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MORPHOLOGICAL VARIATION OF THE SPLEEN – A CASE REPORT

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ABSTRACT

Rare anatomical variations of the spleen were noted in a 65 years male cadaver, during a routine dissection class for Post Graduate Scholars. The variations were found in dimensions of the spleen & segmental or terminal branches of splenic artery in cadaver. The spleen lies deep in the left hypochondrium, wedge obliquely between the diaphragm, stomach & left kidney. The clinical correlation & differential diagnosis of the same are discussed.

KEYWORDS: The Spleen, Variation, Hyposplenia, Polar artery, Segmental artery.

INTRODUCTION

The spleen is a lymphatic organ part of blood vascular system. Its shape is wedge, soft & highly vascular organ. Its located mostly in left hypochondriac region. The small spleen is a rare morphological variation. It may be indicated as functional hyposplenia or asplenia. The small spleen also seen in pathological condition of trauma. According to physiological aspect as the human body ages, the spleen size decreases.[1]

The blood supply to spleen is made by a splenic artery which is the largest branch of the celiac trunk and its course is among the most tortuous in the body. It courses superior and anterior to the splenic vein, along the superior edge of the pancreas. Near the splenic hilum, the artery usually divides into superior and inferior terminal (IT) branches, and each branch

further divides into four to six segmental intrasplenic branches. The splenic artery lies anterior to the left kidney and left suprarenal gland and runs in the lienorenal ligament posterior to the tail of pancreas. It divides into two or three terminal branches before entering the hilum of spleen. These terminal branches are named as the superior, middle, and the inferior primary or lobar branches. The splenic artery was not found to be tortuous in foetuses, new-borns, and young children. The branches of splenic artery entering into the spleen through poles of the spleen are called polar arteries, i.e., superior and inferior polar artery.

Table no. (I): Average Spleen length in Men[8] (As per Age).

Age	Length
31 to 40 yrs	4.7 inch (12.1 cm)
41 to 50 yrs	5.3 inch (13.4 cm)
60 to 70 yrs	4.5 inch (11.5 cm)
71 to 80 yrs	4.4 inch (11.2 cm)
81 to 88 yrs	4.6 inch (11.7 cm)

*cm= centimetre.

Table no. (II): Comparative Dimensions of Spleen with small spleen.

Dimensions	Normal Spleen	Present Case
Length	14 cm	08 cm
Breadth	09 cm	05 cm
Thickness	02 cm	02 cm
Weight	150gm	120gm

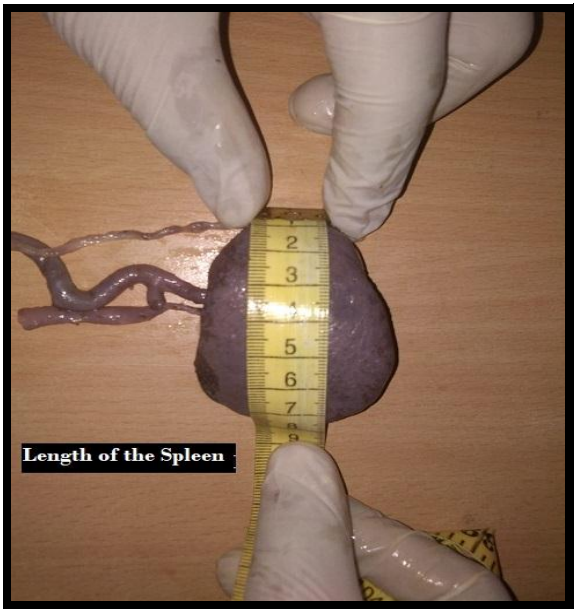

Figure (a): Length of the spleen.

Figure (b): Breadth of the spleen.

Procedure

Following the Cunningham's Manual of Dissection, the abdomen was opened & the anterior abdominal wall was reflected. As we pull the upper part of the greater curvature of the stomach to the right and exposed the spleen deep in the left hypochondrium.[3] Other than the hilus, spleen is covered by peritoneum.[3] After exposing the hilus of the spleen, it dissected from the origin of splenic artery (i.e. from the coeliac trunk) & carefully dissected splenic artery with its branches in supra-colic compartment of abdominal cavity. Photographs of the same were taken & documented than the specimen was preserved in the departmental museum.[1]

CASE REPORT

During the routine post graduate dissection of abdominal region of a 65-year male cadaver at Parul institute Of Ayurveda, Vadodara, Gujarat. A small spleen with its primary branching pattern was found. Morphological features of this spleen & variations of branching pattern of splenic artery were studied and appropriate measurement of length, breadth, thickness was noted with photographs.

