁴ found isolated congenital agenesis of the gallbladder and cystic duct. G. Desolneux et al⁵ observed duplication of the gall bladder. Agarwal A et al⁶ and Gautam A. et al⁷ reported double gall bladder. Nanthakumaran S et al⁸ reported triple gallbladder.

Material and Methods:-

The Study was conducted on 50 gallbladders obtained from formalin fixed cadavers used for undergraduate students study during period of 3 years. Each specimen was studied for morphological variations. Parameters studied maximum transverse diameter of gallbladder at the level of body of gallbladder and maximum length from tip of fundus to the neck of gall bladder with help of metallic tape graduated in

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centimetre. Shapes and external appearance of gallbladder noted. To visualized interior of gallbladder incision is made on the wall of gall bladder and observed.

Results:-

All specimens were inspected in situ by naked eye.

Shapes of gallbladder: - According to their shape gallbladder were classified into pear shaped, cylindrical shaped, irregular shaped, hourglass shaped, flask and retort shaped. Their incidences are presented in table-1 and in figure 1-6.

Maximum length of gall bladder-Smallest length of gallbladder was 4.5 cm and maximum length of gallbladder was 11 cm. Average length of gallbladder was found to be 9.5cm.

Table-1 Shapes of gallbladders

Shapes	No. of specimens	Percentage
Pear shaped	42	84%
Cylindrical shaped	5	10%
Hourglass shaped	1	2%
Retort shaped	2	4%
Flask shaped	0	0
Irregular shaped	0	0



Image:-1:-Small gall bladder



Image-2:-Large gall bladder

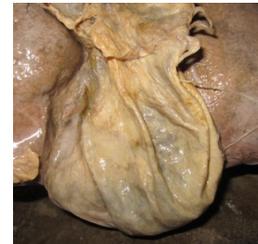


Image:-3 Pear shaped



Image:-4 Cylindrical shaped



Image:-5 Hour glass shaped



Image:-6 Retort shaped



Image:-7 Folded neck



Image:-8 Folded fundus

Maximum transverse diameter of gallbladder- shortest transverse diameter was 2.8 cm and largest was 5 cm. Mean diameter was 3.6 cm.

External appearance of gallbladder- folding of neck (Fig-7) and folded fundus (Fig-8) noted in 4 specimens (8%)

Interior of gall bladder: -in most of cases mucosa of gallbladder found to be with numerous rugosities. Gall stone found in 7 cases.

Discussions:-

Variations in the anatomy of gallbladder, extra hepatic biliary system and the arteries that supply them and liver are important for surgeons. Failure to recognize them may lead to inadvertent ductal ligation, biliary leaks and strictures after laparoscopic cholecystectomy^{9, 10}.

The liver primordium appears as an outgrowth of the endodermal epithelium at the distal end of the foregut in the middle of the third week. This liver bud or hepatic diverticula consist of rapidly proliferative cells that penetrate mesodermal plate called septum transversum. Hepatic cell continue to penetrate septum so the connection between the hepatic diverticulum and foregut narrows forming bile duct. Small ventral outgrowth formed by hepatic bud gives rise to the gallbladder and the cystic duct¹¹. Malformation of gallbladder and the biliary system may result of deviation and arrest normal embryological developmental process¹².

The measurement of length and transverse diameter found in present study it similar to that found by Chari & Shah¹³ and Jabarajguru et al¹² and Prakash AV et al¹⁴ Rajendra R. et al¹⁵. Comparison of the length, breadth and the shape of gall bladder depicted in Table -2.

Table-2 Comparisons of incidence in different study

No	Author	Length(cm)	Breadth(cm)	Shape
1	Turner & Fulcher (2000) ¹⁶	10	3-5	Elliptical
2	Chari & Shah(2008) ¹³	7-10	2-5	Pear shaped
3	Vakil & Pomfret (2008) ¹⁷	7-10	4	Pyriform shaped
4	Standaring(2008) ¹	7-10	-	Flask shaped
5	JabaRajguru et al(2012) ¹²	5-12	2.5-5	Pear shaped (85%)
6	Prakash AV et al(2013) ¹⁴	7-10	2-5	Pear shaped (71.11%)
7	RajendraR,et al(2015) ¹⁵	4-11	2.5-5	Pyriform shaped (53.2%)
8	Present study (2015)	4.5-11	2.8-5	Pear shaped (84%)

Size of gallbladder may vary in some physiological condition as well as in some diseased condition. Gore et al¹⁶ stated that size of gall bladder may increase after vagotomy, in diabetes because of autoimmune neuropathy, in sickle cell disease, after cystic and common duct obstruction in pregnancy and obese peoples. Micro gall bladder may found association with cystic fibrosis

In present study folded gallbladder found in 4 specimens out of which 2 specimen neck folded and 2 specimen fundus folded. Rajendra R et al¹⁵ found incidence of normal gallbladder was 53.2%, oval shaped was 11.4%, cylindrical 11.4%, hour glass shaped 6.3%, partially intrahepatic 5.1%, intrahepatic 3.8%, Phrygian cap 3.8%, left gallbladder 2.5%, double gallbladder 1.5%. Meistrup et al¹⁷ observed bending of gall bladder could occur anterior or posterior. Futura et al¹⁸ observed that there was a higher prevalence of the kinking of the gallbladder and Hartmann's pouch in females. Gore et al¹⁶ found folded fundus in 1-6% population and Jaba rajguru¹² 6.67% and Prakash AV et al found folded fundus in 5.56% and folded neck in 4.44%. In present study we found 8% cases. Septations inside the gallbladder reported quite infrequently. This condition may be associated with cholelithiasis and abdominal colic¹⁸. Septations in the gallbladder has been reported to be single¹⁹ or multiple²⁰. In present study septation inside the gallbladder not found.

Conclusion:-

Congenital anomalies of gallbladder and variants of billiary tree are rare. These anomalies can provide surgeons with an unusual surprise during laparoscopic surgery, as failure to recognize those leads to iatrogenic injuries and can increase morbidity and mortality. Awareness of these anomalies helps in performing invasive procedures, therapeutics and diagnostics in this region.

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