
SPLEEN

I. INTRODUCTION

The spleen, the largest of the lymphoid organs, is situated in the left hypochondrium. Although, it is not part of the alimentary tract it drains to the portal venous system. It constitutes a blood container that has a major role in haematopoiesis and immunity.

II. DESCRIPTIVE ANATOMY

A- SITUATION

The spleen lies under the diaphragm between the ninth and eleventh ribs on the left side of the abdomen at the left margin of the lesser sac.

Being developed in the dorsal mesogastrium, the spleen projects into the greater sac surrounded by peritoneum of the original left leaf of the dorsal mesogastrium. Its hilum lies in the angle between the stomach and left kidney. Its long axis lies along the line of the tenth rib, and its lower pole does not normally project any further forward than the midaxillary line. (Figure 1)

If the spleen enlarges, its long axis extends down and forwards along the tenth rib in the direction of the umbilicus, and its anterior border approaches the costal margin to the left of the greater curvature of the stomach. A kidney enlarging downwards does so in the direction of the iliac fossa.

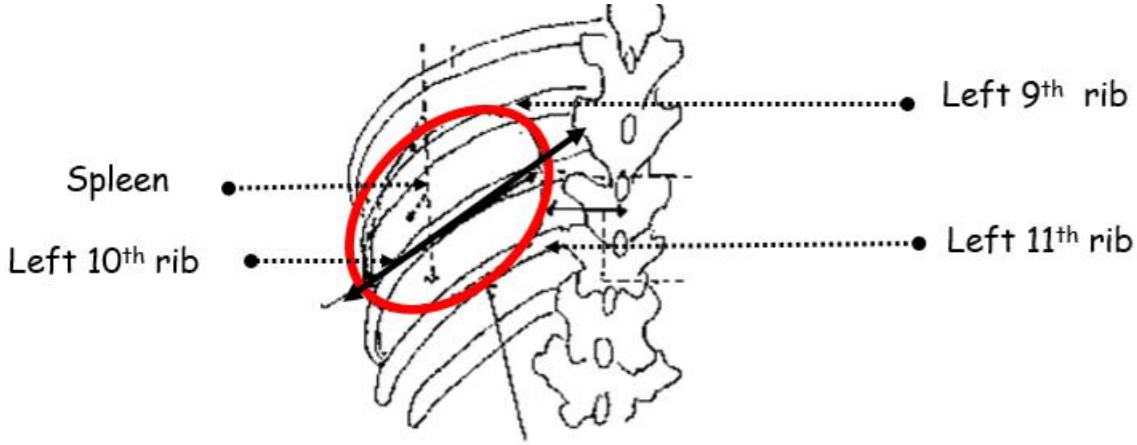

Figure 1: Schematic view showing the projection of the spleen on the thoracic wall

B- DIMENSIONS

The spleen is twelve centimetres long, seven centimetres wide and four centimetres thick. It weighs seventeen grams in the child and two hundred grams in the adult. Its weight decreases in the elderly. The measurements quoted are average; the size of the spleen varies considerably.

The spleen must at least double its normal size before its anterior border passes beyond the left costal margin. A palpable spleen is identified by the notch in its anterior border. In some diseases the spleen is grossly enlarged and may extend across the upper abdomen to far beyond the umbilicus. Whatever the degree of enlargement, the spleen glides in contact with the diaphragm and anterior abdominal wall in front of the splenic flexure, which remains anchored to the lower pole of the left kidney, and no colonic resonance is found on percussion over the organ.

Retroperitoneal tumours, such as the left kidney, do not displace the overlying colon and they are crossed by a band of colonic resonance, a further diagnostic point.

C- SHAPE

The spleen is prismatic in shape and contains two faces, two borders and two ends. (Figure 2)

Its diaphragmatic surface is moulded into a reciprocal convexity of the diaphragm.

Its visceral surface contains the hilum and is in contact with the stomach, the left kidney, and the left colic flexure, each of which, impresses a concavity alongside the attached splenic vessels.

Its long axis is rather anteroposterior alongside the tenth rib and, thus, defines the upper and lower borders and the anterior and posterior ends of the spleen.

To identify the surfaces of the detached spleen, hold the convexity of the organ, its diaphragmatic surface, in the hollow of the left hand. Rotate it until the notched anterior border lies to the front, near the thumb. The concavity behind the notched anterior border is the gastric impression; it leads back to the low prominence of the hilum. Behind the hilum is the concave renal surface, while at the lower pole, at the tip of the little finger of the left hand, is the small colic impression.

