



ROLE OF DYNAMIC CONTRAST-ENHANCED CT IN EVALUATION OF PANCREATIC MASSES: A RETROSPECTIVE CASE SERIES

Radio-Diagnosis

Dr Mohd Ashraf	Resident Doctor Radio-Diagnosis GCRI (Gujarat Cancer and research institute), B J Medical College Ahmedabad.
Dr Sapna S Patel*	Associate Professor Radio-Diagnosis GCRI (Gujarat Cancer and research institute), B J Medical College Ahmedabad. *Corresponding Author
Dr Anshul Gautam	Resident Doctor Radio-Diagnosis GCRI (Gujarat Cancer and research institute), B J Medical College Ahmedabad.

ABSTRACT

Dynamic contrast-enhanced computed tomography (CECT) plays a pivotal role in the evaluation of pancreatic masses. It provides detailed anatomical and vascular information that assists in differentiating between benign and malignant lesions and aids in staging, surgical planning and treatment monitoring. This case series presents imaging findings and diagnostic contribution of dynamic CT in 40 patients with pancreatic masses, highlighting its sensitivity, specificity and impact on clinical decisions.

KEYWORDS

Pancreatic Masses, Dynamic contrast CT, pancreatic adenocarcinoma, neuroendocrine tumor, multiphase imaging.

INTRODUCTION

Pancreatic masses encompass a wide spectrum of neoplastic and non-neoplastic conditions, with pancreatic adenocarcinoma being the most common malignancy. Differentiating between benign, malignant and inflammatory lesions is critical but often challenging due to overlapping clinical presentations.

Dynamic contrast-enhanced CT with pancreatic protocol performed in early arterial phase, late arterial phase (Pancreatic phase) and portal-venous phase, is considered the imaging modality of choice for initial evaluation. It provides vital information regarding lesion enhancement, vascular invasion, metastases and local resectability. This case series reviews the CT findings in 40 patients with pancreatic masses and evaluates the diagnostic role of dynamic CT.

MATERIAL AND METHODS:

Study Design:

- **Type:** Retrospective case series
- **Setting:** Radiology Department GCRI (Gujarat Cancer and Research institute)
- **Duration:** June 2024 – June 2025
- **Sample size:** 40 patients with pancreatic masses confirmed by histopathology and imaging follow up

Inclusion Criteria:

- Patient > 18 years
- Suspicious pancreatic mass detected clinically or prior ultrasound
- Underwent dynamic multiphase CT (early arterial phase, late arterial phase (Pancreatic phase) and portal-venous phase)

CT protocol:

Scanner: 128-slice MDCT

Phases:

- Non-contrast
 - Early arterial phase
 - Late arterial phase (Pancreatic Phase ~ 40 seconds after contrast injection)
 - Portal-venous phase
- Slice thickness: 3 mm

RESULTS:

Demographic Profile:

- Mean age: 60 years
- Male: 27, Female: 13

Diagnosis	Number of Cases
Pancreatic Adenocarcinoma	25
Neuroendocrine tumors (NETs)	07
Solid pseudopapillary tumors	01
Mass forming Chronic pancreatitis	03
Cystic neoplasm (MCN/SCN/IPMN)	04

Dynamic CT Findings:

Features	Observations
Adenocarcinoma	Hypo-enhancing in late arterial phase (pancreatic parenchymal phase) has the greatest conspicuity for detecting the hypo-enhancing tumor against the background enhancing pancreas, duct dilatations, (Double duct sign in pancreatic head mass), vessels encasement and pancreatic head most common location.
NETs	Hyper-enhancing in late arterial phase, most are solid
Solid Pseudopapillary tumors (SPT)	Mixed solid-cystic, encapsulated, Hemorrhage is typical and pancreatic Tail most common location
Mucinous cystic neoplasm (MCN)	Single or a few large cysts (<6 cysts that are > 2 cm), capsule, pancreatic body and tail most common locations
Serous Cystadenoma	Many small cysts (>6 cysts that are < 2 cm), Bunch of grapes appearance, Central enhancing scar with stellate calcification
Intraductal papillary mucinous neoplasm (IPMN)	• Main duct IPMN – Segmental or diffuse dilatational of MPD > 5 mm. • Branch duct IPMN – Cysts > 5 mm communicating with MPD • Mixed type – Meets criteria for both main duct and branch duct type
Mass forming Chronic pancreatitis	Poorly defined or lobulated mass, typically in pancreatic head, iso-attenuating or delayed heterogenous enhancement pattern, Duct penetrating sign, intraductal or parenchymal calcifications, pseudocyst, rarely encases or occludes major vessels and lack of metastasis, lymphadenopathy

