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MORPHOMETRIC AND MORPHOLOGICAL ANALYSIS OF SPLEEN IN GARHWAL REGION OF UTTARAKHAND

Anatomy

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ABSTRACT

Number of viscera are present in our body among them spleen is affected in many systemic as well as infective diseases, by keeping in mind above facts the morphometric and morphological study of spleen is done and embryological correlation also taken into consideration. Presence of the notch on the various borders establish the facts that lobulated form of development. The average weight and length of the spleen were found 114.7gms and 9.2cm respectively. Notch on superior border was recorded in 80% of cases.

KEYWORDS

splenic notch, border, fissure, lobe.

Introduction:

Spleen is an encapsulated mass of vascular and lymphoid tissue located in upper left quadrant of abdominal cavity and its shape variable from wedge shape to tetrahedral. The shape is mostly established by its relation to the neighboring structures to the development. Size and weight of the spleen change with age and between the genders. In the adult usually its dimensions are 12cm long, 7cm broad and 3-4cm in thickness. Its average adult weight is 150gms and normal range varies from 80gms to 300gms (1) . Spleen has medial and lateral end, both ends are joined by superior and inferior border. Generally upper border is sharp and having one or two notches (2).

The development of Spleen occurs from dorsal mesogastrium of lesser sac at the end of 4th week. Spleen is the vascular lymphatic organ and is of mesodermal origin. A mesenchymal condensation develops near the body wall and this condensation differenciates during the 5th week to form a spleen (3) . The spleen is in lobular form in foetus but the lobules (4) normally fuse before birth. The notch in the superior border (5) of adult spleen are remnants of grooves that separated the fetal lobules . Normally spleen is not palpable but it may become palpable when its size increases two or three time of normal. Clinically enlarged spleen is detected by palpating the splenic notch in the superior border. Spleen increased in size (splenomegely) due to- (a) increased demand of splenic function for removal of defecteive erythrocytes like thalassemia, sickle cell aneamia and pernicious anaemia Etc. (b)- response to infection like AIDS, tuberculosis and malaria ect. due to abnormal splenic blood flow like cirrhosis and portal hypertension ect. (d) infiltration of spleen like lymphoma, ameilodosis, AML, CML and idiopathic splenomegely like iron difficiency anaemia' (6).

Material and methods:

Retrospective study of spleen in the anatomy department of VCSGGIMS&R, by using 20 formalin fixed specimens of spleen collected from the adult cadavers by standard dissection procedures. morphometric and morphological analysis of spleen was done by using vernier caliper, measuring inchitape and electronic weighing machine having the maximum limit of 5kg. The following observations are observed and recorded like - weight, length (maximum length), width(maximum) and thickness of spleen and also noted the shape and number of notches present on various borders of spleen by keeping organ in anatomical position. All recorded observations were arranged in tabular form and result were analyzed in percentage and compared with available literatures.

Results:

Table 01: showing the notch and parameters of spleen

S No	Presence of notch in numbers			Weight (gms)	Length (cms)	Width (cms)	Thickness (cms)	shape	Remarks
	upper border	middle border	lower border						
1	1	0	0	814	7.1	12.6	6.2	wedge	
2	1	0	3	140	11.2	6	4.3	elongated	notch divide spleen into two lobes
3	6	0	1	159.5	11.1	7.3	4.5	wedge	
4	5	0	0	109.5	10.2	7	5.2	wedge	
5	1	0	0	138.5	8.6	6.2	5.7	wedge	
6	0	0	1	93	9.4	6.5	4.2	wedge/flat	
7	2	0	0	122.5	8.8	7.1	4.1	oval	
8	1	0	0	56.5	8.5	5.2	2.9	elongated	
9	1	0	0	82.5	9	7	3.1	wedge	
10	1	1	0	130	9.6	7.4	3.8	wedge	
11	0	0	1	40.5	7.1	4.6	2.4	leaf shape	
12	0	0	1	62.5	8.1	6.7	3.4	wedge/irregular	
13	1	0	0	125.5	8.9	7.9	3.8	tetrahedral	
14	1	0	0	189.5	11.3	8.2	3.7	wedge	
15	4	0	0	115.5	8.3	7.7	4.3	triangular	
16	0	0	0	153	10.9	6.8	3.8	wedge	
17	1	0	0	138	8.3	5.9	4	wedge	
18	2	0	0	105	8.4	6.2	3.6	wedge	
19	1	0	1	120	8.8	6.7	3	wedge	
20	2	0	0	98	9.1	6	4	elongated	

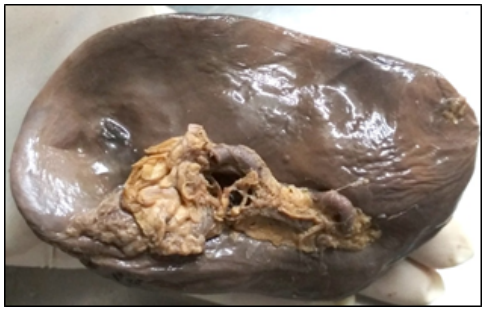
Table 02: statistical analysis of parameters.

S N	Parameters	Mean	SD
1	Length	9.2 cms	1.848
2	Width	6.7 cms	0.903
3	Thickness	3.9 cms	0.777
4	Weight	114.7 gms	37.106

In present study, all parameters are statistically significant by using ANOVA on graph pad software with F ratio value 161.24 and p value is <0.00001.

