



MORPHOLOGICAL STUDY OF SPLEEN

Dr Ashok Khade*

Associate Prof of Anatomy, Modern Institute of Medical Science, Indore.
*Corresponding Autor

Dr Vaishali Bondge

Associate Prof of Anatomy, Grant Medical College, Mumbai.

ABSTRACT

Spleen consists of large encapsulated mass of lymphoid and vascular tissue, situated in upper and left part of abdomen between fundus of stomach and diaphragm. Spleen is lymphoid organ, it develops from mesoderm in the dorsal mesogastrium close to the developing stomach. Spleniculi develops as a collection of mesenchymal cells to form small lobular masses of splenic tissue in the dorsal mesogastrium. These lobules later fuse to form single mass of spleen.

The present study included 64 human cadaveric spleens. Different shapes of the spleens observed wedge 62.5% shapes followed by Tetrahedral 18.75%, oval (9.37%), Triangular 6.25, Irregular (3.13%) and weight of spleen varies between 80 to 150 gm in almost all the specimen. The variation in length, Breadth and width observed 9.58cm, 6.42 cm, and 3.62 cm respectively.

The finding of the present study will be fundamental importance to the physician, surgeons and radiologists and gives clue for various clinical disease.

KEYWORDS :

INTRODUCTION

Spleen consist of large encapsulated mass of lymphoid and vascular tissue, situated in upper and left part of abdomen between fundus of stomach and diaphragm, it lies mainly in the left hypochondrium and partly in the epigastrium. The axis of spleen is oblique and is directed downwards, forwards and laterally coinciding with the left tenth rib. Shape of spleen varies from a slightly curved wedge to a domed tetrahedron. Size of adult spleen is an average 12cm length, 7cm breadth and 3cm thickness. It average adalth weight from 80 to 300gm. It has two surfaces diaphragmatic and visceral, two borders superior and inferior, two ends medical and lateral, and two angles anterior basal and posterior basal[15].

Spleen is a lymphoid organ, it develops from mesoderm in the dorsal mesogastrium close to the developing stomach. Spleniculi develops as a collection of mesenchymal cells to form small lobular masses of splenic tissue in the dorsal mesogastrium. These lobules later fuse to form single mass of spleen. Presence of splenic notches along the upper border of adult spleen indicates lobulated development of spleen. Capsule, Septa and Connective tissue frame work including reticular fibres develop from mesoderm. The mesenchymal cells differentiate into lymphoblasts and other blood forming cells[16].

Spleen is highly vascular, friable and elastic purple in color, moving with respiration. Spleen filter blood by taking out warn out 1may microbial antigens from the circulation. where as lymph nodes filter lymphs. Spleen is performs important immunological and haematological functions, total splenectomy leads to a decreases in immunity and altered haematological features, to avoid this partial splenectomy can be done in indications like traumatic rupture, hypersplenism, neoplasia, splenic cyst etc. The present tendency of surgeon is to try for conservative management and to conserve as much as splenic tissue as possible. Thus, the knowledge of the veriatonal anatomy of the spleen is of fundamental important. So, the aim of this study was to find out morphological structure of spleen[1]

The present study was undertaken in 64 dissected specimen, to describe the morphology such as measuring length, breadth, weight, observed shape, and superior, inferior border splenic notch. Compare it with the available literature which would prove useful to both clinicians and academicians.

MATERIAL AND METHOD

The Formalin embalmed cadavers are stored in cold room. After the routine dissections for undergraduate medical college, various organs are stored in stainless steel tanks containing 10% formalin.

We studied 64 specimen spleen in store since last five years. The spleen was removed from abdominal cavity after ligating the splenic vessels, fatty issue was removed by dissection after the spleen was washed in tap water. All the spleens were 2 studied for the following parameters, spleens were studied for their shapes and percentage of different shapes were calculated. Weight of the spleen was measured by electronic weighing scale. Length of the spleen was recorded as the greatest distance between the two poles of the spleen. The greatest distance between two points at the same level on the superior and inferior borders was taken as its breadth and the maximum thickness of all the spleens were noted. Splenic notches are observed on the superior, inferior and intermediant borders. Accessory splenic tissue was also looked for in the hilum of the spleen.