CT Accuracy Vs Final Diagnosis

- Sensitivity: 92.5%
- Specificity: 88%
- Positive predictive value: 94%
- Negative predictive Value: 85%

DISCUSSIONS:

Dynamic CT proves to be highly effective in characterizing pancreatic lesions based on enhancement patterns, vascular involvement, and associated findings (MPD and biliary dilatations). Arterial phase imaging was especially critical in detecting hyper vascular lesions such as NETs, while venous phase improved assessment of metastatic

spread and venous thrombosis.

The differentiation between inflammatory masses and malignancy remains challenging; however, the presence of duct cut-off with its dilations, vascular encasement, peripancreatic nodes and abrupt caliber changes improved diagnostic confidence in adenocarcinomas. Limitations included overlapping features in autoimmune pancreatitis and well-differentiated tumors.

When evaluating whether pancreatic neoplasm is resectable, it is important to evaluate for any vascular variants and to determine tumor involvement of the nearby vessels: SMA (including first jejunal branch), SMV, Portal vein, Celiac axis, common hepatic artery and splenic artery.

CONCLUSION:

Dynamic contrast-enhanced CT remains a cornerstone in the diagnostic workup of pancreatic masses. It provides crucial information not only for lesion detection and characterization but also for assessing surgical resectability and staging. A standardized multiphase CT protocol enhances diagnostic accuracy and helps guide management strategies effectively.

Cases No – 1: Adenocarcinoma Tail of Pancreas

Histopathology correlation – Adenocarcinoma



A 80-year-old male patient presented in our department with USG

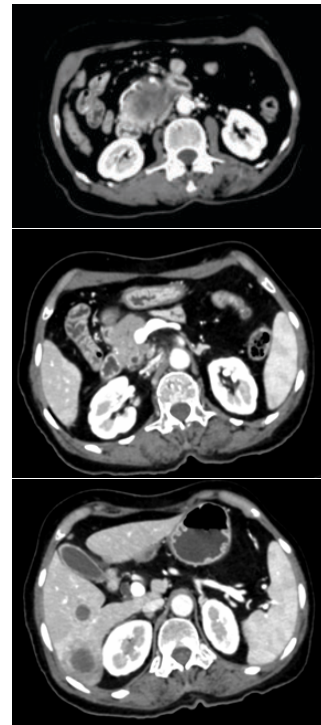
report shows mass in left hypochondriac region for which dynamic CECT Thorax, abdomen and pelvis done.

Findings:

- Approx. 82x78x74 mm sized (APxTRxCC) ill-defined hypodense lesion arising from tail of pancreas with exophytic component on plain study. Lesion remains hypodense in all other phases.
- Lesion infiltrates into mid and lower pole of spleen
- Lesion infiltrates into upper and mid pole of left kidney.
- Lesions encase splenic and left renal vessels
- Multiple lung metastasis, few of them are pleural based.
- Biopsy proven metastatic deposit from right anterior chest wall.
- Left side Mild pleural effusion

Case No – 2: Adenocarcinoma head and uncinate process of Pancreas

Histopathology correlation – Adenocarcinoma



A 64-year-old female patient presented in our department with USG report shows mass in head and uncinate process of pancreas for which dynamic CECT Thorax, abdomen and pelvis done.

