ORIGINAL RESEARCH

To determine the morphology of gall bladde: A Cadaveric Study

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ABSTRACT

Aim: To determine the cadaveric morphology of gall bladde.

Material and methods: The research was carried out at the anatomy department. 60 adult cadaveric human gall bladders preserved in formalin. The gall bladder was dissected thoroughly and evaluated for maximal length and width (transverse diameter), changes in form, exterior appearance, and location. The length and width of the gall bladder were measured using sliding vernier callipers, and an average of three measurements were taken.

Results: The gall bladder measures in this investigation are provided in table no.1. The average length and width of the gall bladder were 6.89±0.79cm and 3.55±0.69cm, respectively. Pear-shaped gall bladders were found in 26 specimens (43.33%), flask-shaped gall bladders in 15 specimens (25%), cylindrical-shaped gall bladders in 12 specimens (20%), irregular-shaped gall bladders in 4 specimens (6.67%), and hourglass-shaped gall bladders in 3 specimens (5%).

Conclusion: Congenital gallbladder malformations and billiary tree variations are uncommon. These abnormalities may catch surgeons off guard during laparoscopic surgery, since failure to diagnose them can result in iatrogenic injuries and increase morbidity and mortality. Being aware of these abnormalities aids in the performance of invasive surgeries, treatments, and diagnostics in this area.

Key Word: Gall bladder, external morphology, Hartmann's pouch, Intrahepatic

INTRODUCTION

Humans are thought to be uniquely similar in their general anatomical construction, but when we investigate one specific region in greater detail, it is surprising how frequently we encounter one type or another of variation. Major biliary complications of laparoscopic cholecystectomy can be avoided if the extrahepatic biliary ductal and arterial anatomic relationships are understood.[1,2] The gall bladder is a bile reservoir that resembles a flask or pear-shaped blind ending diverticulum connected to the common bile duct by the cystic duct. It is normally found in the right hypochondrium, which is partially buried in a fossa on the inferior surface of the right hepatic lobe. It extends forward from the porta hepatis's right end to the inferior hepatic border. Its upper surface is connected to the liver by connective tissue, and it is completely covered by peritoneum that extends from the liver's surface. It is occasionally completely surrounded by peritoneum and even connected to the liver via a short mesentery. It is commonly found near the duodenum, pylorus, hepatic flexure of the

right colon, and right kidney. [3] Hartmann's pouch is an outpouching of the gallbladder wall at the junction of its neck and the cystic duct. Its recognition aids in the delineation of biliary anatomy during cholecystectomy. It is named after Henri Albert Hartmann, who described it first. The term "Hartmann's pouch" is sometimes used to refer to the "Hartmann's procedure," which is a colon or rectal resection without an anastomosis in which a colostomy or ileostomy is created and the distal colon or rectum is left as a blind pouch. Gallstone impaction in the Hartmann's pouch causes mucocoele of the gallbladder.[4] The cystic duct drains bile from the gallbladder to the common bile duct. It is about 3 to 4 cm long and runs backwards and downwards from the gall bladder's neck. The junction with the common hepatic ducts usually occurs immediately below the porta hepatis; however, the two ducts may lie parallel to each other for some distance and may not join until they are almost to the duodenum on occasion. The cystic duct mucus membrane is raised up into a spiral fold with 5 to 10 irregular turns; it is continuous with a similar fold in the gall bladder neck. The spiral fold is thought to keep the duct open so that bile can pass through it both in and out of the gall bladder. [5]

METHOD AND MATERIAL

The research was carried out in the anatomy department. 60 adult cadaveric human gall bladders preserved in formalin. Prior to the start of the study, the institutional ethical committee approved it. The study excluded any specimens with surface anomalies or pathologies. The gall bladder was dissected carefully and studied for maximum length and breadth (transverse diameter), variations in shape, external morphology, and position. The length and width of the gall bladder were measured with sliding vernier callipers, and an average of three measurements were taken. The minimum, maximum, and standard deviation were computed. The gall bladder was carefully dissected and cleaned to note the variations in shape, external morphology, and position.

RESULTS

The gall bladder measurements in this study are shown in table no.1. The average length and width of the gall bladder were 6.89±0.79cm and 3.55±0.69cm, respectively. Table 2 depicts the various gall bladder shapes observed during the study. Pear-shaped gall bladders were found in 26 specimens (43.33%), flask-shaped gall bladders in 15 specimens (25%), cylindrical-shaped gall bladders in 12 specimens (20%), irregular-shaped gall bladders in 4 specimens (6.67%), and hourglass-shaped gall bladders in 3 specimens (5%). Gall bladder external morphology revealed folds at the neck and fundus in four specimens. Hartmann's pouch was discovered in two specimens. The gall bladder was intrahepatic in three specimens, indicating complete type.

