PATTERN OF ANATOMICAL VARIATION OF MESENTERIC VEINS DETECTED ON HELICAL CT VENOGRAPHY AMONG PATIENTS WITH PANCREATIC PATHOLOGIES

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ABSTRACT

Background: Familiarity of the regular and commonest deviations of anatomy of the mesenteric venous system is of great significance for surgeons performing hepatobiliary, pancreatic and gastrointestinal surgeries. **Objective:** To delineate the variable anatomy of superior mesenteric vein and drainage site of inferior mesenteric vein on CT venograms. **Methodology:** A total of 114 patients undergoing helical CT venogram for pancreatic pathologies were included in this cross sectional study from 1st January, 2014 to 31st January, 2015 at Radiology department, Sharif Medical City Hospital, Lahore. The mesenteric venous system was analyzed in all patients. Appearance of the Superior Mesenteric Veins (SMV) and drainage site of the Inferior Mesenteric Veins (IMV) were assessed on CT venography. Two radiologists interpreted the images and reached a concensus on all findings. Data was analyzed by using SPSS version 20. **Results:** The study included 64 (56.14%) female and 50 (43.85%) male with a mean age of 49±4 years. The SMV was composed of single and double trunks around the splenoportal confluence in 109 (95.61%) and 4 (3.50%) patients, respectively. It was absent in 1 (0.8%) patient. The IMV were identified in all patients. The IMV was observed to drain into splenic vein in 40 (35.08%) patients, SMV in 59 (51.75%), the junction between the superior mesenteric vein and the splenic vein in 14(12.28%), and first jejunal trunk in 1 (0.8%) patient. **Conclusion:** Understanding of mesenteric venous tributaries is supportive for surgeons to safely perform peripancreatic surgery, and this study shows the variability in its anatomy.

Keywords: CT venogram, Superior mesenteric vein, Inferior mesenteric vein

INTRODUCTION

Awareness of variations of the superior mesenteric vein (SMV) and inferior mesenteric vein (IMV) are very valuable and of paramount significance for surgeons carrying out surgeries of the pancreas and duodenum.[1] Generally, the portal vein (PV) ascends posterior to the superior aspect of the pancreatic neck from the union of the SMV and the splenic vein (SV).[2] The SMV lies anterior and on the right of the superior mesenteric artery and usually arises from the confluence of jejunal and ileal tributaries.[3] The SMV drains the small intestine, caecum and ascending and transverse parts of the colon. The IMV drains venous blood from superior potion of the rectum, sigmoid colon and descending colon into portal vein via SV. The venous drainage pattern of the mesenteric veins is inconstant. Abdominal venous disparities and anomalies are frequently spotted in routine examinations as a result of advances in noninvasive, cross-sectional imaging techniques.[4,5]

In the old times, catheter angiography used to play an imperative role in mapping out mesenteric vascular pattern and evaluating the existence of mesenteric vessel encasement prior to surgery in patients with pancreatic malignancies.[6] This vascular map can also constructed by CT scan at a low cost than conventional angiography.[7-11] Conventional and helical CT are the present-day imaging techniques to appraise the pancreas and the peripancreatic region. Regarding pancreatic tumor resection, axial images delivers crucial information.[8,9] Preoperative angiography is usually done to get illustration of vascular anatomic variants and know disease process and its relations to splanchnic vasculature on which give a more clear spatial information than do axial images.[10,12,13,14] Now a days, contrast-enhanced helical CT with three-dimensional image reconstruction (CT angiography) has gained chief role to judge the vascular scheme.[15,16] This mode gives diagnostic vascular imaging with reduced morbidity and at a lesser cost.[11] The practice of this skill has focused on the arterial and venous structure in several sections of the body.[12] There is paucity of data on structural alternates of SMV and IMV which denote critical anatomic structures, particularly in pancreatic disease.

The objective of this study was to show the aptitude of helical CT venography to precisely give a picture of the mesenteric venous system. We scrutinized the normal anatomy and anatomic modifications of the superior and inferior mesenteric vein on CT venograms.

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METHODOLOGY

This was a cross sectional study. One hundred and fourteen consecutive patients of both sex and all age groups with known or suspected disease of the pancreas, referred for computed tomographic (CT) scans of the abdomen with intravenous contrast, were included in the study over a period from 1st January 2014 to 31st January 2015. Written informed consent was obtained from all patients. All the patients underwent CT venography in radiology department Sharif Medical city hospital. The procedure was explained to all patients. Patients who gave history of allergy, deranged renal profile, psychiatric illness, poor co-operation and closed space phobia were debarred from this study. All the procedures were performed by Fellow of radiology. The pancreas and the peripancreatic region were examined in detail using a dual-phase helical CT protocol in both the arterial and the portal venous Phases. For the purpose of this study, Mesenteric veins were analyzed from the portal venous phase data set. CT scans were performed on a high Speed Advantage scanner (General Electric Medical System, Milwakuee, WI). details of the SMV and IMV were Interpreted by two radiologist. Demographic features like age and sex were noted and statistical analysis was done using SPSS version 20.