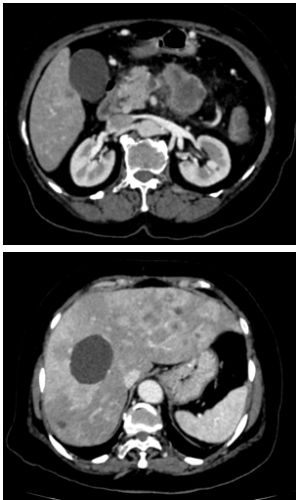
Findings:

- Approx. 30x32x35 mm sized (APxTRxCC) ill-defined hypodense lesion is noted arising from head and uncinate process of pancreas on plain study. Lesion remains hypodense in all other phases.
- There is partial filling defect is noted in SMV. S/o Partial Thrombus appear likely
- Lesion abut and compresses infra-hepatic IVC with loss of fat plane, abut and displaces right renal vein with loss of fat plane and abut SMA with arc if contact < 180 degree with loss of fat plane.
- Few Targets like liver metastasis
- Incidental finding – Complete Dorsal Pancreatic agenesis is noted

Case No – 3: Adenocarcinoma Body and tail of Pancreas

Histopathology correlation – Adenocarcinoma





A 68-year-old female patient presented in our department with USG report shows mass in body of pancreas for which dynamic CECT abdomen done.

Findings:

- Approx. 37x26x41 mm sized (APxTRxCC) ill-defined hypodense lesion is noted arising from body and tail of pancreas on plain study. Lesion remains hypodense in all other phases.
- There is Hypodense filling defect is noted with in Portal Vein, SMV. S/o Tumoral thrombus.
- Liver Metastasis associated with incidental finding simple liver cyst.

Case No – 4: Adenocarcinoma Body of Pancreas

Histopathology Correlation – Adenocarcinoma



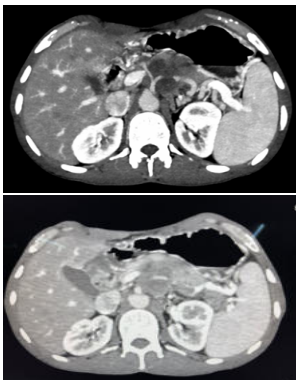
A 75 -year-old Male patient presented in our department with complaint of abdominal pain for 15 days and USG report shows mass in body of pancreas for which dynamic CECT abdomen done.

Findings:

- Approx. 37x45x31 mm sized (APxTRxCC) ill-defined hypodense lesion is noted arising from body of pancreas on plain study. Lesion remains hypodense in all other phases.
- There is abrupt cut-off of MPD with distal dilatation of MPD is noted. Maximum Dilatation of MPD measures (7.5 mm).
- There is parenchymal atrophy of distal body and tail of pancreas.

Case No-5: Adenocarcinoma Body of Pancreas

Histopathology correlation – Adenocarcinoma

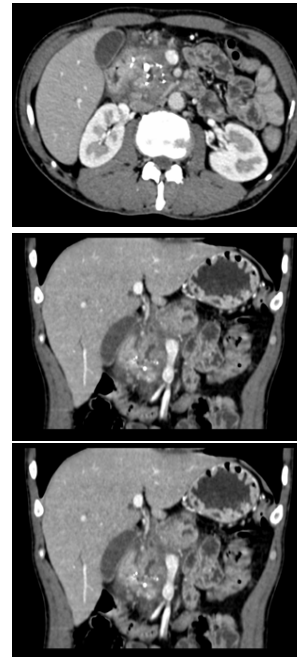


A 46 -year-old Male patient presented in our department with complaint of abdominal pain for 21 days associated with weight loss and USG report shows mass in body of pancreas for which dynamic CECT abdomen done.

