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ORIGINAL RESEARCH

The study of Human Gall Bladder in a Cadaver and Its Clinical Importance

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ABSTRACT

Aim: The study of the bladder in a Cadaver and Its Clinical Importance. **Methods**: This study was conducted on 100 gallbladders obtained from formalin-fixed cadavers. Shape length and transverse diameter of gall bladder studied. **Result:** The commonest shape observed in this study was pear-shaped in 82% of cases. The average length of the gallbladder was found to be 6.54cm. **Conclusion**: Variation in extrahepatic biliary is not uncommon. Knowledge of this variation is important for surgeons and radiologists to avoid iatrogenic injuries during procedures.

Keywords: Gall Bladder, Cadavers, Morphology

INTRODUCTION

The gallbladder is a slate-blue, pear-shaped sac partly sunk in a fossa on the inferior surface of the right hepatic lobe. It extends near the right end of porta hepatis to the inferior hepatic border. Its upper surface is attached to the liver by connective tissue; elsewhere, it is completely covered by the peritoneum. It is a blind-ending diverticulum attached to the common bile duct by the cystic duct. The gall bladder is 7-10 cm long, 3 cm broad at its widest part, and 30-50 ml in capacity.[1]

Understanding the variations in the gallbladder's anatomy, such as the presence of a neck, body, and fundus, is crucial for medical professionals. These variations, including the potential formation of “Hartmann’s Pouch,” Can have significant clinical implications. Awareness of these variations prepares healthcare professionals to effectively manage and treat gallbladder-related conditions.The fundus projects past the lower border of the liver to a variable length. The gall bladder varies in size and shape.[2]

The gall bladder may sometimes be absent, double in number, or bifurcated. A variation seen in the gall bladder for its fundus is called a Phrygian cap. The gall bladder varies in position, including intrahepatic, retrohepatic, retroperitoneal, suprahepatic, floating, anterior epigastric, and transverse.[3]

The present study helps surgeons and radiologists understand the gallbladder's normal and variants.

MATERIALS & METHODS

The study was conducted on 100-gall bladder specimens obtained from 10% formalin-fixed cadavers of the 20-60 age groupin the Department of Anatomy of Index Medical College after obtaining approval from the Institutional Ethics Committee. The parameters studied were the maximum length, breadth (transverse diameter), and shape of the gall bladder.

The gall bladder was observed and carefully cleaned, dissected, and studied in this study. The following parameters were studied:

1. The maximum length of gall bladder.
2. Shape of gall bladder.
3. The maximum breath (transverse diameter) of the gall bladder.
4. External variants of gall bladder.

The vernier caliper was used to measure the length and transverse diameter of the gall bladder.

The maximum length of the gall bladder was recorded from the porta hepatis to the mid-point of the fundus. The recordings of maximum breadth were obtained at the site of maximal gall bladder width perpendicular to the long axis of the gall bladder and noted.

RESULTS

The study was conducted on 100-gall bladders collected from formalin-fixed cadavers from the Department of Anatomy of Index Medical College. The parameters studied were the gall bladder's

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maximum length, breadth (transverse diameter), and shape.

Different dissection shapes of the gallbladder

Thegallbladders were classified according to their shapes. As shown in the figure, various shapes were observed, including pear-shaped, cylindrical-shaped, irregular-shaped, hourglass-shaped, and retort-shaped.

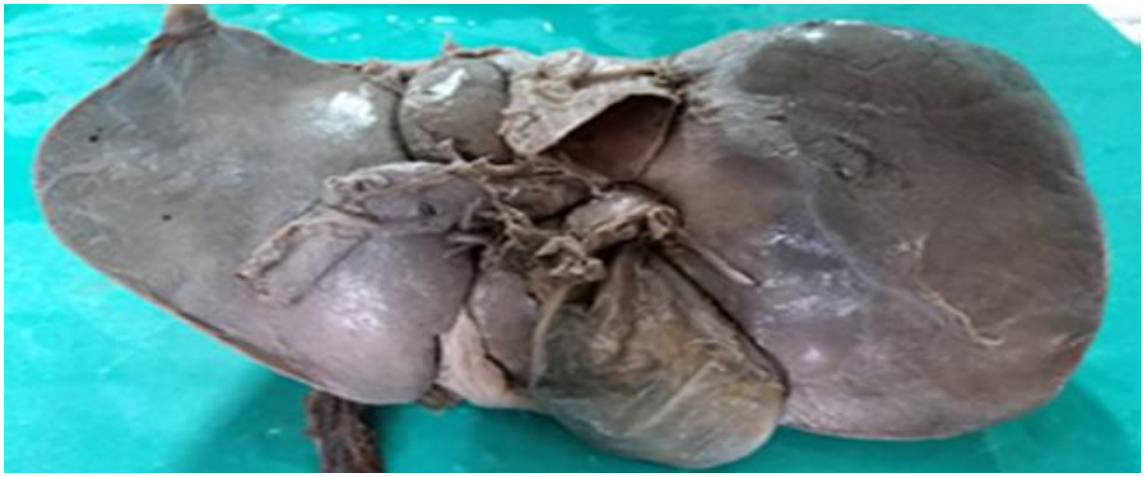

Figure 1: Pear-shaped gallbladder

Figure 2: Cylindrical-shaped gall bladder

Figure 3: Retort shape of gallbladder

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Figure 4: Irregular shaped gallbladder