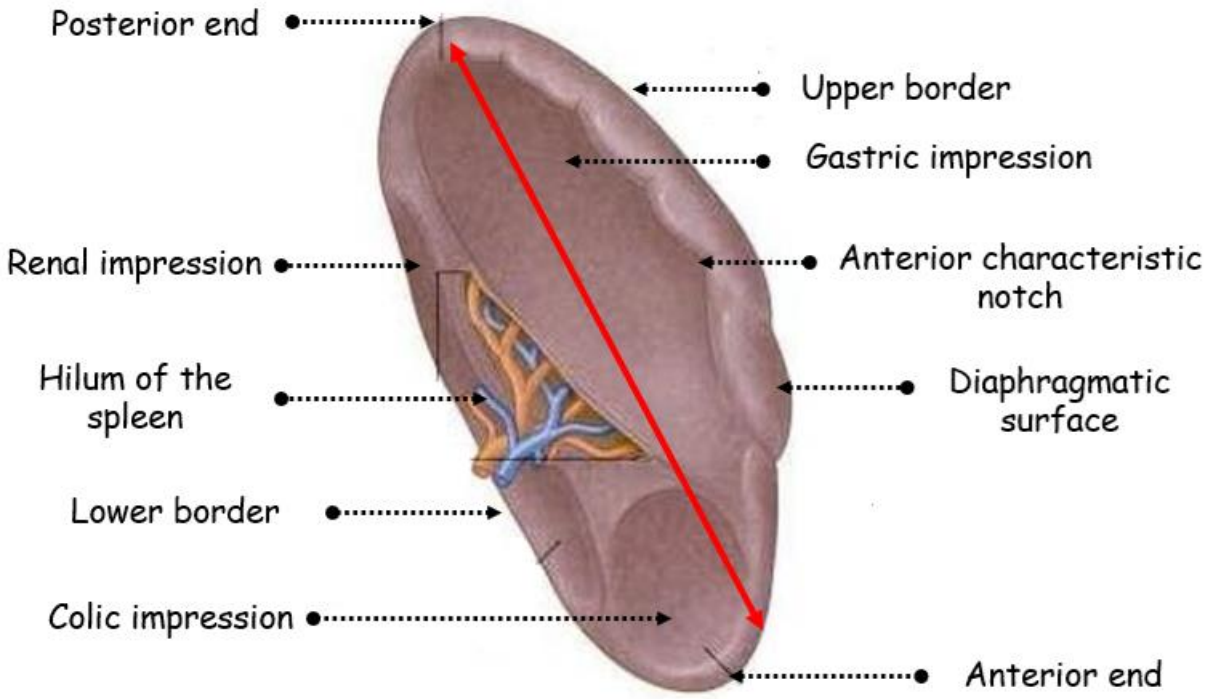

Figure 2: Anterior view of the spleen

III. STRUCTURE

The lymphoid follicles of the spleen which collectively form its white pulp are scattered among the sinusoids or red pulp. The splenic follicles have a unique identifying feature: an arteriole courses through them, near but not through their germinal centres. Of course, in random histological sections not every follicle will be cut in a plane that displays the arteriole, but when seen it is pathognomonic of spleen, which also has a thick connective tissue capsule with trabeculae extending inwards from it below the serous coat. T cells are found in the immediate periarteriolar region of the follicle, with B cells in the germinal centre and other parts.

IV. SUPPORTS

Its visceral peritoneum, or serous coat, invests all surfaces, gastric, diaphragmatic, colic and renal, and at the hilum comes into contact with the right leaf of the greater omentum. (Figure 3)

The two leaves of the greater omentum, now in contact, pass from the hilum forwards to the greater curvature of the stomach, the gastrosplenic ligament, and backwards to the front of the left kidney, the lienorenal ligament. The peritoneal attachment at the hilum of the spleen extends down towards the lower pole, and this attachment makes a ridge in the greater omentum. This attachment can easily be torn, accidentally, during splenectomy. The hilum of the spleen makes contact with the tail of the pancreas, which lies within the lienorenal ligament.

