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Role of contrast enhanced computed tomography in evaluation of vascular complications of pancreatitis: A cross-sectional study

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Abstract:
Background*:pancreas is surrounded by various blood vessels any inflammation during pancreatitis causes exogenous release of the pancreatitis amylases and lipases causing direct action on the arterial vessel walls leading to pseudoaneurysm and hemorrhage. on the other hand the inflamed pancreatic tissue and collections may compress on the adjacent veins leading to thrombosis.contrast enhanced computed tomography helps in identifying these vascular complications.*
Materials and Methods*: this is a cross sectional study conducted in department of Radiodiagnosis in Maharajah's institute of medical sciences, Vizianagaram, India for a duration of 1 year from 1st June 2021 to 31st may 2022.the study population consist of patients with complaints of upper abdominal pain clinically diagnosed as pancreatitis based on raised serum amylases and lipases or those patients which are diagnosed as pancreatitis on ultrasound. These patients are subjected to CT both non-enhanced and enhanced using Iohexol(omnipaque) as contrast medium. After assessing the pancreatitis and local complications, the vessels around the pancreases are examined to look for any thrombosis or aneurysmal dilatations*.
Results*: Of the 40 patients included, Splenic Vein Thrombosis was seen in 26(65%), followed by Portal vein thrombosis in 11 (27.5%), Superior Mesenteric Vein thrombosis in 9 (22.5%), all the three vein thrombosis was seen in 2 (5%) and arterial pseudoaneurysms was seen in 2 (5%).*
Conclusion:*Vascular complications in cases of pancreatitis are not uncommon and should be look in each and every case of pancreatitis. Splenic vein thrombosis is the most frequently found vascular complications in cases of pancreatitis. Timely diagnosis and management will reduce the associated morbidity and mortality.*
Key Word*:complication, pseudoaneurysm, venous thrombosis*

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I. Introduction

Pancreatitis is one of the common disease characterised by inflammation of the pancreatic tissue leading to exogenous release of the proteolytic enzymes, causing both local and systemic complications [1]. Acute pancreatitis causes both local and systemic complications leading to large changes in the clinical features and prognosis [1]. Chronic pancreatitis is an irreversible inflammatory condition of pancreas where there is gradual parenchymal thinning and fibrosis Patients with chronic pancreatitis develop an inflammatory pseudo mass, resulting infocalenlargement with fibrosis. [2]. local complications ranging from acute fluid collection to pseudocyst, when compared with the other complications the vascular complication are relatively rare but they all need to be evaluated due to potential risk. one of the most dangerous complication may be a ruptured pseudoaneurysm[3] .since majority of these complications are lifeendangering these vascular complication are need to be evaluated as early identification can be lifesaving.

As contrast enhanced computed tomography helps in identification of the both pancreatic parenchymal, extrapancreatic and vascular complications. Thestudy is done to describe the CECT findings of vascularcomplications associated with pancreatitis.

II. Material And Methods

This is a cross sectional study conducted in department of Radiodiagnosis in Maharajah's institute of medical sciences, Vizianagaram, India for a duration of 1 year from 1st June 2021 to 31st may 2022.the study population consist of patients with complaints of upper abdominal pain clinically diagnosed as pancreatitis based on raised serum amylases and lipases or those patients which are diagnosed as pancreatitis on ultrasound. These patients are subjected to CT both non-enhanced and enhanced using Iohexol(omnipaque) as contrast

medium. After assessing the pancreatitis and local complications, the vessels around the pancreases are examined to look for any thrombosis or aneurysmal dilatations.
Study Design:cross sectional study

Study Location: This was a tertiary care teaching hospital based study done in Department of Radiodiagnosis, at Maharajah's institute of medical sciences, Vizianagaram,AndhraPradesh, India.

