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Morphometric study of gall bladder

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Abstract

Background: Gallbladder size and volume are important determinants of gallbladder contraction and function. The present study was a morphometric study of gall bladder.

Materials & methods: The present study was conducted in the department of Forensic Medicine. It comprised of 84 gall bladders of both genders. An autopsy of bodies was done. Shape of the gall bladder was assessed.

Results: Out of 84 patients, males were 46 and females were 38. Gall bladder was normal in 14, oval shaped in 35, cylindrical in 20 and hour glass in 13 cases. The difference was significant ($P < 0.05$). Gall bladder was partially intrahepatic in 4, intrahepatic in 3, phrygian cap in 5, left gall bladder in 2 and double gall bladder in 2.

Conclusion: Authors found that most common shape of gall bladder was oval followed by cylindrical.

Keywords: gall bladder, cylindrical, oval

Introduction

Gallbladder size and volume (GBV) are important determinants of gallbladder contraction and function. These parameters have been observed to increase with age. Individuals with a higher resting gall bladder volume have less post prandial fractional emptying and a higher residual volume after meals^[1]. It is also established that large gallbladder volumes observed in older individuals are predictors of impaired gallbladder motility and bile stasis which predispose one to gall stone as well as biliary sludge formation. Other than in advanced age, the GBV also increases in physiological processes such as pregnancy. As observed with increased age, the preponderance of gallstone formation is also increased in pregnancy^[2].

Supersaturated bile is considered to be a necessary factor for cholesterol gall stone formation. As supersaturated bile is also a common finding in subjects without gall stones, however, other factors seem to be of importance. A crucial event in gall stone formation seems to be the formation of cholesterol crystals-that is, the nucleation process. The nucleation time is thus much shorter in gall bladder bile of gall stone patients compared with normal subjects^[3].

Reduction in gallbladder contractility leads to biliary stasis and sludge formation hence the increased tendency of older individuals to form gallstones which result to cholecystitis. The prevalence of cholelithiasis has been reported to increase, with a marked escalation from 4 to 10 times higher after the fifth decade of life. Age related changes in anatomical parameters such as gallbladder size and volume may explain the reduction of gallbladder contractility observed with age^[4]. The present study was a morphometric study of gall bladder.

Materials & methods

The present study was conducted in the department of Forensic Medicine. It comprised of 84 gall bladders of both genders. Ethical clearance was taken prior to the study.

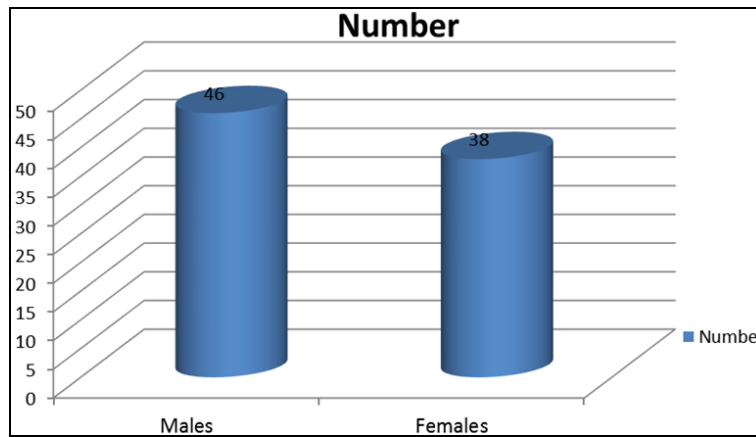
General information such as name, age, gender etc. was recorded. An autopsy of bodies was done. Shape of the gall bladder was assessed. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

Results

Table 1: Distribution of patients

	Total-84	
Gender	Males	Females
Number	46	38

Table 1, graph 1 shows that out of 84 patients, males were 46 and females were 38.



