

## PORTAL VEIN: ANATOMICAL PERSPECTIVE ITS VARIATION AND DISEASES

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### ABSTRACT

Portal vein is one of the important veins of body & responsible for the majority of blood supply to the liver. The anatomical understanding of portal vein is very essential for gastroenterologist and hepatic surgeon to manage clinician conditions associated with it. The portal vein passes in the hepatoduodenal ligament behind the bile duct and hepatic artery. The portal trunk in the portal fissure divides into left and right hepatic branches. There are various pathological conditions associated with portal vein such as portal vein thrombosis, the literary study also reveals anatomical variations in Portal vein positioning & this variation may leads misinterpretation during surgical intervention. Considering these all aspect present article summarized normal anatomical perspective along with its variation & diseases of portal vein.

**KEYWORDS:** Anatomy, Portal vein, Portal vein thrombosis, Portal Hypertension.

### INTRODUCTION

The Portal vein is important source of blood flow to the liver. The diameter of Portal vein is ranges from 7-15mm & the length of portal vein ranges from 7-8cm. It is the vein which begins and ends in capillaries. The point of junction of the superior mesenteric and splenic veins forms the portal vein posterior to the neck of the pancreas. The portal vein passes superiorly, posterior to the duodenum & second lumbar vertebra. Alimentary tract at abdominal area, spleen, gall bladder and pancreas are the areas which are mainly supplied by the portal vein.

#### Anatomically portal vein divided into three parts

- Infraduodenal
- Retroduodenal
- Supraduodenal

It is also divided into right and left branches of the porta hepatis. Generally portal vein arises from the union of superior mesenteric vein and splenic vein. Development of portal vein involves formation of infraduodenal, retroduodenal and supraduodenal parts. Infraduodenal part; arises from left vitelline vein distal to the dorsal anastomosis. Retroduodenal part; initiates from the dorsal anastomosis between the two vitelline veins, while supraduodenal part belongs from the cranial part of the right vitelline vein.<sup>[1,5]</sup>

Table 1: Sites of portal vein & its tributaries.

Portal Vein	Sites (Sthana)
Left branch of portal vein	Umbilicus
Oesophageal tributaries of portal vein	Lower end of esophagus
Superior rectal vein	Anal canal
Hepatic vein	Bare area of liver
Duodenum veins ascending and descending colon	Posterior abdominal wall
Ductus venosus connects left branch of portal vein	Liver

#### Anatomical Variation of Portal Vein

Portal vein initiated through the union of superior mesenteric and splenic vein along with 2<sup>nd</sup> lumbar vertebrae. The possible variation may occur in the convergence of portal vein. The literary review reveal variation in the right portal vein; may be absence of a right portal vein & chances of portal trifurcation as left, right medial and right lateral portal veins. Absent of portal bifurcation is rare in which the portal vein enters the liver offering the right segmental branches then turns to supply the left lobe of the liver. Variation involves direct draining of inferior mesenteric into the portal vein little below the splenic vein instead draining into splenic vein.<sup>[6,8]</sup>

#### Disease in Portal Vein

Portal vein devoid of valves, acts as reservoir of blood since large amount of blood volume stored in portal

system. Liver cirrhosis, infections, trauma, injury, inflammation & internal haemorrhoids may affect functioning of portal vein. This type of dysfunction may lead to condition of Raktapitta which is basically of two types Urdhvagata Raktapitta and Adhogata Raktapitta resembling oesophageal varices and internal haemorrhoids respectively as per modern science. Obstruction of portal vein (Portal Vein Thrombosis; PVT) & portal hypertension are some common diseases of portal vein.

### Portal Vein Thrombosis

Portal vein thrombosis is the condition which possesses obstruction of the blood flow in the hepatic portal vein. Condition associated with portal hypertension and thus reduction in blood supply to the liver. The conditions which may cause Portal vein thrombosis are as follows:

- Trauma.
- Polycythemia.
- Liver Cirrhosis.
- Pancreatitis.
- Formation of tumors.
- Acute appendicitis.

### Symptoms

- Spleen enlargement.
- Vomiting with blood.
- Foul smelling black tarry stools.
- Abdominal pain.
- Stomach bleeding.

### Treatment

- Antibiotics to treat infected umbilical cord.
- Anti coagulants drugs.
- Anti-inflammatory drugs to treat acute appendicitis which is responsible for portal vein obstruction.
- Drugs which reduce blood pressure of the portal vein.

### Portal Hypertension

Normal pressure in portal vein is 5-10 mmHg but in conditions such as; cirrhosis, thrombosis, pancreatitis, abdominal trauma & infection the portal hypertension may increase (>10 mmHg). Ayurveda considered portal hypertension as Raktapitta disease. The Ayurveda perspective of portal hypertension described two Gati in Raktapitta for the Pravartana of Dustarakta. One from Amashaya; Urdhvagati and another one is Pakvashaya; Adhogati. Yakrit and Pleeha are the Moolasthan of Rakta thus Rakta will not come to Amashaya or Pakvashaya until it gets vitiated by some other factors. Prakupita Rakta acquire Gamana and starts Pravartana from Amashaya; Urdhvagati and Pakvashaya; Adhogati. The treatment approaches involve; surgical decompression, use of antihypertensive drugs, sanahan savedan & anti-inflammatory agents.<sup>[6,10]</sup>

### Portal vein aneurysm

Portal vein aneurysm means abnormal vascular dilatation of the portal vein; in this case portal vein diameter

exceeding 1.9 cm especially in cirrhotic patients and 1.5 cm in normal condition. The condition may be hereditary or acquired mainly due to the portal hypertension. The major dilatation of the portal vein occurs at the main portal trunk along with portal bifurcation and in hepatic portal branches.<sup>[11]</sup>

### Causes (etiological consideration)

- Congenital
- Portal Hypertension
- Liver Cirrhosis
- Pancreatitis
- Trauma
- Malignancy.

### Clinical manifestation/ complications

- Biliary tract compression
- Portal vein rupture
- Portal vein thrombosis
- Gastrointestinal bleeding

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