Table 1: Measurements of gall bladder

Measurements of gall bladder	Mean
Breath	3.55±0.69
Length	6.89±0.79

Table 2: Shapes of gall bladder

Shape of gall bladder	Number=60	%
Hourglass	3	5
Cylindrical	12	20
Flask	15	25
Irregular	4	6.67
Pear	26	43.33

Table 3: Showing measurements and shape of gall bladder

	specimens	length	breadth	shape
RajguruJ *et al.*[6]	60	5-12	2.5-5	Pear (85%), flask (5%), cylindrical (3.33%), Irregular (1.67%), hourglass (3.33%), Retort (1.67%)
Nadeem[7]	70	4.5-11.6	2.7-5.2	Pear (82.85%), flask (2.86%), Cylindrical (2.86%), irregular (1.43%),
AV Prakash *et al.*[8]	90	7-10	2-5	Bilobed (1.43%), others (7.14%) Pear (82.22%), others (17.78%)
RajendraR *et al.*[9]	78	4-11	2.5-5	Pear(53.2%),cylindrical (11.4%), hourglass (6.3%) oval (11.4%) others (16.5%)
Desai J *et al.*[10]	50	4.5-11	2.8-5	Pear(84%),cylindrical (10%), hour-glass (2%), retort (4%)
Present study	60	6.89±0.79	3.55±0.69	Pear(43.33%), flask (25%), cylindrical (20%) Irregular (6.67%), hourglass (5%)

Table 4: Showing external variations in gall bladder

Author	Folded neck	Folded fundus (Phrygian cap)	Hartmann's pouch	Intrahepatic gall bladder
Rajguru J *et al.*,[6]	03(5%)	03(5%)	-	-
Nadeem[7]	-	-	05(7.14%)	-
Prakash AV *et al.*,[8]	04(4.44%)	05(5.56%)		
Desai J *et al.*[10]	02(4%)	02(4%)	-	-
Tiwari S[11]	3(6%)	2(4%)	4(8%)	1(2%)
NaharN *et al*[12]	-	-	04(5.7%)	-
Dundareddy*et al.*[13]	-	01(2%)	02(4%)	-
Present study	4(6.67%)	4(6.67%)	2(33.33%)	3(5%)

DISCUSSION

Hepatic diverticulum of foregut evolves into liver, gall bladder, and biliary duct system in the third to fourth week of development. This diverticulum develops into the septum transversum, which separates into two portions for the liver, one cranial and one caudal, as the primordium gives birth to the liver and bile duct. The caudal component gives birth to the gall bladder and cystic duct. An arrest or departure from normal development leads in gall bladder and biliary system malformation.[2] The morphology of fifty gall bladder specimens was investigated in the current research. The average length and width of the gall bladder were 6.89±0.79cm and 3.55±0.69cm, respectively. Pear-shaped gall bladders were found in 26 specimens (43.33%), flask-shaped gall bladders in 15 specimens (25%), cylindrical-shaped gall bladders in 12 specimens (20%), irregular-shaped gall bladders in 4 specimens (6.67%), and hourglass-shaped gall bladders in 3 specimens (5%). The current study's findings are consistent with those of the previous authors. [6,10] Cholecystectomegaly is a condition in which the gall bladder enlarges or grows in size. It has been documented in conditions such as diabetes, as well as after truncal and selective vagotomy. The gall bladder enlarges under physiological situations such as pregnancy and obesity. The gall bladder shrinks in conditions such as cystic fibrosis.[11] External changes found in our investigation included folds at the neck and

