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A Cadaveric Study on Morphological Variations of Spleen: Notches and Size

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Abstract

Introduction: The spleen is an the largest lymphatic organ which is a encapsulated mass and highly vascular organ situated in the left hypochondrial region and having its role in immunological and haematological activity. The aim of present study was to find out the morphological variations of the spleen and to compare them with previous studies.

Materials and Methods: The present study was done on 118 formalin fixed Spleen from the Department of Anatomy and the organ was observed for the following parameters: a) Shape of spleen, b) Presence of notches on its superior and inferior border and c) Presence of anomalous fissure on its surfaces.

Results: Out of 118 observed spleens the number of spleen showing notches on its superior border are 81(68.64%), inferior border are 12(10.16%), both the borders are 11 (9.32%) and absence of notch are 14(11.86%).The number of notches present on the superior border varied from 0 to 5, while on inferior border it was not more than 2. The maximum number of notches noted on the superior border of spleen was 5. The anomalous splenic fissure was found in 8(6.77%) spleens on its diaphragmatic surface. Among 118 spleen 76 (64.40%) are wedge shaped, 15(12.71%) are triangular, 18(15.25%) are tetrahedral and 9(7.62%) are oval shaped spleens found.

Conclusion: The present study shows fundamental importance of variation of splenic morphology to the physicians, surgeons, radiologists and forensic surgeon to differentiate it from the splenic pathology and splenic injury. In addition to this, it is also important for anatomist during routine classroom dissection and discussion.

Keywords: Spleen, Lymphoid organ, Splenic notch, Anomalous splenic fissure.

Introduction

The spleen is the largest lymphatic organ .It is a encapsulated mass and highly vascular organ situated in the left hypochondrial region and partly in the epigastrium, between the fundus of the stomach and the diaphragm.

The shape of the spleen varies from wedge to a domed tetrahedron [1]. The normal adult human spleen is about 1 inch thick, 3 inches broad, 5 inches long and 7 ounces in weight. The normal spleen is not palpable. Its average adult weight is 150 gm [1, 2]. The spleen has two surfaces; superolateral or diaphragmatic and inferomedial or visceral; it has two poles, the anterior and the posterior;

it has two borders, superior and inferior [1,2,3]. The diaphragmatic surface is convex and smooth. The visceral surface is irregular and it is marked by gastric, renal, colic and pancreatic impressions. The posterior pole usually faces the vertebral column. The anterior pole is broad and it is directed laterally. On the superior border, near the anterior pole, there may be one or two notches, indicating lobulated form of the spleen in early foetal life. [1] Sometimes the spleen may retain its fetal lobulated form and shows deep anomalous notches and fissures on its borders and surface respectively.[3]

The filtration of unwanted elements from the blood by phagocytosis is the major function of the spleen [6]. In the foetal life, the spleen manufactures erythrocytes and after birth, it produces lymphocytes. The spleen is the centre where both the B and T lymphocytes multiply and play an important role in the immune responses. Thus, the spleen performs both haematological and immunological functions .

The knowledge of anomalous size, shape or external features may be of importance to surgeons and radiologists.

Spleen is most frequently injured organ in blunt abdominal trauma. During radiological examination of the abdomen, the anomalous splenic notches and fissures can be misinterpreted as a splenic injury by the radiologist.[4] To avoid such misdiagnosis knowledge about variations in the morphology of Spleen is very important.present study shows variation of morphology of spleen and to explore the clinical importance of splenic notch and splenic fissure.

Materials & Methods

Specimen collected from routine dissection at S.M.S. Medical College, Jaipur, rajasthan for undergraduate medical students,and stored in jars containing 10% formalin. The present study was done on 118 formalin fixed Spleen from the Department of Anatomy and the organ was observed for the following parameters: a) Shape of spleen, b) Presence of notches on its superior and inferior border and c) Presence of anomalous fissure on its surfaces.

Results

We observed 118 spleens. The number of spleen showing notches on its superior border, inferior border, both the borders and absence of notch were mentioned in Table.1&Fig. 2.The number of notches present on the superior border varied from 0 to 5, while on inferior border it was not more than 2. The maximum number of notches noted on the superior border of spleen was 5 (Fig-2c). The anomalous splenic fissure was found in 8(6.77%) spleens on its diaphragmatic surface (Fig.2(e)). Among 118 spleen 76 (64.40%)are wedge shaped, 15(12.71%)are triangular,18(15.25%)are tetrahedral and 9(7.62%) are oval shaped spleens (Fig. 1 & Table no. 3).