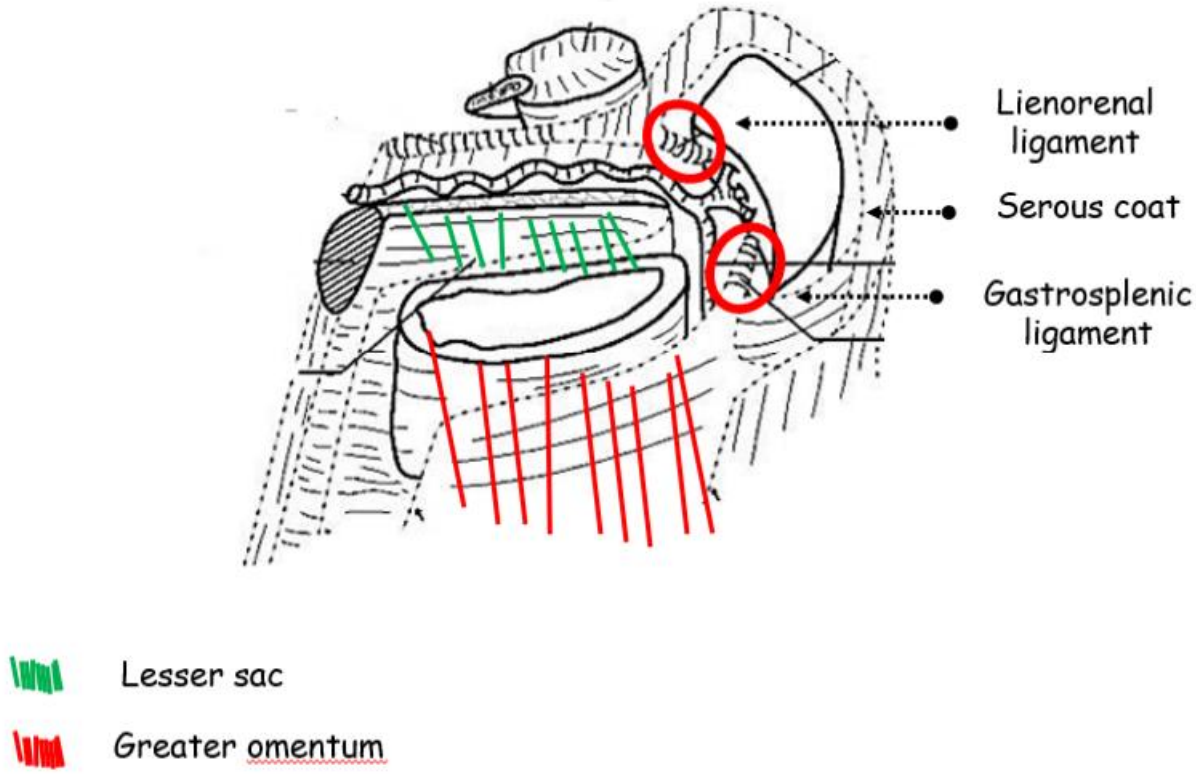

Figure 3: Anterior view of the left part of the supracolic compartment showing the supports of the spleen

V. ANATOMICAL RELATIONS

A- DIAPHRAGMATIC SURFACE

The diaphragmatic surface of the spleen is covered by the diaphragm. Through the latter, it is overlied by the left pleura and lung and the ninth to eleventh ribs. This surface of the liver can be damaged during thoracic trauma.

B- VISCERAL SURFACE

Its visceral surface is segmented into three small concave surfaces by a horizontal fissure ending in a delta at the bottom, the hilum, where the visceral peritoneum reflects and the spleen receives the splenic vessels and nerves.

The gastric surface is the impression of the fundus of stomach, it is suprahilar and is attached to the greater curvature of stomach by the gastrosplenic ligament.

The renal impression is infrahilar and posterior and is attached to the anterior surface of the kidney by the lienorenal ligament.

The colic impression is infrahilar and anterior and is attached through the colic flexure to the diaphragm by the phrenicocolic ligament.

C- UPPER BORDER

Its upper border is recognised by its notch below the anterior abdominal wall of the left hypochondrium and separates the diaphragmatic surface from the gastric impression.

D- LOWER BORDER

Its lower border separates the diaphragmatic surface from the renal impression between the diaphragm and the upper part of the lateral border of the left kidney.

E- ANTERIOR END

It is spread out and rather lateral and coincides with the colic impression.

F- POSTERIOR END

It is rounded and stands in the level of T12 vertebra.

G- ON THE SURFACE

The spleen projects towards the midclavicular and midaxillary lines sagittally and the ninth and eleventh ribs transversally.

VI. BLOOD SUPPLY; LYMPH DRAINAGE AND NERVE SUPPLY

A- ARTERIES

The spleen is supplied by a a five millimetres thick tortuous artery, the splenic or lienal artery. (Figure 4)

The splenic artery is the left terminal branch of the celiac trunk. It may arise, exceptionally, from the aorta of the superior mesenteric artery.

It passes inside the retropancreatic fascia of Treitz alongside the upper border of the pancreas behind the body and then in front of the tail between the two layers of the lienorenal ligament and ends two centimetres from the hilum dividing in a T-shaped or Y-shaped manner.

Usually, further branching gives rise to four segments, perhaps only two or three; intersegmental vessels are small and scanty.

The splenic artery gives rise to pancreatic arteries supplying the body and tail and anastomosing with the circles of the head, short gastric arteries and the left gastroepiploic artery participating to the arterial circle of the greater curvature.

