

Anomalous Formation Of The Portal Vein And Its Clinical Relevance: A Case Report

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Abstract: The portal vein is normally formed by union of the splenic and superior mesenteric veins, around the level of L2, anterior to the inferior vena cava and posterior to the pancreas. Variations of its formation were previously reported in literatures. Knowledge of variations regarding the formation, termination of tributaries of portal vein are very useful and important for surgeons performing surgeries on pancreas and duodenum, for liver surgeries and interventional procedures. Here we present a rare variation in the formation of the portal vein as found during the cadaveric dissections. The portal vein was formed by the union of splenic vein, superior mesenteric vein and inferior mesenteric veins. Identification of these variations is useful in managing traumatic rupture of the mesentery.

Keywords: Portal vein, Superior mesenteric vein, Inferior mesenteric vein, splenic vein

I. INTRODUCTION

The portal vein (PV) is the largest intra-abdominal vein located in the right upper quadrant of the abdomen. Anatomic variations of the portal vein (PV) are relatively common. Portal vein is formed by union of superior mesenteric vein and splenic veins behind the neck of pancreas and in front of inferior vena cava. It lies at the level of L2 vertebra. From its formation the trunk of portal vein passes upward and slightly to the right behind the neck of pancreas and first part of duodenum. It then enters the free margin of lesser omentum and reaches porta hepatis to divide and distribute branches to liver. It drains blood from the abdominal part of alimentary tract except the lower part of rectum and anal canal. Knowledge of variations regarding the formation, termination of tributaries of portal vein are very useful for surgeons performing surgeries on pancreas and duodenum. It is also benefit for radiologist performing catheter based interventions.

II. CASE REPORT

During routine dissection of abdomen, in the Department of Anatomy, GMCH, Chandigarh, we found an adult male

cadaver showed a variation in the formation of the portal vein. The superior mesenteric vein, the splenic vein, inferior mesenteric vein and formation of portal vein of the cadaver was exposed during routine dissection. The variations in the formation of portal vein, termination of IMV, jejunal veins, colic veins were noted and photographs were taken accordingly. The diameter and length of portal vein, from the beginning to the point before it bifurcated into right and left branches were measured by using sliding vernier caliper with an accuracy of 0.001 mm and recorded.

III. RESULTS AND OBSERVATION

The formative tributaries of portal vein were superior mesenteric vein, splenic vein and inferior mesenteric vein. Moreover, colic veins were seen terminating into superior mesenteric vein before the formation of portal vein. (Figure 1,2). The diameter and length of the portal vein were measured as 1.8cm and 6.50 respectively.

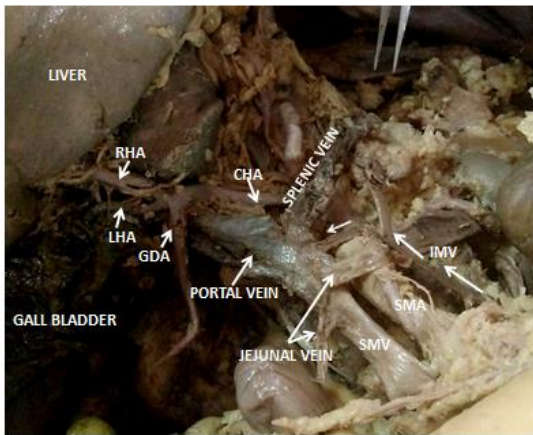


Figure 1: The portal vein (Type II) was formed by union of the superior mesenteric and splenic veins, and the inferior mesenteric vein (IMV) emptied in the angle of the junction of SMV and splenic vein

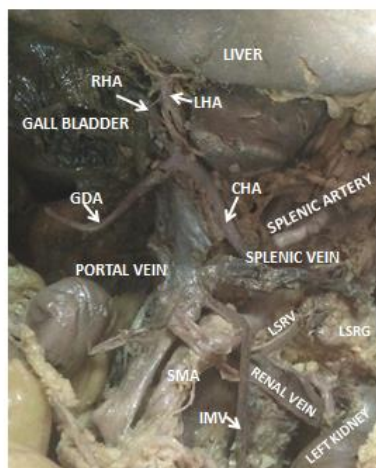


Figure 2: Showing IMV, jejunal veins opening directly at confluence of Splenic vein and SMV