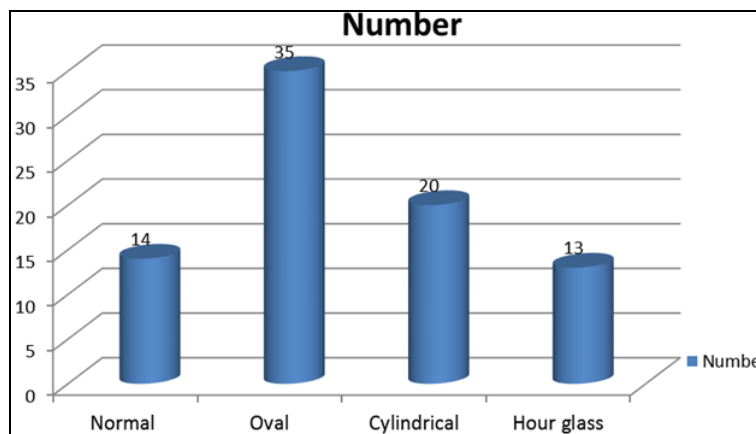
Graph 1: Distribution of patients

Table 2: Morphological classification of GB

Classification	Number	P value
Normal	14	0.01
Oval	35	
Cylindrical	20	
Hour glass	13	

Table II, graph II shows that gall bladder was normal in 14, oval shaped in 35, cylindrical in 20 and hour glass in 13

cases. The difference was significant ($P < 0.05$).



Graph 2: Morphological classification of GB

Table 3: Variation in gall bladders

Gall bladder	Number	P value
Partially intrahepatic	4	0.04
Intrahepatic	3	
Phrygian cap	5	
Left gall bladder	2	
Double	2	

Table III shows that gall bladder was partially intrahepatic in 4, intrahepatic in 3, phrygian cap in 5, left gall bladder in 2 and double gall bladder in 2.

Discussion

There is no exact known cause to define these variations but following are the probable reasons. A) As contraction of GB and secretions of bile are under activation of cholecystokinin and secretin hormones which are released from adreno-axis of pituitary gland, maturations of functional activity of liver depends on adreno-axis of pituitary. Hence role of pituitary may be responsible for these variations [5]. B) Microscopically, there is no

muscularis mucosa in GB rather there is a muscularis lamina consisting of irregular anastomosing bundles of smooth muscles running in longitudinal, circular and oblique directions, moreover concentration of bile solely depends on the ability of epithelium which withdraws water and inorganic ions from the bile [6]. The present study was a morphometric study of gall bladder.

In present study, out of 84 patients, males were 46 and females were 38. Gall bladder was normal in 14, oval shaped in 35, cylindrical in 20 and hour glass in 13 cases. Rajendra *et al.* [7] in their study 78 non-pathological gall bladders were studied morphometrically. The length and breadth of GB was measured. The measurements were taken

by measuring Tape. Morphologically Normal (Pyriform) GBs were 53.2%, cylindrical 11.4%, oval shaped 11.4%, partially intra hepatic 5.1%, intra hepatic 3.8%, hour glass 6.3%, Phrygian cap 3.8%, double GB 1.3%, left sided 2.5%. Metrically length and breadth of GB was highly significant ($p < 0.01$). This study will certainly help anatomists, anthropologists and medico legal experts to compare the south Indian GB parameters with that of other parts of the country and abroad. Moreover to radiologists to differentiate Reidel's lobe of the liver with variations of the gall bladder and laparoscopic surgeons during cholecystectomy.

The height of the cells of the epithelium is quite variable to respond to the degree of contraction of bile. Hence indefinite muscular framework might have resulted into variations of shape and size of the GB [8]. C) The plasticity of hepatic parenchyma is observed in fetal life as it does not develop completely until several years after birth but with proliferation of hepatic parenchyma there is an increase in the size and shape of the GB, cystic duct and common bile duct hence there is a mutual or reciprocal relation between GB and functional liver as pars cystica is a spur of pars hepatica. Hence delay in proliferation or plasticity of hepatic parenchyma might result in Variations of morphometricity of GB. D) [9]. As there is an intimate relation between germ layers, fate or destiny of Anatomy of any gland or organ is difficult to predict, especially in the secondary mesoderm which undergoes such an intimate differentiation that it is hardly possible to follow. Hence it clearly indicates that these variations of the GB resulted in response to the functional need of the body. Karluki *et al.* [10] found that the mean gallbladder volume was 47.948 (± 19.080) cm³ and showed a statistically significant increase with age. There was also a significant increase of gallbladder length ($p = 0.01$) and diameter. The gallbladder volume which is a function of length and diameter, shows a statistically significant increase with age. Notably, there is a marked increase in these parameters after the fifth decade. This could explain the exponential increase in prevalence of cholelithiasis by 4 to 10 times after the fifth decade of life.

Conclusion

Authors found that most common shape of gall bladder was oval followed by cylindrical.

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