OBSERVATION

Table No. (1) Different Shape of spleens

No.	Shape of Spleen	Number and Percentage	
1.	Wedge	40	62.5%
2.	Tetrahedral	12	18.75%
3.	Oval	6	9.37%
4.	Triangular	4	6.25%
5.	Irregular	2	3.13%

Different shape of spleen observed in 64, wedge shaped spleen were 40 (62.5%), Tetrahedral shaped spleen were 12 (18.75%), oval shaped spleen were 6 (9.37%), Triangular shaped spleen were 4 (6.25) and irregular spleen was 2 (3.13%)

Table No. (2) Weight of spleens

No.	Weight of Spleen	Number and Percentage	
1.	range 80 to 100 gm	14	21.87%
2.	range 101 to 200gm	42	65.25%
3.	range 201 to 300 gm	8	12.5%

Observe weight of spleens in 64, we noted range between 80 gm to 100 gm were spleens 14 (21.37%), range between 101 to 200 gm were spleens 42 (65.63%) and range between 201 to 300 gm were spleens 8 (12.5%).

Table No. (3) Length of spleens

No.	Length of Spleen	Number and Percentage	
1.	below 5 cm	4	(6.25%)
2.	range 5 cm to 7 cm	10	(15.62%)
3.	range 7.1 cm to 9cm	40	(62.5%)
4.	above 9 cm	10	(15.62%)

Measures Length of spleens in 64, the length was in range of below 5

cm were 4 (6.25%), range between 5cm to 7cm were 10 (15.62%), range between 7.1 cm to 9cm were 40 (62.5%) and length was more than 9cm were 10 (15.62%).

Table No. (4) Breadth of spleens

No.	Breadth of Spleens	Number and Percentage
1.	below 4 cm	8 (12.5%)
2.	range 4 cm to 6 cm	48 (75%)
3.	above 6 cm	8 (12.5%)

Measures breadth of spleens in 64, the breadth was in below 4 cm were 8 (12.5%), range between 4cm to 6cm were 48 (75%) and breadth was more than 6cm were 8 (12.5%).

Table No. (5) Width of spleens

No.	Width of Spleens	Number and Percentage
1.	below 2 cm	6 (9.3%)
2.	range 2 to 4 cm	42 (62.63%)
3.	more than 4 cm	16 (25%)

Measures width of spleens in 64, the width was in below 2 cm were 6 (9.3%), range between 2cm to 4cm were 42 (62.63%) and width was more than 4cm were 16 (25%).

DISCUSSION

Morphology of the spleens observed shape, superior and inferior border of splenic notch, observed weight, measuring length, breadth and width. In the present study, five different shapes of spleen were observed amongst those, most common was wedge shape 40 (62.5%) followed by tetrahedral 12 (18.75%) and triangular 4 (6.35%) shapes. This was not in accordance with previous studies, as in studies done in past by kawale sugat G et al [7] wedge shape was (61.26%) followed by tetrahedral (21.62%) and triangular (12.61%) shapes. Michels NA [9] and by Holineshed [6] wedge shape was found in 44%, tetrahedral shape in 42% and 5 triangular shape in remaining 14% specimens. Contrary to previous studies, additional oval 6 (9.37%) and irregular shapes 2 (3.13%) were also observed in the present study. Chawareet al [3] found that out of 111 spleens 68 (61.26%) were wedge shaped, 24 (21.62%) were tetrahedral, 14 (12.61%) were triangular, 4 (3.60%) were oval, and 1 (0.90%) was irregular in shaped. The specimens showed a wide range of variations in their shapes i.e. 37 were oval (52.9%), 13 had wedge shape (18.6%), 10 were triangular (14.3%) and 9 were tetrahedral (12.9%), as depicted below. A clear dome like appearance was seen in one specimen (1.43%). The variation in the configuration of spleen is due to indentations of the organ including stomach, colon, pancreas and kidney which are in close relation to the spleen.