Figure 5: Folded fundus (Phrygian cap) of gall bladder

Figure 6: Hartmann's pouch in gall bladder

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Figure 7: Hourglass shaped

Variations in the Shape of the bladder

Various gall bladder shapes were observed during the study. A pear-shaped gall bladder was observed in 82 specimens (82%), a flask-shaped gall bladder in 1 specimen (1%), a cylindrical gall bladder in 1 specimen (14%), an irregular gall bladder in 1 specimen (1%), an hourglass gall bladder in 02 specimens (02%), and an s-shaped gall bladder in 2 specimens (2%) out of 100 specimens. The most common shape found was the pear shape (82%).

Table 1: Variations in the Shape of the Bladder

Variations	Shape of Gallbladder	No. of specimen	Percentage (%)
1	Pear shaped	82	82
2	Cylindrical	12	12
3	Hourglass	2	2
4	Flask shaped	1	1
5	S-shaped	2	2
6	Irregular	1	1

Position of Fundus

The length of the fundus below the inferior margin in the inframarginal type of fundus ranged between 0.78-2.84 cm. (table 2)

Table 2: Position of Fundus

Position	Number of specimens (n)	Percentage (%)
Inframarginal Fundus	69	69
Marginal Fundus	17	17
Supramarginal Fundus	14	14

Transverse diameter of gallbladders

The maximum transverse diameter of the gall bladder from the porta hepatis ranged between 2.46 and 7.76 cm. (table 3)

Table 3: Transverse diameter of gallbladders

Transverse diameter of gall bladders	Number of specimens (n)	Percentage (%)
< 3	69	69
3 – 4	17	17
> 4	14	14

Length of gall bladder

The length of the gall bladder ranged from 5.1cm -9.2cm. The mean±SD for the length of the gall bladder was6.54±1.04cm. (table 4)

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Table 4: Length of gallbladder			
Number of specimens	**Length in cm**	**Mean**	**Standard division**
100	5.1-9.2	6.54	1.04

The external appearance of gall bladder

The folding of the neck and fundus (anteriorly or posteriorly) was noted. The folding of the fundus was 24 out of 100, and folding of the neck was 20 out of 100, and Hartman's pouch was 30 out of 100.

DISCUSSION

Variations in the anatomy of the gallbladder, extrahepatic biliary system the arteries that supply them, and liver is important for surgeons. Failure to recognize them may lead to accidental ductal ligation, biliary leaks, and strictures after laparoscopic cholecystectomy. [4,5,6]

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, consists of rapidly proliferative cells that penetrate the mesodermal plate called the septum transversum. Hepatic cells penetrate the septum, so the hepatic diverticulum and foregut connection narrows, forming the bile duct. Small ventral outgrowths formed by the hepatic bud give rise to the gallbladder and the cystic duct [7]

The study was conducted on 100-gall bladders collected from formalin-fixed cadavers from the Department of Anatomy of Index Medical College. The parameters studied were thegall bladder's maximum length, breadth (transverse diameter), and shape.

The length of the gall bladder ranged from 5.1cm - 9.2cm. The mean±SD for the length of the gall bladder was6.54±1.04cm. The measurement of length and transverse diameter found in the present study is similar to that found by Chari & Shah [8] and Jabarajguru et al. and Prakash AV et al. [9] Rajendra R. et al. [10] Comparison of the length, breadth, and the shape of the gall bladder. The breadth of the gall bladder ranged from 2.1cm -5.7cm. The mean±SD for the length of the gall bladder was 3.6±0.92cm.

A similar study was done by Sharad Kumar Pralhad Sawant et al.In 48 specimens, the gall bladder was pear-shaped. Other shapes observed were cylinder, hourglass, flask-shaped, and irregular. In the specimen, the gall bladder was partially intrahepatic. A very prominent Hartmann's pouch was observed in 22 specimens. The length of the Gall bladder ranged between 5.3 cm - 10.2 cm, and the transverse diameter ranged between 2.8 cm and 5 cm. Different positions of the fundus with the inferior border of the liver were also noted. Anatomical variations of the Gall's bladder become vital during surgical settings. Congenital anomalies and anatomical variations related to the gallbladder and extrahepatic biliary tree, though uncommon, can be of clinical importance as failure to recognize them during operative procedures may lead to accidental complications [11].