DISCUSSION

The Spleen is highly vascular lymphoid organ. It consists of a large encapsulated mass of lymphoid tissue situated in upper left quadrant of abdominal cavity between the fundus of the stomach and diaphragm.[4] It also attached with posterior wall of stomach & connected to the greater curvature by the gastrosplenic ligament & the to the left kidney by the splenorenal ligament. Embryologically the spleen appears at the sixth week of embryonic life as a localized thickening of the coelomic epithelium of the dorsal mesogastrium near its cranial end. The proliferating cells invade the underlying angiogenicmesenchyme, which becomes condensed and vascularized. The process occurs simultaneously in several adjoining areas, which soon fuse to form a lobulated spleen. In later period of embryonic life, earlier lobulated character disappears but indicated by the presence of the notches on its upper border of adult human being.[10]

Normally, the size healthy spleen found vary in every human body. The factors are affecting the size of spleen are sex, height according to physiological conditions. The normal range of spleen size 5 inches long, 3-inch-wide, 1.5-inch-thick & weight is about 7 ounces (i.e. approx. 150 – 170gms) Also according to gender comparison, women mostly have smaller

spleen than man. Even though small studies had previously suggested that taller and larger people had larger spleens.[9]

The spleen has many developmental or congenital anomalies, which are complete agenesis, polysplenia or multiple spleens, splenunculi, splenomegaly or enlargement of the spleen. The small size of the spleen is indicated as physiological anomaly as it has not any other abnormal masses around it and also there is not any displacement in abdominal cavity.[6]

Variation of arterial anatomy is very common and occurs in nearly half of the population. In some cases, the splenic artery itself or its primary branch gives an artery which does not pierce directly to the hilum, but goes to each one of the poles of the spleen. It can be named as the superior or the inferior polar branch according to location. These branches supply a particular part (pole) of the spleen which is separated by an avascular area. These branches divide the spleen into definite arterial segments.[2] There is high prevalence of variations in the origin, course and branching pattern of the splenic artery. Each splenic artery has its own peculiar pattern of terminal branches (Pandey et al., 2004) trunk. Anatomical variations of the splenic artery are due to aberrations in its embryological development (Hamilton and Mossman, 1976) The incidence of the presence of a superior polar artery has been reported to be 65% (Michels, 1942), 51% (Sahni et al., 2003) and 31.3% (Ignjatovic et al., 2005). A study by Trubel et al. in 1988 describes the incidence of superior polar artery as 48.4%. However, a superior polar artery with no branches to the stomach other than spleen, as seen in the present case, has an incidence of 3.27%. The average extracapsular length of the superior polar artery in the said study was 3.9 cm, as opposed to 10 cm in the present case.

The origin of the superior polar artery has been reported to be about 4-5 cm proximal to the splenic hilum by Sahni et al. (2003). The present case shows a more distal origin of the superior polar artery (6.4 cm from splenic hilum), which is of fundamental importance to surgeons.

There are two primary branches of splenic artery noted in this presented case which are bifurcated from splenic artery named as superior polar artery direct supply to superior pole and another one is inferior polar artery supply to inferior pole of the spleen.

The present case was noted the reduced size of spleen in length as well as in breadth, also we observed decreased in weight. The thickness & location were normal. The change in

dimensions were considered as physiological anomaly as cause of death in natural as per the death certificate & not any history of chronic illness.[6]

The different branching patterns of splenic artery should be taken into consideration by the surgeon during surgery of the splenic pedicle, or else there is a possibility of dangerous bleeding if damaged (Madoff et al., 2005).