The present study has shown similar observation for size of spleen as in previous studies. Similar to the earlier studies (Bergman et al Hollineshed), in our study also, weight varied between 80gm to 250gm in almost all the specimens. As per Grey's Anatomy average adult weight is 150gm, which varies from 80 to 300 gms, in our study, average weight of spleen was 150 gms. Compared to the earlier studies done by Sivanageswara et al [12], the values for weight spleen were 80 to 300 gm. In the present study are the values for weight were 80 to 300 gm. Chaware et al observed 104 (93.69%) Spleen had weight in the range of 80 to 300 gms, with a maximum number i.e. 73 (65.76%) of spcimens with 6 weights in the range of 80 to 150 gms. The average weight of spleen were 145.76 gms Variation in length, breadth and width of spleen observed in previous study reported by Michel's NA [9] average length is 11cm, breadth 7 cm and width was 3 cm and as mentioned in textbook of Gray's Anatomy average length mention 12cm, breadth 7cm and width is 3 to 4cm. In S.Rao et al [12] measured length is 10.5cm and breadth was 8.3cm. Chaware et al mention length is 9.55cm, Breadth is 6.22 cm and width 3.06cm, is also measured by Chaudhari ML et al [2] was length is 9.59cm, Breadth was 6.59 cm and width was 4.54cm and present study length is 9.48cm, breadth is 6.42cm and width is 3.62cm.

Table No. (6) Variation in length Breath and Width

No.	Measurment	Textbook of Grey's Anatomy	Michels NA	Rao et al	Chaware et al	Chaudhari ML et al	Present Study
1	Length	12	11	10.5	9.66	9.59	9.48
2	Breadth	7	7	8.3	6.22	6.59	6.42
3	Width	3 to 4	3	-	3.06	4.54	3.62

The values for the length, breadth, width and weight of the spleen in the present study were slightly lower than those which were reported from previous studies. This may be due to the differences in the genetic factors, body constitution, geographical conditions, feeding habits and the better 7 socioeconomic status, in the western countries where these studies were done.

The spleen develops from the mesoderm during its development different lobules are formed, which fuse with each other letter on. The indication of the lobulation in adult spleen is its notched upper border Sometimes, this lobulated appearance may persist in the spleen. That is why we can get many notches on the spleen, which can be seen on the superior as well as on the inferior borders. In the present study, the splenic notches were found on the superior as well as on the inferior borders. The number of notches varied from zero to five, but commonly, there were only one or two notches.

Shaik Hussain et al [14] the average length, width and thickness of foetal spleen of gestational age between 12 to 24 weeks were 1.7cm, 1.08cm, and 0.8cm respectively, gestational age between 25 to 36 weeks 2.53cm, 1.64cm and 1.0cm, respectively and gestational age greater than 36 weeks were 2.67cm, 1.67cm and 1.0cm respectively. The average weight and spleen weight of gestational age between 12 to 24 weeks were 800gm and 2.84gm respectively and ratio between two was 0.35%, gestational age between 25 to 36 weeks were 1321.42gms and 4.52gm respectively, ratio between two was 0.34% and gestational age greater than 36 weeks were 2100gms and 7.07gms respectively ratio between two was 0.33%.

Muktyaz Hussein et al [5] found that, out of 32 spleens, 19 spleens 8 (59%) were found to be normal and variations were found multiple lobes and notches were present on the superior border of spleen. 4 spleen (12.5%), present deep notches on inferior border, 2 spleen (6.2%) showed deep notches on middle border, 2 spleen had shape similar to liver (6.2%) and one spleen (3.1%) was pyramidal shape with presence of notch on inferior border and one of the spleen (3.1%) was small size 2.7 inches in length.

Satheesha Nayak et al [13] found that, 50 spleens observed, 25 spleen (50%) were normal and had all the features explained in the textbooks. Twenty five spleens (50%) did not have any notches, two spleens (4%) did not have a hilum and 4 spleens (8%) were small in sized i.e. about 3 inches long. one of the spleen (2%) was liver shaped with 2 lobes, in the spleen without hilum, the splenic vessels interred the spleen by piercing the visceral surface at different places.

Present studies we have found that 64 spleens were observed amongst those, most common was wedge shape 40 (62.5%), followed by Tetrahedral 12 (18.75%) and triangular 4 (6.25%) shapes. Weight of spleen varied between 80 to 150gm in almost all the specimen. The variation in length, breadth and width observed 9.58cm, 6.42cm and 3.62cm respectively. In present study, the splenic notches were found on the superior as well as on the inferior borders. This may be due to the different genetic factors, different geographical condition, feeding hapits, socioeconomic status and body condition. 9

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