Dr. Stuti Srivastava et al.The study found that the Gall bladder had lengths ranging between 5.52 and 11.32 cm, transverse diameters between 2.78 and 5.57 cm, and thickness at the neck, body, and fundus was not found to be uniform. The most common shape observed in this study was the pear shape. The length of the gall bladder below the inferior border of the liver varied between 0.46 and 3.93 cm. [12]

A study done by Desai et al. Found that the Commonest shape observed in this study was pear-shaped in 84% of cases in our study. Pear-shaped was 82%, which is slightly lower than them.

In the present study, a pear-shaped gall bladder was observed in 82 specimens (82%), a flask-shaped gall bladder in 1 specimen (1%), a cylindrical gall bladder in 1 specimen (14%), an irregular gall bladder in 1 specimen (1%), an hourglass gall bladder in 02 specimens (02%), and an s-shaped gall bladder in 2 specimens (2%) out of 100 specimens. The most common shape found was the pear shape (82%),24 of which had a folded neck and 20 of a folded fundus out of 100. Rajendra R et al. found that the incidence of normal gall bladders was 96%, oval-shaped 11.4%, cylindrical 38%, hourglass-shaped 8%, partially intrahepatic 5.1%, intrahepatic 3.8%, and Phrygian cap 3.8% [13].

In the present study, we found 8% of cases. Septations inside the gallbladder have been reported quite infrequently. This condition may be associated with cholelithiasis and abdominal colic18. Septations in the gallbladder have been reported to be single 19 or multiple 20.

CONCLUSION

Congenital anomalies and anatomical variations related to the gallbladder and extrahepatic biliary tree are uncommon, but they can be clinically important. They are important for radiological studies, investigative procedures, surgical interventions, and their clinical outcomes.Awareness of these anomalies helps perform invasive procedures, therapeutics, and diagnostics in this region.

REFERENCES

1. Bharathi D et al. Morphometry and Morphology Of Variations Of Gall Bladder: A Cadaveric Study. International Journal of Anatomy and Research, Int J Anat Res 2020, Vol 8(2.1):7413-17. ISSN 2321-4287 DOI: https://dx.doi.org/10.16965/ijar.2020.118.
2. Shivanal, Parashuram, et al. Morphometric study of adult human gall bladder in a cadaver and its clinical importance. Indian Journal of Clinical Anatomy and Physiology 2021;8(3):202–207
3. Tiwari S. Study of human gall bladder anatomic variations and its clinical importance. Indian J Clin Anat Physiol. 2018;5(1):124–8.

DOI: 10.69605/ijlbpr_13.9.2024.2

4. Audi P, Noronha F, Rodrigues J. Intrahepatic gall bladder: a case report and literature review. The internet journal of surgery. 2010;24(1).
5. Joshi DS, Anjaankar AP et al. A cadaveric study involving variations in external morphology of gall bladder. Int J Med Res Health Sci. 2016;2(2):239-42.
6. Jain S, Ghai R, Singla M, Goel P.Variations in the External Morphology of Gall Bladder. Journal of Anatomical Society of India. 2016,9-12.
7. T.W.Sadler, langman's medical embryology 12th edition ch-15 Lippincott Wliiams&Wikins, aWolter Kluwer business 2012 pp218.
8. Prakash AV, Panshewdikar P N., Joshi DS, Anjaankar AP. A cadaveric study involving variations in external morphology of gall bladder. Int J Med Res Health Sci. 2013; 2(2):239-242.
9. Rajendra R, Makandar UK., Tejaswi H L, Patil. B. G. Morphometric Study of Gall Bladder In South Indian Population(cadaveric study).Indian Journal of Forensic and Community Medicine, January – March 2015;2(1):35-42.
10. Sharad Kumar Pralhad Sawant, Shaheen Rizvi/A Cadaveric Study of Variant Morphology of Gall Bladder and its Clinical Significance/Indian J Anat. 2022;11(1):15-22.
11. Srivastava, D. S., & Khan, D. A. Z. . (2019). Morphology Of Gall Bladder- A Cadaveric Study. *Journal of Current Medical Research and Opinion*, *2*(10), 293–298.
12. J. Desai1*, N. Bhojak, Study of Variations in External Morphology of Gall Bladder in Cadavers BJKines-NJBAS Volume-7(1), June 2015.
13. Futura G, Kinfu Y Anatomical variations of Gallbladder and biliary ducts among Ethiopians Ethiop Med. J, 2001; 39(3): 173-84.