Study Duration:1st June 2021 to 31st may 2022.
Sample size: 40 patients.
Subjects & selection method: the study population consists of patients with complaints of upper abdominal pain clinically diagnosed as pancreatitis based on raised serum amylases and lipases or those patients which are diagnosed as pancreatitis on ultrasound.These patients are subjected to contrast enhanced computed tomography and the vessels around the pancreas are evaluated for vascular complication. Those patients with positive vascular complication are included in the study.
Inclusion criteria:those patients with pancreatitis who are having vascular complications like splenic vein thrombosis, portal vein thrombosis, superior mesenteric vein thrombosis and pseudoaneurysms of adjacent arteries with normal renal function tests.
Exclusion criteria:patients who are allergic to iodinated contrast, altered renal function test and uncooperative individuals**.**

Procedure methodology

As per the inclusion and exclusion 40 patients are included in the study population informed written consent was obtained from all the patients of study population ,contrast enhanced computed tomography of abdomen and pelvis is performed using GE 16 SLICE CT machine ,initially plain computed tomography was performed followed by contrast study. Patients are asked to stay nil by mouth prior to study for a duration of 6hours and get their renal function tests done. After completion of the plain computed tomography contrast enhanced computed tomography id done with iodinated contrast agent iohexol given at 2ml/kg body weight. the scan field is included from domes of diaphragm to pubis. Patient lies in supine position with hands placed over the head the parameters used in image acquisition are 120kV, 300mA with 0.9sec of tube rotation time, FOV:350mm images are acquired with slice thickness of 5mm. these images obtained are reconstructed with 1mm thickenss in sagittal and coronal planes. Images are obtained during arterial, venous and delayed phases.

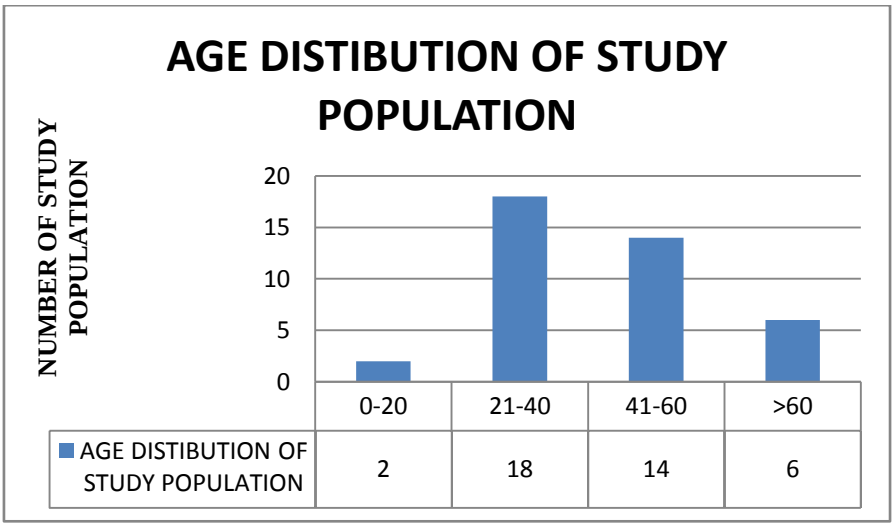
Statistical analysis
The results are evaluated using Microsoft excel 2016, and depicted in tables and figures