Table 1: Incidence of variations in splenic notch and splenic fissure

S.No.	Type of variation	No. of spleen	Percentage%
1	Notches in superior border	81	68.64%
2	Notches in inferior border	12	10.16%
3	Absence of notch	14	11..86%
4	Presence of notch in both the borders	11	9.32%
5	Presence of anomalous splenic fissure in diaphragmatic surface	8	6.77%

Table 2: Variations in the notches on the borders of spleen

Borders	No. of Notches	No. of spleen	Percentage%
Superior border	0	26	22.03%
	1	58	49.15%
	2	24	20.33%
	3	4	3.38%
	4	5	4.23%
	>4	1	0.84%
	Total	118	

Inferior border	0	95	80.50%
	1	19	16.10%
	2	4	3.38%
	Total	118	
Present on both sup. & inf. borders		11	9.32%
Absent on all borders		14	11.86%

Table 3: Variations in the shape of spleen

S. No	Shape of spleen	No.of spleen	percentage
1	Wedge	76	64.40%
2	Triangular	15	12.71%
3	Tetrahedral	18	15.25%
4	Oval	9	7.62%

Fig:1 shapes of spleen ,(a)wedge shape spleen,(b) Triangular shape spleen.(c) Tetrahedral shape spleen,(d)Oval shape spleen

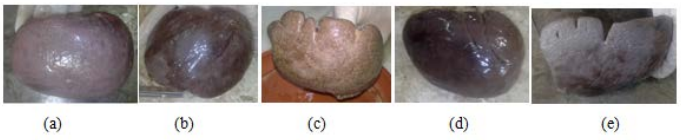

Fig:2 (a)Absence of splenic notch, (b)Notch present on both superior and inferior border, (c)Multiple notches present on superior border, (d)Splenic fissure present on diaphragmatic surface, (e)Anomalous deep notch present on superior border of spleen

Table 4: Comparison with other studies on incidence of notches in superior and inferior border

S. No	Study	Notches in superior border	Notches in inferior border	Splenic fissure
1	Das et al(2008)	98%	2%	1%
2	Prashant Nashiket Chaware et al(2012)	74.76%	24.32%	-
3	Sivanageswara Rao et al(2013)	70%	14%	1%
4	Girish V.Patil et al(2014)	95%	3.33%	-
5	R. Siva chidambaram et al(2015)	63.33%	10%	6.6%
6	Present study	68.64%	10.16%	6.77%

Discussion

The present study has noted the variation in the notch and size of spleen. Among the four different shapes, 76 (64.40%)are wedge shaped, 15(12.71%)are triangular,18(15.25%)are tetrahedral and 9(7.62%) are oval shaped spleens (Fig. 1 & Table no. 3).

The variation in the configuration of spleen is due to indentations of the organs including stomach, colon, pancreas and kidney which are in close relation to the spleen.

Various authors were previously reported the incidence of splenic notches in the superior border and inferior border. R. Siva chidambaram et al [4](2015) as 63.33% & 10% ,Das et al[7], 2008 as 98% & 2%,Prashant Nashiket Chaware et al[8],2012 as 74.76% & 24.32%, Sivanageswara Rao et al[9], 2013 as 70% & 14% and Girish V.Patil et al[11],2014 as 95% & 3.33%) of splenic notches on superior and inferior border respectively. But in the present study it was 68.64%% & 10.16% respectively (Table.3) which is similar to study of R. Siva Chidambaram et al(2015). Absence of splenic notch was noted in 14(11.86%) spleens (Fig. 2a).

Srijit Das et al[7] (2008) and Satheesha Nayak et al[11] (2012) reported 1%, R. Siva Chidambaram et al(2015) reported 6.6% incidence of anomalous splenic fissure, but in the present study we noted 6.77% incidence of anomalous splenic fissure . An anomalous splenic fissure may be due to the improper fusion of the splenic nodules during development or due to mechanical pressure by the adjacent viscera.

