Sonographic Evaluation of The Spleen

Thesis

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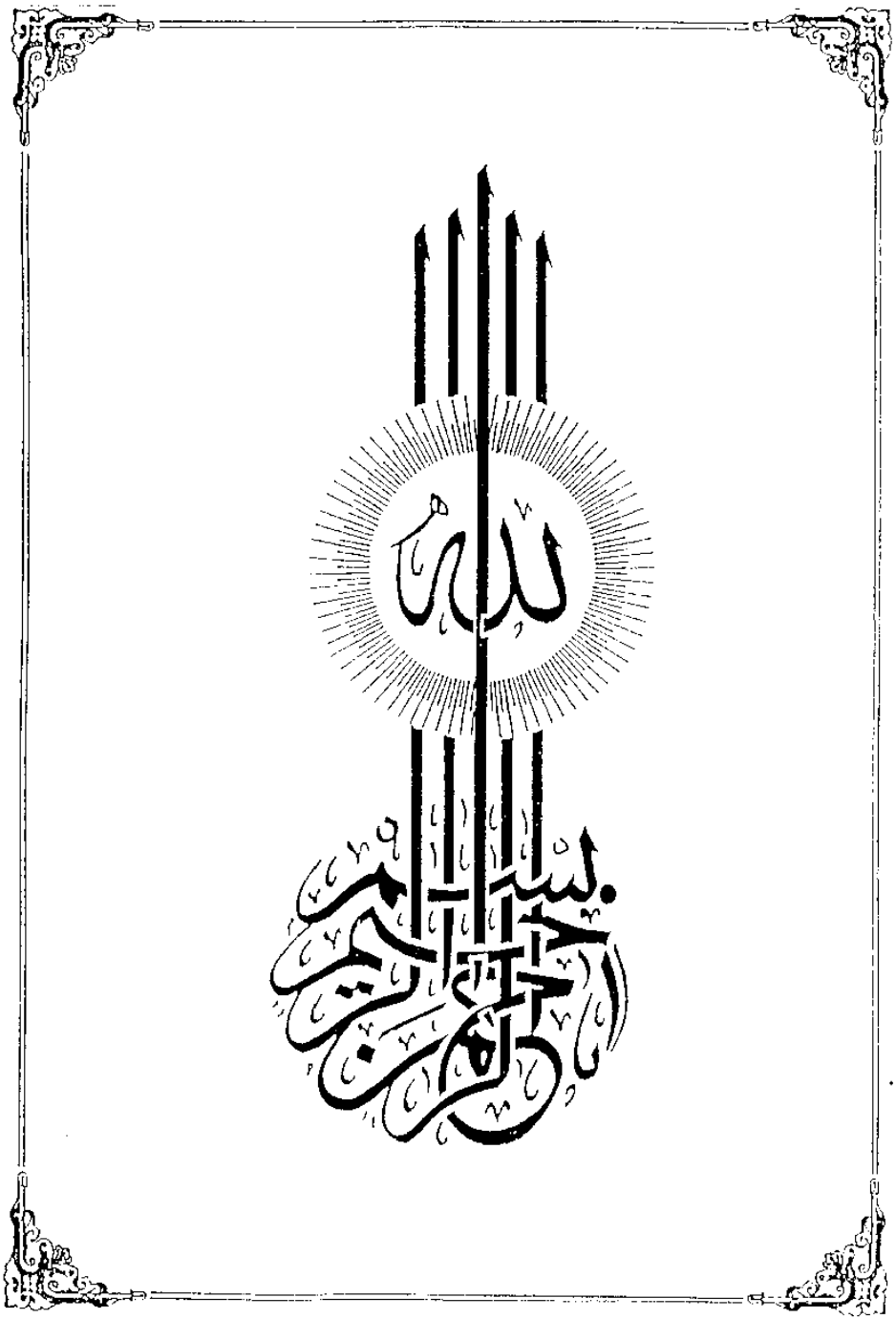

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The spleen, as a part of the reticulo-endothelial system, has a definite and important contribution in the defence mechanism of the body and is partly implicated in some metabolic processes.

Besides, it plays a role in relation to erythrocytic formation, destruction and filtration of the damaged, aged R.B.C_s as well acting as a reservoir. It also participates in immune response in the body.

Meanwhile, the spleen can be and frequently is removed without ill-effects.

The spleen is frequently affected by many disease processes whether local or systemic and unfortunately its clinical evaluation is still unsatisfactory and in good number of cases, inaccurate.

This is partly due to the fact that the spleen is rather inaccessible to palpation unless it is significantly enlarged.

The fact that disease processes of the spleen are in many ways incompletely discernible, reflects the multiplicity of measures available for its evaluation other than the clinical examination.

These, include plain radiography, computed tomography, radio nuclear studies and vascular contrast examination.

Although, these measures play an essential part in the evaluation of the spleen and its function, yet they are in many ways inconclusive.

The advent of ultrasonography has greatly contributed to and facilitated the understanding of many splenic affections.

Being an intra abdominal organ, it became rather accessible for sonographic study which made possible the demonstration of morphologic changes associated with the different diseases which affect the spleen.

