ORIGINAL ARTICLE

Cadaveric Study of Morphometry of Spleen

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ABSTRACT

Aim of the Study: Spleen is a clinically important organ because of its immunological and hematological role in the body. It can show a wide range of variation, the knowledge of which is important for physicians, surgeons and radiologists The present study was done to perform a morphometric analysis of cadaveric spleens and compare the results with previous studies.

Materials and Methods: The present study was done on 53 cadaveric spleens. It can show a wide range of variation, the knowledge of which is important for physicians, surgeons and radiologists The present study was done to perform a morphometric analysis of cadaveric spleens and compare the results with previous studies.

Results: Out of 53 spleens studied, a wedge shaped or triangular spleen was the most common shapes encountered (18 each) followed by 8 tetrahedral spleens and 5 oval spleens. The least common shapes were heart shaped, semi lunar shaped spleens (2 each). Weight of the spleen ranged from 53 to 444 g average weight being 145 g. Length of the spleen ranged from 50.5 to 144.3 mm average being 96.88. Breadth of the spleen ranged from 43.7 to 107.5 mm average being 68.4. Thickness of spleen ranged from 22.3 to 52.14 mm average being 36.12. Notches were only seen on the superior border of 44 spleens and most of these spleens had one or two notches. Three spleens showed the presence of multiple notches and in 5 spleens no notches were seen.

Conclusion: These findings will be helpful for operating surgeons and intervention radiologists and for objective determination of splenomegaly.

KEY WORDS: Accessory spleen, hematological, immunological, notches.

Introduction

Spleen consists of a large encapsulated mass of vascular and lymphoid tissue situated in the upper left quadrant between fundus of stomach and diaphragm. It is shape varies from a slightly curved wedge to a domed tetrahedron. The size and weight of the spleen varies with age and sex. It can also vary in the same individual under different conditions. On an average it is 12 cm long 7 cm broad and 4 cm thick in the adult. Weight of the spleen ranges from 80 to 300 g average being 150 g.[1] Spleen assumes clinical importance due to hematological and immunological role. Surgeons also like to conserve splenic tissue during splenectomy due to the same reasons. The present study was undertaken to describe the morphometric variations in spleen and compare it with the available literature which would prove useful to both clinicians and academicians.

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Materials and Methods

The present study was undertaken in the department of anatomy of MVJ Medical College and Research Hospital. A total of 53 human adult cadaveric spleen of both sexes were included. Spleen was removed from the abdominal cavity after ligating the splenic vessels. Fatty tissue was removed by dissection after the spleen was washed in tap water. All the spleens were 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. 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

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all the spleens were noted. Notches on the superior and inferior borders were studied and the presence of multiple notches was also noted. Accessory splenic tissue was also looked for in the hilum of the spleen. The mean, standard deviation and range of parameters studied were tabulated and analyzed statistically.

Results

Out of 53 spleen studied 18 (34%) were wedge shaped (Figure 1), 18 (34%) were triangular (Figure 2), 5 (9.4%) were oval (Figure 3), 8 (15%) were tetrahedral (Figure 4) 2 (3.7%) were heart shaped (Figures 5 and 6), and 2 (3.7%) were semi lunar (Figure 7 and Table 1).

Weight of the spleen ranged from 53 to 444 g (Table 2). Out of the 53 spleen studied 31 spleens were in the weight range of 50-150 g. 13 spleens between 151 and 250 g, 3 spleens between 251 and 350 g, 5 spleens between 351 and 450 g and 1 spleen in the weight range of 451-550 g. Length of the spleen ranged from 50.5 to 144.3 mm average being 96.88. Breadth of the spleen ranged from 43.7 to 107.5 mm average being 68.4.

Thickness of spleen ranged from 22.3 to 52.14 mm average being 36.12.

Notches were only seen on the superior border of the spleen and 44 spleens had single notches.3 spleens showed the presence of multiple notches of 2 or more and in 5 spleens no notches were seen.

Discussion

In the present study, the morphometry of spleen was compared with previous studies. The values for

Figure 1: Wedge shape spleen

Figure 2: Triangular spleen with tongue shape projection from superior border

Figure 3: Vertically oval spleen

Figure 4: Tetrahedral shape

Figure 5: Heart shaped spleen with multiple notches

Figure 6: Heart shape spleen

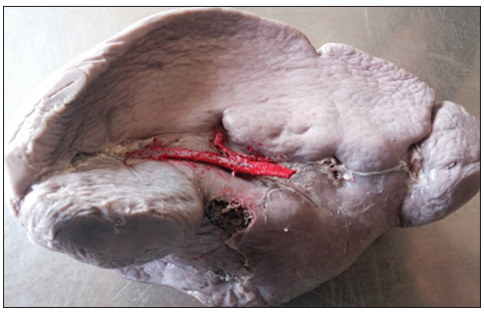

Figure 7: Semilunar shape spleen

length, breadth and thickness were comparable with studies by Chaware *et al*.[2] and Chaudari *et al*.[3] but were less compared with studies by Michel[4] and Rao *et al*.[5] This could be attributed to the differing genetic factors, body built regional and socio economic backgrounds (Tables 2 and 3).