Findings:

- Approx. 41x43x49 mm sized (APxTRxCC) ill-defined hypodense lesion is noted arising from posterior aspect proximal body of pancreas on plain study. Lesion remains hypodense in all other phases.
- Lesion encases celiac trunk, common hepatic artery and splenic artery.
- Lesion reaches up to pre-aortic region.
- There is hypodense filling defect is noted with in splenic vein. S/o Tumoral Thrombus.
- Lesion abut portal vein with loss of fat plane.

Case No – 6: Mass Forming chronic Pancreatitis in head of pancreas



A 46 -year-old Male patient presented in our department with complaint of recurrent episodes of abdominal pain, nausea, vomiting and weight loss and USG report shows mass in head of pancreas for which dynamic CECT abdomen done.

Findings:

- Approx. 33x36x38 mm sized (APxTRxCC) poorly defined irregular contours hypodense lesion is noted involving head and uncinate process of pancreas on plain study. Lesion shows heterogenous post contrast enhancement.
- Main pancreatic duct passes through the mass without abrupt cutoff
- Lesion shows multiple coarse calcifications with in.
- Lesion abut and displaces adjacent vessels without its involvement.

Case No – 7: Neuroendocrine Tumor (NET) Head of pancreas

Histopathology Correlation – NET



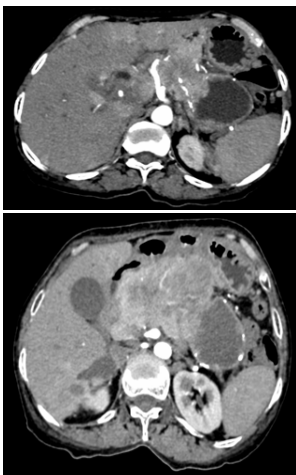


A 39-year-old female presented with recurrent episodes of hypoglycemia with clinically suspected NET for which dynamic CECT abdomen done.

Findings:

- Presence of approx. 14x14x15 mm sized (APxTRxCC) hyperdense lesion is noted arising from head of pancreas on arterial phase. Lesion shows exophytic component.
- Lesion abut 2nd part of duodenum with loss of fat plane.

Case No – 8: Neuroendocrine Tumor (NET) body and tail of pancreas
Histopathology Correlation – NET



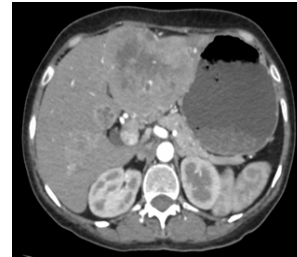
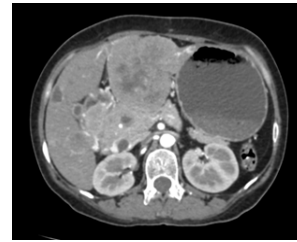
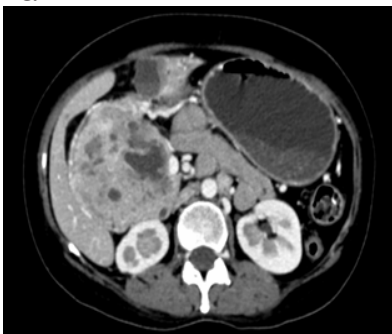
A 45-year-old Female presented with abdominal pain associated with weight loss and USG report shows mass in body of pancreas for which dynamic CECT abdomen done.

Findings:

- Presence of approx. 63x83x81 mm sized (APxTRxCC) ill-defined hyperdense lesion is noted arising from body and tail of pancreas on arterial phase.
- Lesion shows exophytic component.
- Lesion encases celiac trunk, common hepatic artery and splenic artery.
- Lesion encases SMV, splenic vein and portal vein.
- Lesion abut 2nd part of duodenum, pylorus and left lobe of liver with loss of fat plane.
- There is approx. 53x60 mm sized well-defined fluid-density lesion with peripheral rim calcification is noted involving tail of pancreas.