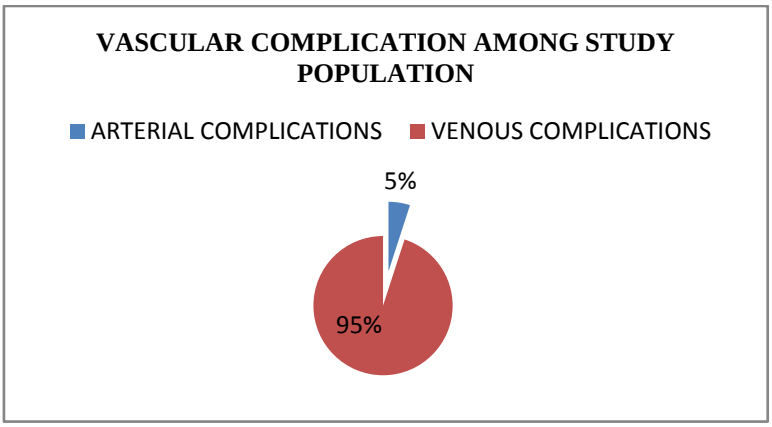
III. Result

In present study we have 40 patients of pancreatitis in those vascular complications have been identified using CECT. Thepatients' age are ranging from 3 to 72 years. most of the study population effected are of between 20 to 40 years of age (45%). the least effected age group is of less than 20 years (5%), among the study population the male individuals are 34 and female individuals are 6.
Splenic vein thrombosis is noted 26 patients that denotes a percentage of 65%.portal vein thrombosis is seen in 11 patients that is about 27.5%.superior mesenteric vein thrombosis is seen in 9 patients that is about 22.5%, all three veins thrombosis is seen in 2 patients that is about 5%.among all the following the spleen vein thrombosis is the most commoner followed by the portal vein thrombosis.
Only 2 cases of the pseudo aneurysms have been noticed in the study one is arising from the splenic arterywhereas the other is arising from the gastroduodenal artery

AGE (YEARS)	NUMBER	PERCENTAGE
0-20	2	5
21-40	18	45
41-60	14	35
>60	6	15
TOTAL	40	100

Table 1 showing age wise distribution of study population





Vascular complications	Complication findings	Number of cases	Percentage
Arterial complications	Pseudoaneurysms	2	5
	Splenic artery pseudoaneurysm	1	2.5
	Gastroduodenal artery pseudoaneurysms	1	2.5
Venous complications	Splenic vein thrombosis	26	65
	Portal vein thrombosis	11	27.5
	Superior mesenteric vein thrombosis	9	22.5
	Splenic vein +portal vein thrombosis	2	5
	Splenic vein +superior mesenteric vein thrombosis	3	7.5
	Portal vein +superior mesenteric vein thrombosis	1	2.5
	Splenic + portal vein +superior mesenteric vein thrombosis	2	5

TABLE2 showing vascular complications

IV. Discussion

In the present study of 40 cases of pancreatitis with vascular complications among the vascular complications the venous complications(95%) are most commoner than arterial complications (5%). The most commonly effected age group in the present study is 21-40 years(45%).the most common complication is splenic vein thrombosis which is seen in 26 patients (65%) followed by portal vein thrombosis which is seen in 11 patients (27.5%).superior mesenteric vein thrombosis is seen in 9 patients(22.5%).only two cases of pseudoaneurysm is seen one in the splenic artery and the other in the gastroduodenal artery. The present study

findings are similar to that of study conducted by Sanjay D and Magdum, in there study population of 47 cases of pancreatitis, the vascular complications are seen in 17 cases ,out of the 17 cases 11 cases are of splenic vein thrombosis(64.7%) and 2 cases are of portal vein thrombosis.(6)

Vascular complications are not so common in cases of pancreatitis but these are around seen in 25% cases of pancreatitis.

One of the most common causes of vessel injury is severe pancreatic inflammation and necrosis, which results in the local release of exocrine proteolytic and lipolytic enzymes. These cause erosion of the vessel wall, leading to formation of a pseudoaneurysm, a hematoma (when the pseudoaneurysm is thrombosed or there is no active extravasation), or intraperitoneal hemorrhage due to rupture of pseudoaneurysm (13).