fundus in four specimens each. Hartmann's pouch was seen in two specimens, while intrahepatic gall bladder was detected in three. Variations in the external appearance of the gall bladder in the current research are compared with findings published by other authors.[6-13] The folded fundus and fold at the neck of the gall bladder are the most prevalent variations detected. The folded fundus of the gallbladder is known as the Phrygian cap; it is a triangular malformation in which the fundus is folded on the body, partly separating the fundus from the body. This variation is asymptomatic and may be identified on x-ray or ultrasound.[14, 15] It has no clinical importance but can be misinterpreted for a layer of stones or hyperplastic cholecystosis. Hartmann's pouch is characterised by a widening at the lateral end of the gallbladder's neck. This can obscure the cystic duct and calot's triangle, leading to conditions such as mucocele and Mirizz's syndrome.[16] As a result, pre-operative detection of the presence of Hartmann's pouch is recommended to avoid intraoperative and post-operative complications. One of the aberrant positions of the gallbladder is intrahepatic gallbladder. It may exist in two forms: partial or total. The partial type occurs when the gallbladder partially projects out from the liver, while the complete type occurs when the gallbladder is entirely lodged inside the liver parenchyma. With this sort of presentation, the surgeon finds it difficult to operate on the gallbladder during laparoscopic cholecystectomy, which might lead to difficulties. This developmental anomaly is caused by a congenital arrest in the movement of the gall bladder from its intrahepatic position in the second month of gestation to its normal superficial location.[11] Individuals with intrahepatic gall bladder are more prone to cholelithiasis due to incomplete gall bladder emptying caused by stasis. It may be identified by ultrasonography or a CT scan.[17] During laparoscopic cholecystectomy, 3.67% of patients had bleeding complications, and 1.67% had biliary leak through the drain. Three patients were reexplored, one for bleeding and the other for biliary leak, resulting in a morbidity of 1%.[15] As a result, it is critical for surgeons and radiologists to be aware of such morphological variations of the gall bladder in order to execute safe diagnostic and therapeutic interventions.

CONCLUSION

Congenital gallbladder malformations and billiary tree variations are uncommon. These abnormalities may catch surgeons off guard during laparoscopic surgery, since failure to diagnose them can result in iatrogenic injuries and increase morbidity and mortality. Being aware of these abnormalities aids in the performance of invasive surgeries, treatments, and diagnostics in this area.

REFERENCES

1. Rajguru J, Khare S, Jain S, Ghai R, Singla M, Goel P. Variations in the external morphology of gall bladder. J.Anat.Soc.India, 2012; 61(1):9-12.
2. Sah SK, Silotry N, Kumari H. Morphological Study and Variations of Gall Bladder Int. J. Adv. Microbiol.Health.Res., 2018; 2(2):1-11.
3. Slaby FJ, McCune SK. Gross Anatomy in the Practice of Medicine, 1st Edition, Lea and Febiger,1994:457.
4. Cornelius Rosse, Penelope Gaddum- Hollinshead's Text book of Anatomy, 5th Editon, Lippincott-Raven, Philadelphia, 1997;58, 217-221.
5. Mahato NK. Septate gallbladder: Gross and histological perspectives in an uncommon occurrence. International Journal of Anatomical Variations (2010) 3: 70–72
6. Rajguru J, Khare S, Jain S, Ghai R, Singla M, Goel P. Variations In The External Morphology of Gall Bladder. J. Anat. Soc. India. 2012; 61(1):9-12.
7. Nadeem G. A study of the clinico-anatomical variations in the shape and size of

gallbladder J. Morphol. Sci. 2016; 33(2):62-7.

8. Prakash AV, Panshewdikar PN, Joshi DS, Anjaankar AP. A cadaveric study involving variations in external morphology of gall bladder. Int J Med Res Health Sci. 2013; 2(2):239-42.
9. Rajendra R, Makandar UK., Tejaswi HL, Patil BG. Morphometric Study of Gall Bladder In South Indian Population(cadaveric study).Indian Journal of Forensic and Community Medicine. 2015; 2(1):35-42.
10. Desai J, Bhojak N. Study of Variations in External Morphology of Gall Bladder in Cadavers BJKines- NJBAS.2015;7(1):29-33.
11. Tiwari S. Study of anatomic variations of human gall bladder and its clinical importance. Indian journal of clinical anatomy and physiology.2018; 5(1):124-128
12. Nahar N, Ara S, Rahman M, Shahriah S, Afroz H *et al*. Presence of hartmann's pouch in human gall bladder. Bangladesh Journal of Anatomy. 2012; 10(2):57-8.
13. Dundareddy R, Sumana R. Comparative study of Human Gall Bladder variations in south Indian population. International journal of scientific research. 2017; 6(4): 36-8
14. Piracci A, Mitrushi A, Totozani D. ultrasound examination of anatomical variations of the gall bladder. Albanian medical journal.2013;1: 88-91
15. Talpur KAH, Laghari AA, Yousfani SA, Malik AM, Memon AI *et al*. Anatomical variations and congenital anomalies of Extra Hepatic Biliary System encountered during Laparoscopic Cholecystectomy. J Pak Med Assoc. 2010; 60(2):89-93
16. Choudhury P. Relevant Biliary Anatomy during cholecystectomy. Journal of evolution of medical and dental sciences. 2014; 3(35):9332-42.
17. Manjit Singh Khalsa, Hari JP, Dutta A. Cholecystectomy for intrahepatic gall bladder with incidental subhepatic appendix: a challenge for the surgeon. International Journal of Research in Health Sciences. 2017; 5(2):16