Besides, liver examination is possible at the same time as well as other intra-abdominal organs, thus facilitating the arrival to a proper diagnosis. Again, its size can be accurately assessed.

The progress made in ultrasound machines largely facilitated and overcame the inherent limitations of the process.

It is harmeless and non-invasive but needs marked experience. Ultrasound images are only pictures of internal anatomy and the purpose of ultrasound examination is to detect alterations in this anatomy which reflects the presence of underlying disease.

This fascinating role in medical diagnosis cann't be overemphasized.

The aim of this study is to emphasize the diagnostic capabilities of ultrasonography of the spleen in the different disease processes which may eventually help in solving many medical problems.

Besides, the description of the appearances as seen in ultrasound images will be attempted in an endeavour to correlate with the disease processes.

Normal Sonographic Appearance of the Spleen

Normal Sonographic Appearance of the Spleen

Gross Anatomy and Relations of the Spleen

The spleen is an unpaired organ located intraperitoneally in the left upper quadrant of the abdomen between diaphragm stomach and the left kidney.

It has a relatively convex surface blending with the thoraco-abdominal wall and pointing laterally and cranially.

This surface is in contact with the diaphragm and its cranial part is covered by the left lung.

It also has an irregular visceral surface which is concave or rectilinear pointing medially and caudally. Although the medial aspect of this surface may be minimally convex, it is never frankly convex. This is an important feature in the differentiation of some left upper quadrant tumours of large volume.

However, Frank concavity of the medial border of the spleen is not abnormal.

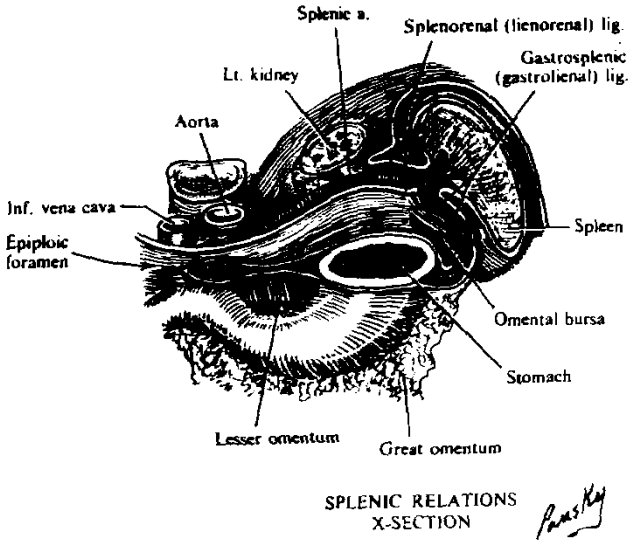


Fig (1) Shows splenic relation

(Quoted from Pansky P. 1984)

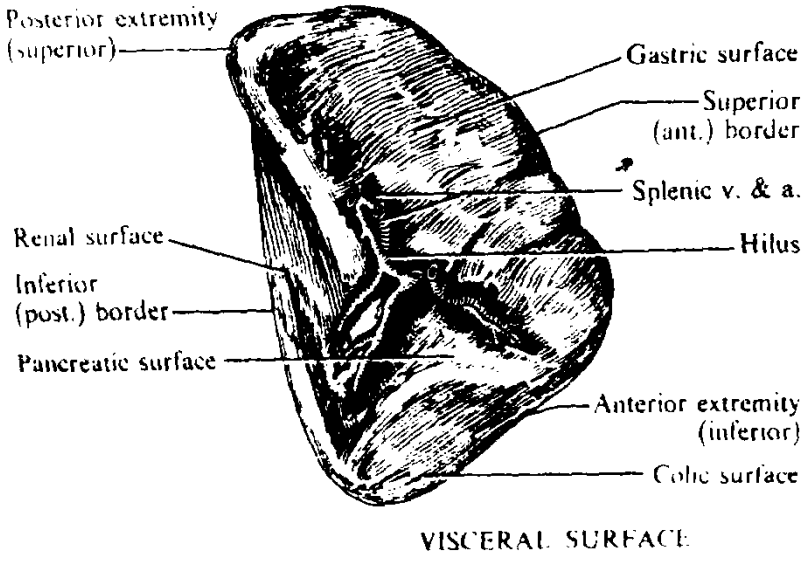


Fig (2) Shows relation to the visceral surface of the spleen

(Quoted from Pansky P. 1984).

An irregular depression is seen at the centre of this surface (Hilum), where the splenic artery and vein enter.

