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Dr. P Sri Vaishnavi
Kamineni Institute of Medical Sciences, Narketpally, Telangana, India

Dr. Amdipuram Suma Bhargavi
Kamineni Institute of Medical Sciences, Narketpally, Telangana, India

Dr. PVN Murthy
Kamineni Institute of Medical Sciences, Narketpally, Telangana, India

Corresponding Author:
Dr. PVN Murthy
Kamineni Institute of Medical Sciences, Narketpally, Telangana, India

CECT evaluation of rare and common complications of pancreatitis

Dr. P Sri Vaishnavi, Dr. Amdipuram Suma Bhargavi and Dr. PVN Murthy

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Abstract
AIM: To evaluate the role of CECT in diagnosis of common and rare complications of pancreatitis.
Materials and Methods:
Type of study: Retrospective study.
Place of study: Dept. of Radio Diagnosis, KIMS, NARKETPALLY.
Sample size: 129
Duration of study: 1st October 2019-30th September 2020 (12 months).
Inclusion criteria: Patients with clinical features and/or laboratory findings and/or ultrasonography findings of acute pancreatitis and chronic pancreatitis.
Results: 129 subjects were included in the study, among which 88.3% were males. Most of them belonged to the 31 -40years age group. On CECT, Acute peri-pancreatic fluid collection was seen in 43.4%, acute necrotic collection in 5.4%, Pseudocysts in 16.2% including rare locations like renal subcapsular, hepatic subcapsular, splenic subcapsular, perinephric and retrovesical sites and walled-off necrosis in 4.6%. Vascular complications were seen in 24.8%, among which, thrombosis was seen in 20%, pseudo-aneurysm in 0.7%, hemorrhage in 3.1% and collaterals in 10% of the cases. Pancreatico-pleural fistula was seen in 2.3%, Traumatic pancreatitis in 1.5%, groove pancreatitis in 0.7%, ascites in 72.8% and Pleural effusion was seen in 43.4% of the cases.
Conclusion: Pancreatitis is associated with a wide variety of complications. Some complications of pancreatitis have atypical presentations. CECT plays an important role in diagnosing these complications, guiding management and reducing morbidity.

Keywords: CECT, pancreatitis, acute peri-pancreatic, subcapsular

Introduction

Pancreatitis is the inflammation of pancreas and is the most common disease of pancreas. It can be acute, chronic or acute on chronic. It has a broad spectrum of findings ranging from mild interstitial edematous pancreas to severe forms with significant local and systemic complications. It is caused due to various factors like alcohol abuse, gallstones, steroids, trauma, autoimmune disorders etc. Most common cause of acute pancreatitis is gall stones and most common cause of chronic pancreatitis is alcohol abuse.

Acute pancreatitis has high morbidity and mortality. Computed tomography is the gold standard technique for evaluating the pancreatitis and its complications. Contrast enhanced computed tomography helps in early diagnosis and staging of severity of acute pancreatitis and its complications which helps in predicting prognosis of the disease.

Contrast-enhanced CT is the imaging modality of choice for the diagnosis and grading of acute pancreatitis [1, 2]. Pancreatitis is associated with a wide variety of complications which include, pancreatic complications, peri-pancreatic fluid collections and extra-pancreatic complications.

Pancreatic complications include exocrine insufficiency, diabetes, Malabsorption and increased predisposition to carcinoma. Peripancreatic fluid collections consist of exudate, peripancreatic fat tissue necrosis, or haemorrhage [3-7].

Pancreatic necrosis is considered to be one of the most important complications that can occur, and it is also considered to be the most important indicator of disease severity [8].

Present study was done to assess the role of Contrast enhanced CT in evaluating pancreatitis and its complications.

Materials and Methods

A Retrospective study was conducted involving 129 patients of all age groups and genders, with clinical features and/or laboratory findings and/or ultrasonography findings of acute pancreatitis or chronic pancreatitis or acute on chronic pancreatitis in Dept. of Radio Diagnosis, Kamineni Institute of medical sciences, NARKETPALLY, during October 2019-September 2020 (12 months).

Inclusion criteria

All the patients referred to the department of Radio Diagnosis, KIMS, Narketpally, with clinical features and/or laboratory findings and/or ultrasonography findings of acute pancreatitis and chronic pancreatitis were included in the study and were subjected to Contrast enhanced CT.