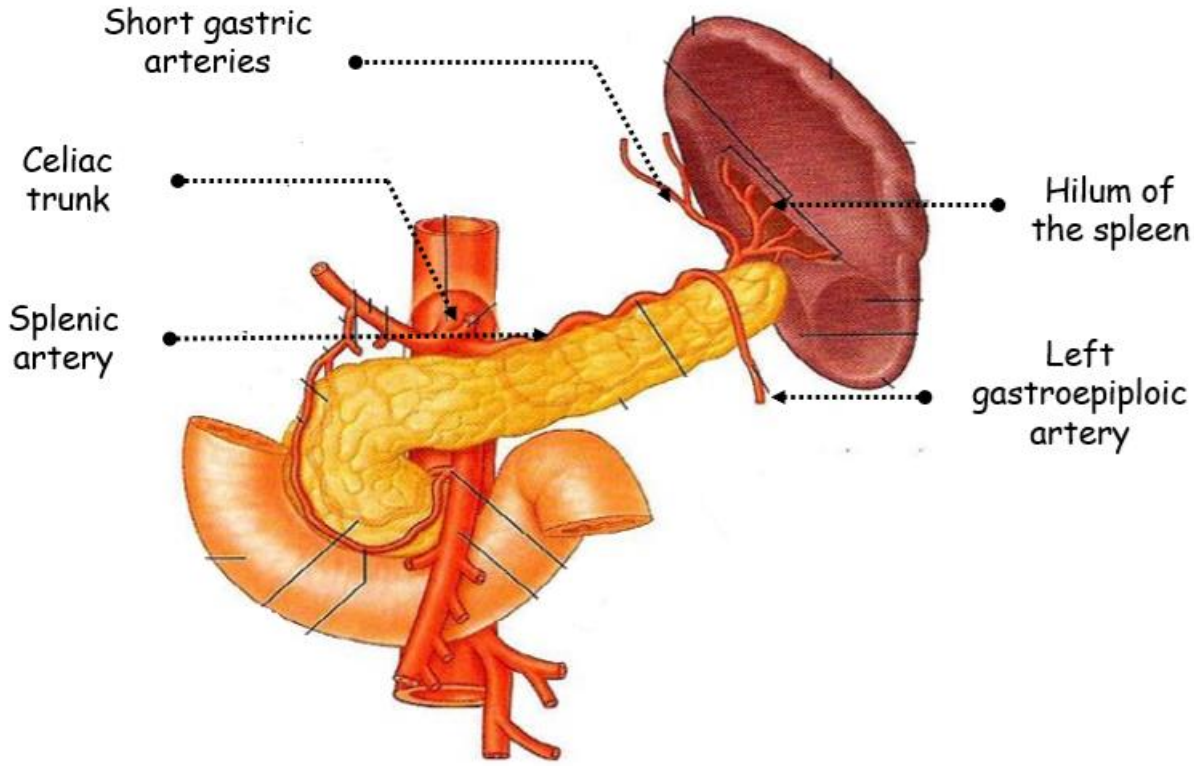

Figure 4: Anterior view of the duodenum and pancreas showing the arteries of spleen

B- VEINS

The veins of the spleen drain the sinusoids of the red pulp, accompany the arteries and unite to form the splenic vein. The splenic vein flows into the portal vein beneath the lower border of the splenic artery, first, in front of the tail of the pancreas, then, behind the body and inside the

retropancreatic fascia, afterwards, over and in front of the left renal vein and the origin of the superior mesenteric artery. It ends within the superior mesenteric vein at an angle of seventy-five to one hundred thirty degrees. At this point, its diameter reaches ten millimetres.

The splenic vein drains the short gastric veins, the left gastroepiploic vein, the pancreatic veins and the inferior mesenteric vein.

C- LYMPH DRAINAGE

Lymph drains into several nodes lying at the hilum and thence, by way of the retropancreatic nodes, to the coeliac nodes.

D- NERVES

The spleen is supplied from the coeliac plexus with sympathetic fibres only.

VII. SURGICAL APPROACH

Removal of the spleen, known as splenectomy, essentially involves cutting its two pedicles, the lienorenal and gastrosplenic ligaments. In an emergency after rupture with haemorrhage, the left or posterior layer of the lienorenal ligament is incised and the spleen turned medially so that the splenic vessels can be dissected away from the tail of the pancreas and ligated, arteries before veins. The short gastric vessels and the gastrosplenic ligament are then

divided and removal completed. For an elective procedure it is usual to enter the lesser sac by dividing the gastrosplenic ligament and its vessels and then to deal with the splenic vessels and the lienorenal ligament. The stomach must not be perforated when ligating the short gastric vessels and damage to the tail of the pancreas and splenic flexure of the colon must be avoided.

VIII. CONCLUSION

The spleen is a left recess of the portal veinous drainage. Its implications in clinical medicine are numerous. It may concern the obstruction of the portal drainage behind splenomegaly and dilatation of portosystemic anastomoses. It has, also, a major immunological function that requires the use of prophylactic means against infections after splenectomy. Moreover, as a haematopoietic factory, the spleen may be concerned by some abnormalities of haematopoiesis responsible for anaemia.