As the pancreases is in close relation to splenic vein , portal vein and superior mesenteric vein any inflammation around the pancreas like pseudocyst /acute fluid collection lead to adjacent compression of these vessels further leading to thrombosis. Splein vein thrombosis is quiet common in those cases of pancreatitis with pseudocyst and collections[13].Portal vein rupture and pancreaticopotal fistula are very rare.[14]

Pseudoaneurysm are very rare about 3.5-10% in patients with pancreatitis(18) splein artery being the most common artery involved in pseudoaneurysm (40%) followed by gastroduodenal (30%), pancreaticoduodenal (20%), gastric (5%), hepatic (2%), and other rarely involved are superior mesenteric, jejunal, ileocaecal, aorta which constituted for 1-3% [9,19-23]

Rupture of these pseudoaneurysm is a fatal complication. The pseudoaneurysm may rupture into the pseudocyst, GI tract, peritoneum, or pancreatic parenchyma.[24,25] There is an entity called ‘‘Haemosuccus pancreatitis’’ where the pseudo aneurysm rupture in to the pancreatic duct and bleed from ampulla of vater which seen in ERCP. Another entity called as "Pseudoaneurysmaticpseudocyst wherea artery is involved with in the pseudocyst .[28]. A rare case of was of rupture of gastroduodenal artery pseudoaneurysm into superior mesenteric vein was reported by Suzuki T et al.[29]. Rupture of the pseudoaneurysm is not determined by the size.[30] although pseudoaneurysms are rare those with potential rupture are need to be treated immediately as undetected rupture can be life threatening. Endovascular Embolisation is the best first-line treatment, and if that fails, emergency surgery should be performed as soon as possible [31,32].

Angiography is considered the gold standard, but Computerised Tomography (CT) scans are usually used for these patients as angiography is not always available.

The presence of contrast enhancement within or adjacent to a suspected pseudocyst on a CT scan is suggestive of a pseudoaneurysm.

On plain scan, increased attenuation within a fluid collection may indicate a recent hemorrhage. Contrast enhanced CT plays an important role in detecting these vascular complications of pancreatitis [33] and helps in identifying the cause of pancreatitis [34].

A more recent study of 127 patients over two years by Gonzelez HJ et al. found 20 patients with splenic vein thrombosis. They proposed that venous thrombosis in patients of pancreatitis is the common finding and due to overlap of peripancreatic collections and splenic vein thrombosis strongly advocated the mechanism of thrombosis to be compression and perivascular inflammation [37].

LIMITATIONS: This study did not aim to determine the intervention and management of the condition, and there was no follow-up to determine the consequences of these complications. Furthermore, because the study was conducted in a single institute, it was limited to a smaller number of patients.

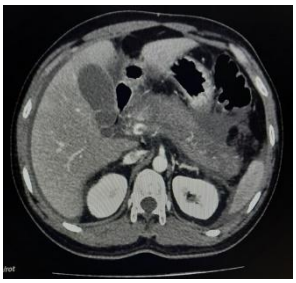


Figure 1 Contrast enhanced CT showing thrombosis in splenic vein extending uptospleno-portal confluence

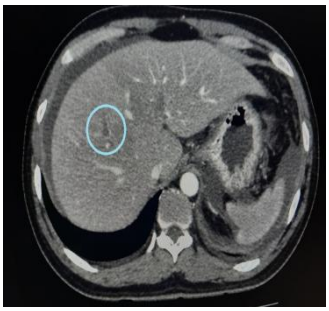


Figure 2 Contrast enhanced CT showing thrombosis in portal vein division

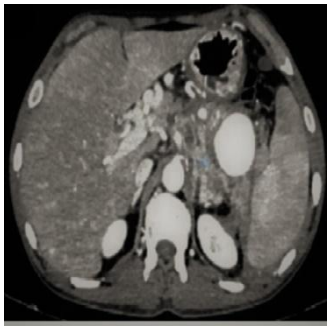


Figure 3 Contrast enhanced CT showing pseudoaneurysm of splenic artery in case of chronic pancreatitis

V. Conclusion

Vascular complications in cases of pancreatitis are not uncommon and should be look in each and every case of pancreatitis. Splenic vein thrombosis is the most frequently found vascular complications in cases of pancreatitis. Timely diagnosis and management will reduce the associated morbidity and mortality.

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