RESULTS

The mean age of patients in our study was 49±4. Years. There were 64 (56.14%) female and 50 (43.85%) male patients. CT venography was completed in all patients without any intra-procedure or post-procedure complication.

Table I: Variation of superior mesenteric veins and drainage pattern of inferior mesenteric veins

Variation of superior mesenteric veins			
Parameters		**Patients**	**(%)**
Single trunk		109	95.61
Double trunk		4	3.50
Absent		1	0.8
Drainage pattern of inferior mesenteric veins			
Parameters		**Patients**	**(%)**
Splenic vein	**Proximal end**	27	23.68
	Middle part	4	3.50
	Distal end	9	7.89
Superior mesenteric vein		59	51.75
Junction of SV & SMV		14	12.28
First jejunal trunk		1	0.8

It was noted that 70 (61.04%) patients had co morbid condition and 97 (85.08%) patients had neoplastic disease of the pancreas whereas, 17 (14.91%) patients had chronic pancreatitis. None of the patients showed allergic reaction to intravenous contrast. All patients were shifted back to their respective wards just after the procedure. Variation of SMV and drainage pattern of IMV are shown in table I.

DISCUSSION

Preoperative information of the anatomy is key before planning vascular resection in certain patients with pancreatic adenocarcinoma. The capability to this ability to recognize mesenteric venous system with preoperative CT scans can help in reducing major. Avoiding harm to these veins also inhibits injury to the Superior mesenteric artery that can happen in an effort to switch off venous bleeding with sutures.[13]

In our study, SMV was found as single trunk in 109 (95.61%) patients and as double trunk in 4 (3.50%) patients. It was absent in 1 (0.8%) patient. IMV was observed to be drained in SV in 40 (35.08%), into SMV in 59 (51.75%) and into confluence of SMV and SV in 14 (12.28%) patients. Graf O et al,[14] explored mesenteric venous system in 54 patients and reported single trunk of SMV in 74.07% and double trunk in 13% patients. They also detected IMV drained into the splenic vein in 56%, into the SMV in 26% and into the splenomesenteric angle in 18% patients.[14] In another study by Kim HJ et al,[15] a single trunk of the SMV was present in 95% and absent in 5% patients. The IMV was observed to drain into splenic vein in 53%, SMV in 31%, splenoportal confluence in 12% and into first jejunal trunk in 4% while in our study, we found one (0.8%) patient with IMV draining into jejnual trunk.[15]

In a study by Sakaguchi T et al,[16] SMV was composed of single and double trunks in 76.47% and 23.52% patients, respectively. The inferior mesenteric vein joined the splenic vein in 68.5%, SMV in 18.5%, and splenoportal confluence in 7.6% patients.[16] Papavasiliou P et al,[17] reported that IMV drained into the SMV in 27%, SMV-portal vein confluence in 17%, and it was inserted into the splenic vein in 54%, of cases into anterior first jejunal branch in 0.67% and into ileal branch in 0.3% cases.[17]

In a study by Raut RS et al,[18] showed IMV terminate into SV in 30% and into SMV in 22.5% patients. SMV, SV and IMV all fused to form PV in 47.5%

population.[18] Munguti J et al,[19] described the pattern of IMV termination; Splenic Vein (35.7%), Splenoportal Junction (26.2%) and Superior Mesenteric Vein (38.1%).[19] Kaur H et al,[20] found IMV draining into SMV in 40% cases. In 3.33% cases, there were two right colic veins uniting with each other, joined the right gastroepiploic and inferior pancreaticiduodenal veins were ultimately drained into SMV.[20]

In our study, we identified IMV in all patients. Absence of SMV was found in one case. In a study conducted by Papavasiliou P et al, in 5.3% of cases both the ileal and jejunal veins were draining together into the splenoportal confluence.[17] Nayak SB et al, reported a case in which two proximal jejunal veins drained into the splenic vein instead of the superior mesenteric vein.[21] Knight HO, reported multiple SMVs joining with the SV to form the PV.[22] Lin YY et al, reported a case of absence of IMV demonstrated by contrast-enhanced CT scan in a patient with rectal cancer.[23] Popovici Z described that in one body, of a series of 34 cadavers, IMV was not found.[24] The variation in mesenteric venous anatomy is taken as a challenge by surgeons during pancreatic surgeries, especially resectable pancreatic cancers, where venous resection is obligatory to get a negative margin.

CONCLUSION

Preoperative documentation of the Superior Mesenteric Veins and assessment of the drainage patterns of the Inferior Mesenteric Veins can benefit interventional radiologists and surgeons in scheduling for pancreatic surgeries with or without venous reconstruction. Our study showed the variability in anatomy of superior and inferior mesenteric veins.

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