Case No – 9: Neuroendocrine Tumor (NET) Head and uncinate process of pancreas

Histopathology correlation – NET



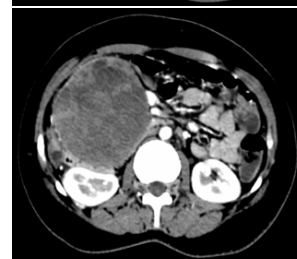
A 37-year-old Female presented with abdominal pain, nausea, vomiting and USG report shows mass in head of pancreas for which dynamic CECT abdomen done.

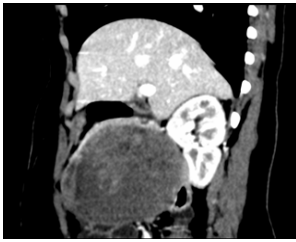
Findings:

- Presence of approx. 69x65x72 mm sized (APxTRxCC) ill-defined hyperdense lesion is noted arising from head and uncinate process of pancreas on arterial phase.
- Lesion abut displaces and compresses duodenum laterally on right side with loss of fat plane resultant proximal dilatation of stomach.
- Lesion causes mass effect in form of compression of portal vein at its confluence and infra-hepatic IVC.
- Lesion shows few foci of calcifications with in and multiple cystic area.
- Liver metastasis

Case No – 10: Solid Pseudopapillary tumor (SPT) head and uncinate process of pancreas

Histopathology Correlation – Solid Pseudopapillary tumor (SPT)



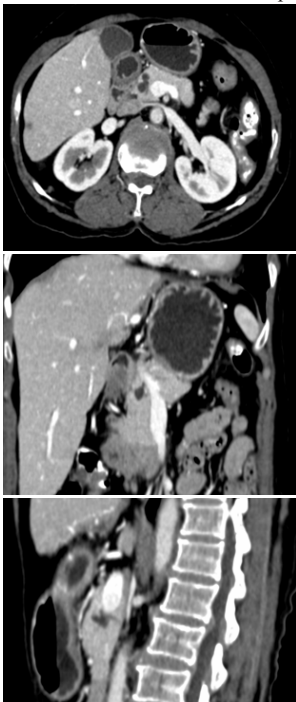


A 19-year-old Female presented with abdominal pain and USG report shows mass in right lumbar region for which dynamic CECT abdomen done.

Findings:

- Presence of approx. 82x86x93 mm sized (APxTRxCC) well defined Capsulated large heterogeneous solid cystic area is noted arising from head and uncinate process of pancreas.
- Lesion abut and compress 2nd and 3rd part of duodenum, abuts and displaces right kidney posteriorly.
- Lesion abut and displaces SMV.

Case No – 11: Side branch IPMN head and neck of pancreas

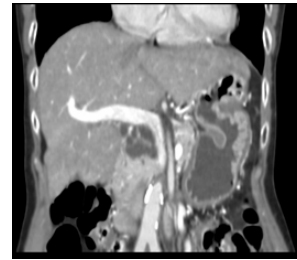
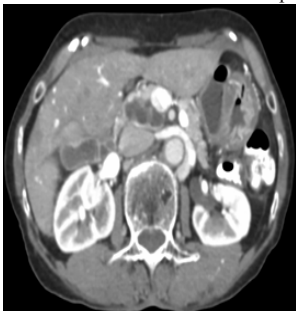


A 45-year-old Male with known case of Ca Rectum. Incidental finding on CECT abdomen well defined lobulated cyst head and neck of pancreas for which dynamic CECT abdomen done.

Findings:

- Presence of approx. 13x8x11 mm sized (APxTRxCC) well-defined lobulated multi-cystic lesion is noted arising from head and neck of pancreas.
- Appears communicating with the main duct.
- MPD is not dilated

Case No – 12: Side branch IPMN head and neck of pancreas



A 61-year-old Male with Incidental finding on USG shows Multiloculated cyst in head of pancreas for which dynamic CECT abdomen done.

Findings:

- Presence of approx. 16x30x27 mm sized (APxTRxCC) Multiloculated cyst is noted arising from head and uncinate process of pancreas.
- Appears communicating with the main duct. Lesion shows internal septations.
- MPD is not dilated.

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