IV. DISCUSSION

The portal vein is rarely variable. Identifying the variation from normal portal architecture is important in the work-up for stent placement, embolization and during surgery such as liver transplantation. It is also useful in managing the traumatic rupture of the mesentery. Very few literatures are available regarding the study of variations in the formation of portal vein³. Benninger described two new terminologies regarding the normal formation of portal vein. He said that inferior mesenteric joins splenic vein to form “splenomesenteric” vein which should be atleast 3cm before joining superior mesenteric to be called as splenomesenteric. He suggested this name due to its high percentage of incidence and clinical relevance. When inferior mesenteric joins directly superior mesenteric instead of splenic vein then this common vein is termed as “common mesenteric vein”. The splenomesenteric vein is informally termed as “Benninger’s vein”. This 3cm length of portal vein is in danger during

pancreatitis, vascular complication venous occlusion, pancreatic cancer, cholangiocarcinoma.

Type I–Portal vein is formed by confluence of superior mesenteric vein and splenic vein. Type II–Portal vein is formed by confluence of superior mesenteric vein, inferior mesenteric vein and splenic vein.

Douglass & co-workers found predominance in type I as 38%, Wunnee Chaijarookhanarak et al. found type I in 58.46% of population, Rajashree SR et al showed type I in 52.5%. On the textbook of Woodburne, the IMV empties directly into splenic vein in 60%.

As stated above Treves found type II mainly in 44%, 10 cases (15.38%) reported by Wunnee Chaijarookhanarak et al, Purcell & coworkers found this in 53%, Woodburne observed this in 40%, 12.5% reported by Aktan, Rajashree SR et al showed type II in 47.5% population.

Rajashree SR et al. coated, Of the total 40 cases in 2 cases (10%) portal vein is formed by confluence of superior mesenteric veins, splenic vein, inferior mesenteric vein and jejunal vein. Of these two, one case showed only one tributary of jejunal vein opening into portal vein at its commencement (2.5%) while one showed classically many jejunal tributaries opening into portal vein at its commencement (2.5%)². In present study portal vein is formed by confluence of superior mesenteric veins, splenic vein, inferior mesenteric vein and two jejunal vein.

Wunnee Chaijaroonkhanarak, et al. reported the mean length and diameter of the portal veins in females, were 6.48+0.75 cm and 1.13+0.22cm. While in males, the mean length and diameter of the portal veins were 6.70+1.03 cm and 1.22+0.23 cm respectively⁵. An Iranian study coated mean length 8.3 to 0.44cm⁸. Our results demonstrated that the length of the portal vein i.e. 6.50 cm was shorter than that reported by above authors. These anatomic dimension and variations of its formation might helps to avoid surgical hazards like portal vein ligation, resection, intraoperative haemorrhage also reduces the complication rate of surgery.

Several studies had been done regarding the variations of the termination of portal vein in the porta hepatis, but studies on formation of portal vein and its anomalous course are lacking. Bergman et al. have reported the absence of portal vein and opening of superior mesenteric and splenic veins into the renal vein. Jin Shan et al. have reported doubling of the portal vein.

V. EMBRYOLOGY

In the embryo, the paired vitelline veins transport blood from the yolk sac to the sinus venosus. During the fourth to fifth weeks of embryonic life, three anastomoses form between the vitelline veins, these are the cranial-ventral, dorsal and caudal-ventral anastomoses, and are named according to their anatomical position and relationship to the primitive foregut that will become the duodenum. From the formation of these anastomoses to the third month of development, there is selective involution of the venous network that eventually produces the portal vein. It has been proposed that aberrations in this process of involution can

result in anatomical variations within the portal venous system.

VI. CONCLUSION

Most abdominal venous variations are asymptomatic, but awareness of the existence of these variations critically significant in surgical resection and transplant patients, especially during pretreatment planning, in order to reduce the incidence of complications. As the present case showed colic vein and IMV draining into portal vein, so the pattern of termination of tributaries needs to be kept in mind before operation to prevent intraoperative haemorrhage.

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