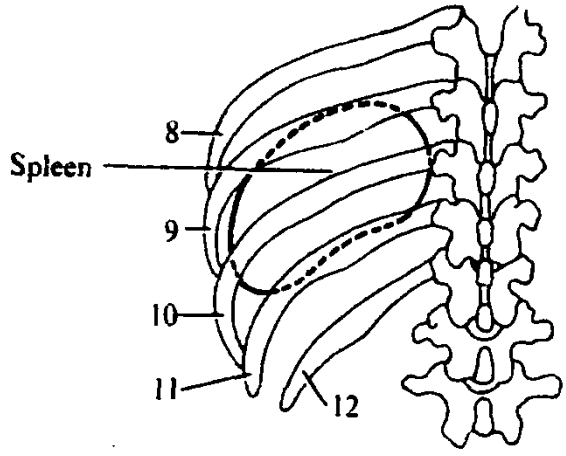
The visceral surface is in contact with the stomach anteriorly and cranially and the colon anteriorly and caudally while posterolaterally, it is related to the left kidney as shown in figure (1)& figure (2).

The Hilum of the spleen is close to the tail of the pancreas. **(Holm, H.H, Kristensen, J.K. et al, 1971)**

The spleen weighs approximately 150 gm and it measures on the average (12x7x4 cm) in its (Longitudinal, transverse, thickness) diameter and has the same size of a clenched fist.

It is related to the posterior parts of 9^{th}, 10^{th}, 11^{th} ribs. Rarely, wandering spleen (0.2 % of cases) due to laxity of its ligamentous attachments, may lie in the middle abdomen or left lower quadrant instead of its normal position **(Cooperberg et al, 1980).** as in figure (3)

The anterior border of the spleen usually reaches to the level of the midaxillary line.



RELATION TO RIBS
POSTERIOR VIEW

Fig (3) Shows relation of the spleen to the posterior parts of 9^{th},10^{th}, 11^{th} ribs

(Quoted from Pansky P. 1984).

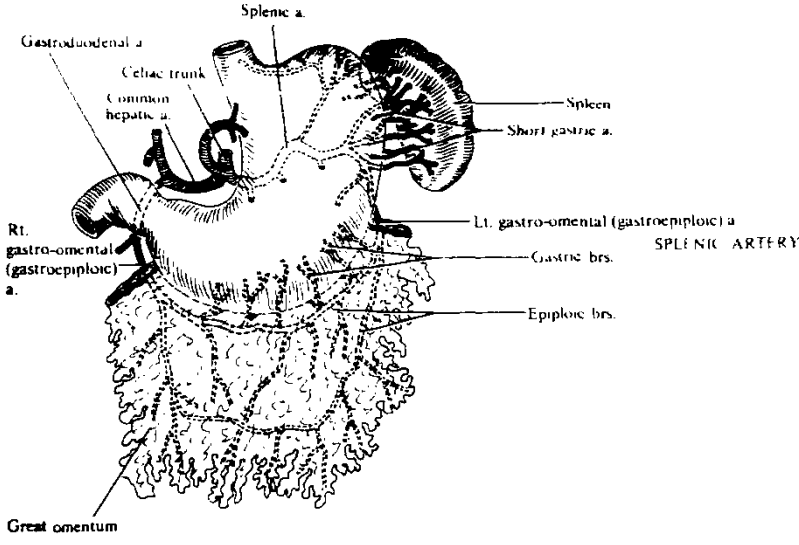


Fig (4) Shows blood supply of the spleen.

(Quoted from Pansky P. 1984).

Blood supply of the spleen :

The splenic artery represents the main arterial supply of the spleen. It is a branch of coeliac artery which arises from the anterior aspect of the aorta at the level of 12th thoracic spine. It is a large tortuous artery which runs along the superior border of the pancreas and before it reaches the spleen, it divides in the lienorenal ligament into five or more branches which enter the hilum and ramify throughout the splenic pulp to from arterioles, sinusoides and venules. as shown in figure (4)

The splenic vein which emerges from the hilum is not tortuous like the artery, it commences from 5 or 6 tributaries which return the blood from the spleen. These unit to form splenic vein.

The splenic vein passes to the right with a downwards inclination, across the posterior abdominal wall lying at a lower level than the splenic artery and grooving the upper part of posterior surface of body of pancreas. In its course it crosses the anterior surface of the left kidney and its hilar structures. It is separated from the left sympathetic trunk and crus of the diaphragm by the left renal vessels and from abdominal aorta by the superior mesenteric artery and left renal vein. It ends behind the neck of the pancreas

where it unites at a right angle with the superior mesenteric vein to form the portal vein. It drains the short gastric veins,left gastro-epiploic vein, pancreatic vein and inferior mesenteric vein.

The spleen has a complicated structure with a thin glistening connective tissue capsule with elastic fibers and little smooth muscle without contractile function. The spleen consists of connective tissue framework, vascular channels lymphatic, tissues, lymph drainage channels and cellular components of haemopoietic and reticulo-endothelial systems.

Histologically there are two main components :

a - The Red pulp. b - The white pulp.

The red pulp consists of sinuses and pulp cords, the sinuses (20-40μm) in diameter are lined by endothelial macrophages. The white pulp consists of peri-arteriolar lymphoid sheath and the adjoining follicles (Malpighian bodies), which contain a germinal centre and are structurally similar to lymphoid follicles. The outer capsule of connective tissue framework consists of collagen tissue with elastic fiber covered by serous endothelium, from this come off a large number of lace-like trabeculae which extend into the pulp carrying blood vessels and