

## To Study Anatomical Basic (Shape and Dimensions) of Gall Bladder in Cadavers

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### Abstract

The extra hepatic biliary apparatus usually shows anatomical variations. These variations are not noticed normally. They are commonly encountered during surgery or any radiological investigation. So the present study was carried out to determine the external morphology of gall bladder in 40 liver and gallbladder specimens obtained from 10% formalin fixed cadavers from dissection hall. In present study, most common shape of gall bladder was Pear shape( 67.5%), the average length and max. transverse diameter were found to be 6.75cm and 3.05cm respectively. Maximum length of gall bladder range between 4.5 – 8 cm, out of which 52.5 % gall bladder range between 6.6–8 cm. Maximum transverse diameter of gallbladder range between 2–5 cm, out of which, 45% of gall bladder range between 2–3 cm.

**Keywords:** Gall Bladder; Morphology; Extra Hepatic Biliary Apparatus.

### Introductions

The gall bladder (GB) is a pear shaped hollow visceral organs, slate blue in colour situated obliquely in a non peritoneal fossa on the under surface of the right lobe, and extends from the right end of porta hepatis to the inferior border of liver. It measures about 7 cms to 10 cms in length, maximum breadth being 3cms and capacity is 30 – 50 ml. The presenting parts of gall bladder are from below upwards are fundus, body and neck. The fundus is the lower expanded free end of the gall bladder which projects below the liver. The liver, gall bladder and biliary ductal system develop from hepatic diverticulum of the foregut, in the beginning of the fourth week of development. This diverticulum rapidly proliferates into septum transversum and divides into two parts cranial part and caudal part. The cranial part is the primordium for liver and bile duct and caudal part give rise to

gall bladder and cystic duct. Initially the extra hepatic biliary apparatus is occluded with epithelial cells, but later on it gets canalized because of degeneration of epithelial cells. Any arrest or deviation from normal embryological development may result in malformation of gall bladder and billiary system [1]. It is very much essential to have a basic knowledge regarding the development and normal anatomy of biliary tract which gives us a fuller understanding of the anatomical and embryological anomalies. The knowledge of these variants will make the laparoscopic procedures easier, though preoperative diagnosis sometimes goes unseen in few cases, which in turn is an unexpected finding during laparoscopic surgeries. This study will be an addition to the literature and will create awareness among anatomists, radiologist, to surgeons and also gastroenterologist to be thorough regarding the normal and abnormal aspects of Gall Bladder [2].

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### Materials and Methods

This study was carried on 40 liver and gallbladder specimens obtained from 10% formalin fixed cadavers in the Department of Anatomy, Indira Gandhi Govt. Medical College, Nagpur. Cadavers

with obvious abdominal surgery and crush injury to the abdominal organs were excluded from the study. The parameters studied were the maximum length of gall bladder, maximum transverse diameter and shape. Maximum length and maximum transverse diameter were measured using metallic measuring tape graduated in centimeters. The shape of gall bladder was noted down.

## Results

### Shapes of Gallbladder

According to their shape, gall bladders were classified into pear shaped, cylindrical shaped, flask shape, hourglass shaped, and retort shaped and

irregular shaped. The commonest shape found was pear shape (67.5%). Their incidences are presented in Table 1.

### Maximum Length of Gall Bladder

Minimum length of gallbladder was 4.5 cm and maximum length was 8 cm. Average length of gallbladder was found to be 6.75 cm. 52.5% gall bladder had length ranging between 6.6 to 8 cm.

### Maximum Transverse Diameter of Gallbladder

Smallest transverse diameter was 2 cm and largest was 5 cm. Mean diameter was 3.05 cm. 45% gall bladder had transverse diameter ranging between 2 to 3 cm.

