

# A Rare Variation of the Inferior Mesenteric Vein with Clinical Implications

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## INTRODUCTION

The portal venous system consists of four large veins: the hepatic portal, splenic (SV), superior mesenteric (SMV) and inferior mesenteric (IMV). The SMV collects the venous return from the small intestine, stomach, pancreas, cecum, ascending colon and proximal portion of the transverse colon. The SMV tributaries include the small intestine, right gastro-omental, inferior pancreaticoduodenal, ileocolic, right colic, middle colic (MCV) and marginal (MarV) veins. The IMV receives the blood from the superior rectal, sigmoid and left colic veins, which cover the distal portion of the transverse colon, descending colon, sigmoid colon and superior rectum. According to the description by Thompson in 1890, the portal vein tributaries are categorized into four types. It is most common that the IMV drains into the SV, which then meets the SMV to form the hepatic portal vein. The IMV may also empty directly into the SMV or join the confluence of the SV and SMV [1-3]. These typical portal vein tributaries were described by other studies as well and observed during our routine gross dissection over the past years [4-8]. In addition, some uncommon variations were reported, such as the IMV drained into the first jejunal trunk or ileal trunk of the SMV [5,8]. However, this is the first time that the IMV is found to enter the MarV, one of the SMV tributaries. Besides, the IMV tapers gradually along the ascending course to accommodate its termination at the MarV. Awareness of a rare variation like this could help clinicians choose an appropriate surgical plane to minimize likelihood of bleeding during gastrointestinal surgery and postoperative complications.

## CASE REPORT

On a 94-year-old male cadaver, the SMV ran adjacent to the superior mesenteric artery (SMA) behind the neck of the pancreas. Both vessels and their branches seemed normal. However, the superior rectal and sigmoid veins united and ascended for a short distance before joining the left colic vein to become the IMV (Figure 1). The IMV ran along with the inferior mesenteric artery (IMA) to its left and continued beyond the origin of the IMA. After coursing anterior to both the SMV and SMA perpendicularly, the IMV entered the MarV, draining into the SMV via the MCV (Figure 2). The SMV and SV then converged to form the portal vein to enter the liver as illustrated in Figure 3. The diameter of the IMV varied, ranging from 1.5 mm to 3.0 mm. It gradually became narrower while running superiorly before its termination. The IMA arose from the abdominal aorta. It was notable that the colon was constricted and muscular with sparse adipose tissue of this case. The cause of death was attributed to arteriovascular sclerotic disease and chronic mesenteric artery insufficiency with episodic acute mesenteric artery insufficiency. No surgical reconstruction was noted on this cadaver.

## CASE REPORT CONT'D



Figure 1) The small IMV is formed by the union of the SRV and SigV, and then LCV. It ascends to the left of the IMA. After passing anterior to the SMV and SMA, it continues to terminate into the MarV.



Figure 2) The IMV joins the arcade of the MarV. The MarV then anastomoses with the MCV to empty into the SMV

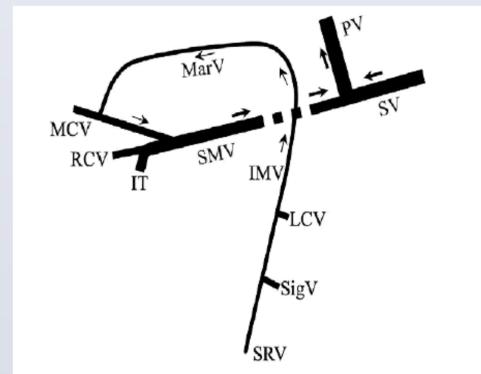


Figure 3) Illustrative drawing of a rare variation of the IMV drainage into the portal venous system

## CONCLUSIONS

The IMV drainage, follows one of the three common patterns: 1) it often drains directly into the SV, 2) it may empty into the SMV, and 3) it may join the confluence of the SV and SMV [1-8]. In addition, the uncommon patterns of the IMV draining into the first jejunal trunk or ileal trunk of the SMV have also been documented [5,8]. To the best of our knowledge, this report is the first time to present a rare variation, in which the IMV joins the MarV that in turn drains into the SMV via the MCV. The complex anatomy of the SMV and IMV has largely attributed to technical difficulties in colon and pancreaticoduodenal surgeries [9,10]. This is particularly true for the laparoscopic procedure, a less invasive and more preferred alternative to open surgery for colectomy. As laparoscopic surgery often uses the mesenteric vessels as surgical landmarks of dissection, it is essential to understand the vascular structure preoperatively to avoid massive bleeding [11,12]. The uncommon mesenteric vein variation such as this case would add another layer of complexity, which can result in bleeding and extended operative time. Awareness of the vascular variation is important in planning a safe and successful surgery. In most cases, the IMV conveys blood from the left portion of the colon and superior rectum to the portal venous system.

Additionally, while the average diameter of the IMV has been reported as 3.2 mm [2], this case presents with a relatively small IMV. Its caliber tapers before it empties into the MarV. This might reflect its adaptation to the termination, as the MarV is a small vessel which anastomoses with the MCV to drain into the SMV. Giving the fact that the size and course of the SMV and its tributaries look normal, the adaptation could help to reduce the blood load to the SMV.

## CONCLUSIONS (CONT'D)

Furthermore, the cadaver had arteriovascular sclerosis affecting both the SMA and IMA. The sclerotic vessel wall and the smaller IMA might have resulted in chronic mesenteric artery insufficiency with acute episodes. The aberrant IMV with a small caliber, on the other hand, might have been another contributing factor to the mesenteric vascular insufficiency, as both the arterial and venous impairment could disturb the blood supply to the small intestines and colon, which gradually leads to the ischemic changes [14]. In addition, it might have also led to the constricted colon with little adipose tissue.

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