In present study, weight ranged from 40.5gms to 189gms (average weight 114.7gms), the length ranged from 11.3 to 7.1cm (average length 9.2cm), width ranged from 8.2-4.6cm (average width 6.7cm) while thickness was ranged from 5.7-2.4cm (average thickness 3.9cm). One splenic observation was showing exceptionally larger parameters (weight 814gms, length 17.1cm, width 12.6cm and thickness 6.2cm). Observation of splenic notch present on upper border 80%, notch on upper and lower border 15%, on middle border 5%, notch only in lower border 15%, notch on middle and upper border 5% and absent notch in 5% of cases (figure-1). Shape of the spleen in our study was found wedge shaped 65%, lobulated 5%, oval 5%, elongated 10%, leaf shape 5%, tetrahedral 5% & triangular 5%.

Figure-1: Shows absent notch.



Discussion

In the early 20th century, spleen was considered as an important organ (7). But significance of the spleen now has increased because of its immunological and cytopoitic activity especially with its relation with RBC storage and blood filtration potential"(8). The spleen increases in size in many diseases like thalassemia, portal hypertension, AML, CML and malaria etc'(6). Embryologically, the notch in the superior border of the adult spleen are remnants of grooves that separate the fetal lobules(4). The spleen develops from splenic bud and notches represent lobulation during fetal development. The notches on superior border may have clinical importance as this is the portion which is clinically useful for palpating the enlarged spleen(9).

According to literatures its average weight is 150gms and length 12cm, 7cm broad and 3-4cm in thickness(1) and Weight of spleen was 87gms as mentioned in literature(10). In present study weight ranged from 40.5gms to 189gms (average weight 114.7gms), the length ranged from 11.3 to 7.1cm (average length 9.2cm), width ranged from 8.2-4.6cm (average width 6.7cm) while thickness was ranged from 5.7-2.4cm (average thickness 3.9cm). all the parameters were smaller then the parameters mentioned in the literature(1). Weight of spleen in our study was higher than those reported by Mallikarjun adibatti etal(10). It may be due to the ethnical variability. Literatures on the parameters of spleen are limited. One splenic observation was showing exceptionally larger parameters (weight 814gms, length 17.1cm, width 12.6cm and thickness 6.2cm). It may be because of splenomegely.

Table 03: showing reports of various authors on the pattern of notches of spleen.

Author (s)	Superi or border	Infer- ior border	Interm ediate Border	Superi or & infer- ior border	Spleen withou t notch	Deep notch/ fissure	Spleen with maxim um number of notches
Siva nageswara rao s settee etal.	70%	14%	Nil	–	16%	2%	--
Srijit Das etal.	98%	2%	Nil	--	1%	2%	04
Satheesha nayak B etal.	50%	---	--	---	50	2%	--
Nand kishor Karmali etal.	10.7%	7.1%	7.1%	--	--	--	--
U. Sunil Kumar etal.	--	--	--	--	--	2%	--
Present study	80%	15%	5%	15%	5%	5%	6

In our study, notches on superior border were found 80% which was nearly coinciding with the study of setty etal (11) Das etal(9) and disagree with Nayak etal(12) and Karmali etal(13). We reported 15% notches on the inferior border which coincide with study of Setty etal(11) and disagree with the report of Srijit Das etal(9), Nayak etal(12) and Karmali etal(13). In present study, notch on intermediate border was found 5% cases, which was less than the reports of Karmali etal(11). Notches on the upper and lower border were found 15% in present study which was not reported by other authors. In our study, spleens without notch (**figure-1**) were found 5% which was less than the reports of Setty etal() and Nayak etal(12) and more than Das etal(9). In present study, deep notch/ fissure which divides the spleen into lobes (**figure-2**) were found in 5% which was the nearly same as reported by Setty etal(11), Das etal(9), Nayak etal(12) Kumar etal(5). Maximum number of notches in the present study was found 6 (**figure-3**) which was more than the report of Setty etal(11). Shape of the spleen in our study was found wedge shaped 65%, lobulated 5%, oval 5%, elongated 10%, leaf shape 5%, tetrahedral 5% & triangular 5%. 2% lobulated spleen were reported by Nayak etal(12) which nearly coincide with our findings.

Figure-2: Showing lobulated Spleen.

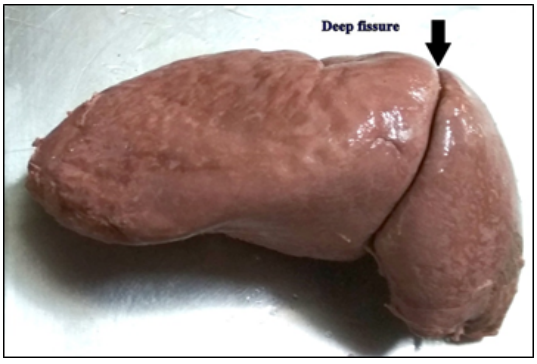
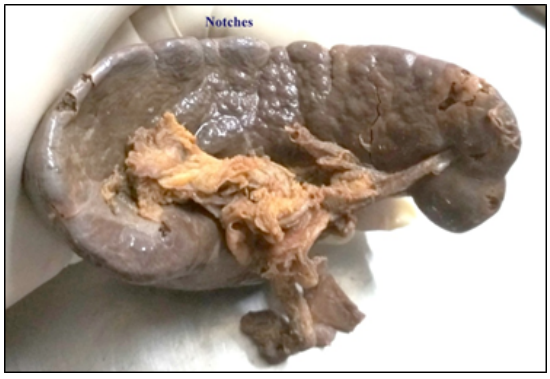


Figure-3: Showing six notches in upper border.



Conclusion:

Splenic notch present in different location on the borders is fruitful for Clinicians, Ultrasonologists and Surgeons for making their diagnosis and to avoid miscalculation of abnormal mass. Its parameters are helpful for ultrasonologists to establish the enlargement of spleen.

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