Table 1: Showing incidences of shapes of gall bladder

Sr. No.	Shapes	No. of Specimens	Percentage
1	Pear shape	27	67.5%
2	Cylindrical shape	4	10%
3	Flask shape	3	7.5%
4	Hour glass shape	2	5%
5	Retort shape	2	5%
6	Irregular shape	2	5%
	Total	40	100%

Table 2: Showing Measurements of gall bladder

Sr. No	Maximum Length in cm	No. of specimen	Percentage	Maximum Transverse Diameter in cm	No. of specimen	Percentage
1	< 5 cm	3	7.5%	2 - 3 cm	18	45%
2	5 - 6.5 cm	16	40%	3.1 - 4 cm	17	42.5%
3	6.6 - 8 cm	21	52.5%	4.1 - 5 cm	5	12.5%



Fig. 1: Pear shaped gall bladder



Fig. 2: Cylindrical shaped gall bladder

**Table 3:** Comparison of shape, length and transverse diameters of gall bladder with other authors

Sr. No.	Author	Shape of gall bladder	Length	Max. Transverse diameter
1	LeeMc Gregor et al(1986) <sup>(3)</sup>	-	7.5 - 10 cm	-
2	Turner & Fulcher (2000) <sup>(4)</sup>	Elliptical	10 cm	3 - 5 cm
3	Moore & Dalley (2006) <sup>(5)</sup>	Pear	7 - 10 cm	-
4	Chari & Shah (2008) <sup>(6)</sup>	Pear	7 - 10 cm	2 - 5 cm
5	Vakili & Pomfret (2008) <sup>(7)</sup>	Piriform	7 - 10 cm	4 cm
6	Standring(2008) <sup>(8)</sup>	Flask	7 - 10 cm	-
7	Jaba Rajguru et al(2012) <sup>(1)</sup>	Pear (85%)	5 -12 cm	2.5 - 5 cm
8	Prakash A V et al (2013) <sup>(9)</sup>	Pear (71.11%)	7 - 10 cm	2 - 5 cm
9	Rajendra R et al (2015) <sup>(10)</sup>	Piriform (53.2%)	4 - 11 cm	2.5 - 5 cm
10	J. Desai et al (2015) <sup>(11)</sup>	Pear (84%)	4.5 - 11 cm	2.8 - 5 cm
11	Chakka S. et al (2016) <sup>(2)</sup>	Pear (80%)	7 - 10 cm	2 - 5 cm
12	Present study	Pear (67.5%)	4.5 - 8 cm	2 - 5 cm

**Fig. 3:** Hour glass shaped gall bladder**Fig. 6:** Irregular shaped gall bladder**Fig. 4:** Flask shaped gall bladder**Fig. 5:** Retort shaped gall bladder

## Discussion

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.

The pear shape of gall bladder found in most of the specimens (67.5%) in the present study which is similar to the findings of previous authors Jaba Rajguru et al (2012) [1], Chakka S. et al (2016) [2], Moore & Dalley (2006) [5], Chari & Shah (2008) [6], Prakash A V et al (2013) [9], J. Desai et al (2015) [11]. Elliptical shaped gall bladder had been observed by Turner & Fulcher (2000) [4]. Standring (2008) [8] observed flask shape as most common shape. In the present study, cylindrical shape was found in 10%, flask shape in 7.5%, hour glass shape in 5%, retort shape in 5%, irregular shape in 5%.

Maximum length of gall bladder range between 7- 10 cm was observed by Chakka S. et al (2016) [2], Moore & Dalley (2006) [5], Chari & Shah (2008)[6], Vakili & Pomfret (2008)[7], Standring (2008)[8],

Prakash A V et al (2013)[9]. In the present study, Maximum length of gall bladder range between 4.5 – 8 cm. Out of which, 52.5% of gall bladder range between 6.6 – 8 cm. 40% range between 5 – 6.5 cm and 7.5% gall bladder <5 cm.

Maximum transverse diameter of gallbladder range between 2 – 5 cm was observed by Chakka S. et al (2016)[2], Chari & Shah (2008)[6], Prakash A V et al (2013)[9]. In the present study, 45% of gall bladder range between 2 – 3 cm, 42.5% gall bladder range between 3.1–4 cm and 12.5% gall bladder range between 4.1–5 cm.

Comparison of the length, breadth and the shape of gall bladder depicted in Table 3.

### Conclusion

Variations of gall bladder generally remain symptoms free but often lead to complications and therefore must be correlated clinically. Awareness of these anomalies will decrease morbidity. Most of the interventional procedures in this modern era are done laparoscopically and there is tremendous increase in number of laparoscopic Cholecystectomies. So, thorough knowledge of possible variations in morphology of gall bladder is important.

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