Comparison of the shape of spleen with previous studies (Table 4) showed that our findings correlated with the studies by Chaudari *et al*.[3] and Rao *et al*.[5] We also observed additional semilunar and heart shapes of spleen in two of the spleens studied in each.

Table 1: Different shapes of spleen

Shape of spleen	*N* (%)
Wedge	18 (33.9)
Triangular	18 (33.9)
Tetrahedral	8 (15)
Oval	5 (9.4)
Semilunar	2 (3.7)
Heart shape	2 (3.7)

Table 2: Range of weight of spleen

Weight range (g)	*N*
50-150	31
151-250	13
251-350	3
351-450	5
451-500	1

Notches were observed only on the superior aspect of spleen. Presence of notches on the superior margin is useful for the physician to palpate the spleen during enlargement of spleen.[6] Previous studies regarding the site of notches on the spleen have revealed the presence of notches on the superior order in 98% Das *et al*.,[7] 78.6% by Skandalakis *et al*.,[8] 50% Sateesha *et al*.[9] Previous studies have shown the presence of notches on both superior and inferior aspects of spleen which was not found in our study.[3] Notched superior border results from improper fusion of the splenic nodules along the superior margin. Computed tomographic based study on the morphometry of spleen showed that all dimensions of spleen have significant positive correlation with height but length of the spleen has negative correlation with age.[10] This correlation could not be studied in this case, as we had measured the dimensions on spleens which had been previously dissected out.

Study of foetal spleen revealed that the ratio between foetal and splenic weight has no correlation with the gestational age.[11]

Conclusion

To conclude, knowledge of the anatomy and function of the spleen is essential for the assessment of its role in disease. The contribution of spleen to the immune

Table 3: Comparison of the dimensions of spleen with previous studies

Measurement	Michael	Rao *et al.*	Chaware *et al.*	Chaudhari *et al.*	Present study
Length	11	10.5	9.66	9.59	9.68
Breadth	7	8.3	6.22	6.59	6.84
Thickness	3	-	3.06	4.54	3.61

Table 4: Comparison of the shape of spleen with previous studies

Shape	Rao *et al.* (%)	Hollinshed[5] (%)	Chaware *et al.* (%)	Chaudhari *et al.* (%)	Present study (%)
Wedge	40	44	61.26	33.87	33.9
Triangular	32	42	12.61	19.35	33.9
Tetrahedral	20	14	21.62	32.25	15
Oval	8	-	3.60	8.06	9.4
Heart	-	-	0.90	6.45	3.7
Semilunar	-	-	-	-	3.7

response and defence against infections mandates the preservation of spleen by a conservative approach in the management of ruptured spleen. Studies on the morphometry of spleen will be of interest not only from academic point of view but also for operating surgeons and interventional radiologists. The detailed knowledge on spleen is important to avoid and prevent any complications and to obtain a good operative, as well as diagnostic intervention.

References

1. Standring S. Grays Anatomy: The Anatomical Basis of the Clinical Practice. 39th ed. Edinburg: Elsevier Churchill Livingstone; 2006. p. 1239-44.
2. Rao S, Katikireddi S. Morphometric study of human spleen. Int J Biol Med Res 2013;4:3464-8.
3. Chaware PN, Belsare SM, Kulkarni YR. Morphological variations of the human spleen. J Clin Diagn Res 2012;6:159-62.
4. Chaudari ML, Maheria PB, Lakhani C. Morphological variations of human spleen and its clinical significance. Int J Med Res Rev 2014;2:16-9.
5. Hollinshed WH. Anatomy for Surgeons. 3rd ed., Vol. 2. New York: Harper and Row; 1982. p. 436-45.
6. Asghar A, Naaz S, Agharwal D, Sharma PK. Morphometric study of spleen in North Indian adult population: CT scan image based study. J Clin Diagn Res 2011;5:974-7.
7. Das S, Abd Latiff A, Suhaimi FH, Ghazalli H, Othman F. Anomalous splenic notches: A cadaveric study with clinical importance. Bratisl Lek Listy 2008;109:513-6.
8. Skandalakis PN, Colborn GL, Skandalakis LJ, Richardson DD, Mitchell WE Jr, Skandalakis JE. The surgical anatomy of the spleen. Surg Clin North Am 1993;73:747-68.
9. Sateesha NB, Somayaji SN, Soumya KV. A study on the variations of size, shape and external features of the spleen in South Indian population. Int J Morphol 2011;29:675-7.
10. Asghar A, Naaz S, Agarwal D, Sharma PK. Morphometric study of spleen in North Indian adult population: CT scan image based study. J Clin Diagn Res 2011;5:974-7.
11. Hussain SS, Devi SV, Haseena S. Morphological and morphometric study of human foetal spleen. Int J Anat Res 2014;2:234-8.

Financial Support: None; **Conflict of Interest:** None

How to cite this article: Sangeeta M, Varalakshmi KL, Sahana BN. Cadaveric study of morphometry of spleen. J Med Sci Health 2015;1(3):14-17.

Date of submission: 11-09-2015
Date of peer review: 20-09-2015
Date of acceptance: 29-09-2015
Date of publishing: 10-10-2015