Kevin Paul Smidt et al[12] (1977) suggested that in splenic scintigraphy study a congenital splenic fissure can be interpreted as splenic laceration in the patient with suspected intra-abdominal trauma. To avoid such misinterpretation knowledge of splenic fissure is essential for the radiologist. Such fissures can be differentiated from the laceration by its smooth contour and sharply marginated appearance in the contrast enhanced CT study.

Spleen is an important lymphoid organ because of its role in immunological and haematological activity. Splenomegaly is commonly seen in case of malaria, infectious mononucleosis, typhoid and leukemias[6].In such conditions, the physician can palpate the splenic notches on its superior border to differentiate the splenic enlargement from other visceral mass.

Conclusion

From the present study, we suggest that the multiple splenic notches and anomalous splenic fissure is an important finding, lower in incidence in the inferior border and diaphragramatic surface respectively.

The knowledge of variation in the morphology of spleen, splenic notch and splenic fissures are important for physicians during the routine clinical examination of the abdomen, for surgeons while performing splenic transplantation and other surgical procedures and for the radiologist to differentiate it from the splenic injury. This knowledge is very important for the anatomists during their routine classroom dissections

An extensive review of literature shows that the congenital splenic fissure is an abnormality which is a cause of splenic scan abnormality due to its asymptomatic presentation.

References

1. Standring, S. Gray's Anatomy. The Anatomical Basis of Clinical Practice. New York, Elsevier Churchill Livingstone, 2005.1239-44.
2. Hollinshead WH. Anatomy for Surgeons. 3rd ed. vol-2. New York: Harper and Row, 1982; 436-45.
3. Sadler, T. W. Langman's Medical Embryology. Baltimore, Lippincott Williams & Wilkins, 2000.277.
4. R. Siva Chidambaram, Soorya Sridhar. ``Morphological Variations of Spleen: A Cadaveric Study" Journal of Evidence based Medicine and Healthcare; Volume 2, Issue 29, July20, 2015; Page:4248-4254.
5. Yildiz A E, Ariyurek M O, and Karcaaltincaba M. Splenic Anomalies of Shape, Size, and Location: Pictorial Essay: Hindawi Publishing Corporation The ScientificWorld Journal Vol. 2013, Article ID 321810, 1-9.
6. WeinrebN. J, RosenbloomB. E.Splenomegaly, hypersplenism, and hereditary disorders with splenomegaly: Open Journal of Genetics; 3 (2013), 24-43.
7. Das S, Abd Latiff A, Suhaimi FH, Ghazalli H, Othman F. Anomalous splenic notches: A cadaveric study with clinical implications. Bratisl Lek Listy 2008; 109:513-6.
8. Chaware P N, Belsare S M, Kulkarni Y R, Pandit S V, Ughade J M.The Morphological Variations of the Human Spleen, Journal of Clinical and Diagnostic Research. 2012 April, Vol-6(2): 159-162.
9. Sivanageswara Rao Sundara Setty & Raja Sekhar Katikireddi Int J Biol Med Res. 2013; 4(3): 3464-3468.
10. Girish v. Patil, Shishirkumar, Apoorva D, Thejeswari, Javed sharif, C. Sheshgiri & Sushanth, N. K. Study of splenic notches in a human cadaver, International Journal of Recent Advances in Multidisciplinary Research.2014; 1(2): p.001-003.
11. Satheesha Nayak B, Vasanth kumar, Naveen kumar, Raghu jetti. Unusual fissure on the diaphragmatic

surface of the spleen – a case report; Int J. Anat Var (IJAV).2012;5: 96-98.

12. Kevin Paul Smidth,M.B, Splenic scintigraphy: A Large congenital fissure mimicking splenic hematoma. Radiology 122(1);169, Jan. 1977.
13. Judy L.Freeman, S. Zafar H.Jafri, John L.Roberts, Duane G.Mezwa, Ali Shirkhoba. CT of congenital and acquired abnormalities of the spleen: Radiographics 1993; 13(3): 597-610.
14. Alex L , George A, Xavier B, Jacob P, Rani K D, Vijaya Lakshmi G Morphological Variations of Human Spleen in Different Age Groups, International Journal of Healthcare Sciences ISSN 2348-5728 (Online) Vol. 3, Issue 1, pp: (122-129).