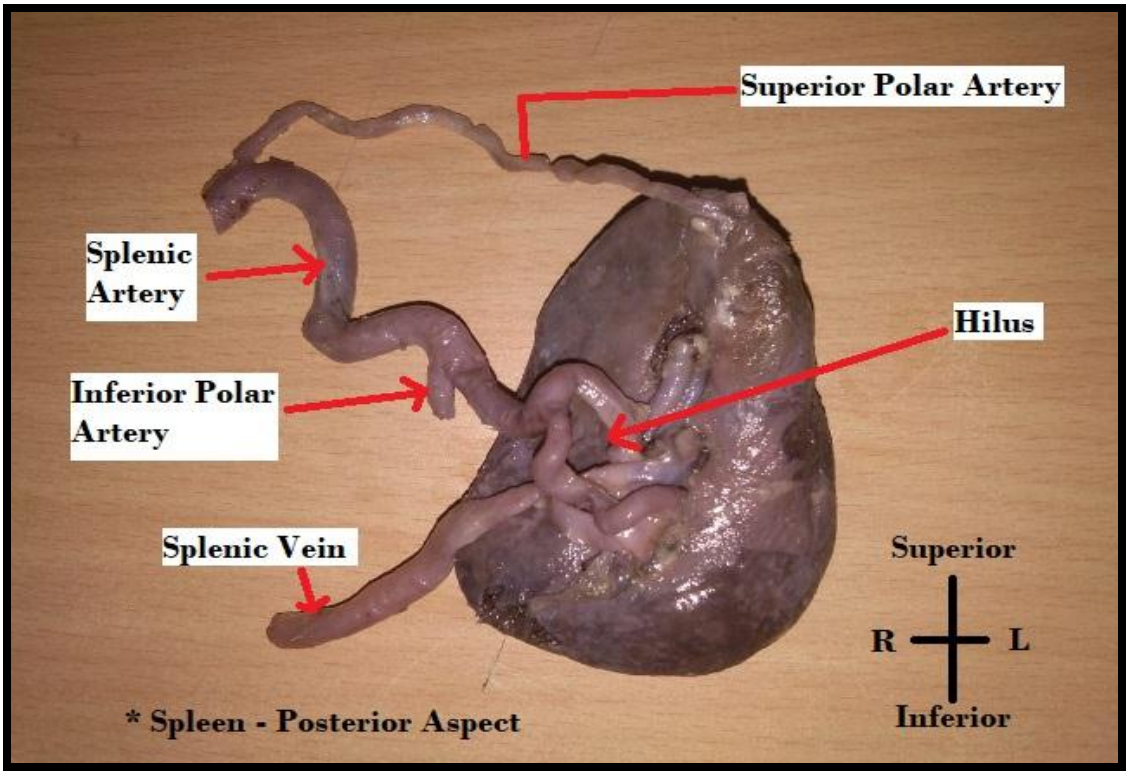

Figure (c): Primary branches of Splenic Artery (i) Superior Polar Artery (ii) Inferior Polar Artery(cut) which are directly bifurcated from Splenic artery & pierce into each pole of the spleen.

CONCLUSION

The size of normal spleen is found to be with length of 14 cm, breadth- 09cm, thickness-02cm, weight -150gm. Comparison to the one found during dissection class of PG scholars had distinct dimensions of length-08cm, breadth-05cm, thickness-02cm, weight-120gm which make it unusually small in size without any abnormal shape & features. This knowledge of the size of spleen with their normal & abnormal dimensions is of importance to haematologist, surgeons during any surgery related to spleen & also clinician to distinguish the physiological or pathological symptoms regarding the size of spleen in radiological anatomy. The knowledge of Hyposplenia is important in treatment & in management of the

patients with haematological disorders. Even this acquired knowledge of spleen size is important to radiologist for correction of interpretational errors in diagnostic imaging. Knowledge of spleen size & its variation in anatomy is important for students during cadaveric dissection, also for the academicians to follow this unusual variation about spleen. Effects of physiologic changes on spleen size have been acknowledged. Heavy exercise causes an acute reduction of spleen volume by approximately one-fifth, presumably at least in part an effect of "autotransfusion".[5]

Precise knowledge polar arteries are very important because now a days, during surgery, surgeons try to remove only affected tissue. Findings reported by various studies will be helpful to surgeons while performing surgical procedures on spleen. Knowledge of variational anatomy of the splenic artery and its branching pattern is really essential to the Surgeon in laparoscopic abdominal surgeries, radiological diagnostics, Splenectomy, resection of tumours & cyst. Prior knowledge of the presence of such a variation can contribute to avoiding iatrogenic injuries and inadvertent complications during splenic surgery.

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