Technique

Equipment: Toshiba Alexion 16 Slice MD-CT Scan.

All patients were held on fasting for at least 6 hours prior to the scan. A written consent had been obtained from each patient after explaining the possibility of contrast reaction at the time of imaging.

The patient was placed on the gantry table in the supine position with both arms above the head. Non-enhanced 5mm sections were obtained throughout the abdomen. 5ml test dose was given 10mins before starting the scan.

Contrast scans were obtained by injecting non-ionic contrast 60ml to 80ml at a rate of 3ml per second using a pressure injector via an 18G cannula placed in the antecubital vein.

Interpretation

Acute interstitial edematous pancreatitis is diagnosed by focal or diffuse enlargement of pancreas, edema of pancreas and fat stranding around the pancreas.

Necrotising pancreatitis is diagnosed by identifying areas of necrosis in pancreas characterized by absent enhancement.

Presence of calcifications and/or atrophy in the pancreas points towards the diagnosis of chronic pancreatitis.

Presence of calcifications and/or atrophy in the pancreas along with areas of active inflammation and necrosis indicates acute on chronic pancreatitis.

Modified CT severity index

- It is used to access the amount of pancreatic inflammation and/ or necrosis and/or complications.

Pancreatic inflammation

- Pancreas is normal-0 points.
- Intrinsic abnormalities of pancreas with or without inflammatory changes in peripancreatic fat-2 points.
- Pancreatic or peripancreatic fluid collection or peripancreatic fat necrosis-4 points.

Pancreatic necrosis

- No necrosis-0 points.
- Lee than or equal to 30% necrosis-2 points.
- More than 30% necrosis-4 points.

Extrapancreatic complications

- Presence of one or more extrapancreatic complications like ascites, pleural effusion, vascular complications like thrombosis, hemorrhage, pseudoaneurysm, gastrointestinal involvement or parenchymal complications-2 points.

Grading of pancreatitis

- 0-2: mild
- 4-6: moderate
- 8-10: severe

Revised Atlanta classification-2012

According to revised Atlanta classification of 2012, peripancreatic fluid collections in acute pancreatitis have been divided into 4 types, based on Continue, Degree of encapsulation and Time. They are:

- **Acute Peripancreatic Fluid Collections (APFC):** They contain only fluid, they are not encapsulated or partially encapsulated. They occur within 4 weeks of interstitial edematous pancreatitis.

- **Acute Necrotic Collections (ANC):** They contain both fluid and necrotic material. They are not encapsulated or partially encapsulated. They occur within 4 weeks of necrotizing pancreatitis.

- **Pseudocyst:** They contain only fluid, and are encapsulated. They occur after 4 weeks of interstitial edematous pancreatitis.

- **Walled off necrosis (WON):** They contain both fluid and necrotic material. They are fully encapsulated. They occur after 4 weeks of necrotizing pancreatitis.

Results

129 patients were included in the study. 88.3% (114) are males and 11.6% (15) are females. (Table. 2) Most of the patients belonged to the age group of 31-40 years-31% (40). (Table. 1).

Acute pancreatitis was seen in 72% (93) patients, of which, interstitial edematous pancreatitis was seen in 45% (58) patients, necrotizing pancreatitis was seen in 25.6% (33) patients, acute on chronic pancreatitis was seen in 10% (13) patients, Chronic pancreatitis was seen in 17.8% (23), of which, chronic calcific pancreatitis was seen in 10.8% (14), chronic atrophic pancreatitis was seen in 6.2% (8), groove pancreatitis was seen in 0.7% (1). (Table 3).

The patients with acute pancreatitis (acute and acute on chronic) are 106, of the 63.7% have interstitial pancreatitis and 36.3% have necrotising pancreatitis. (Table 4). Severity of pancreatitis as assessed on MCTSI, in our study all patients had pancreatic inflammation, 7 patients were given 2 points while 16 patients were given 4 points 49 patients were given 6 points, 25 patients were given 8 points, 9 patients were given 10 points (Table 5).

According to, MCTSI maximum patients were seen to fall in the moderate category 65(61.3%) and minimum patients 7(6.6%) were seen in the mild category while severe category had 34(32%). (Table 6).

Acute peri-pancreatic fluid collection was seen in 43.4% (Table 7), acute necrotic collection in 5.4%, Pseudocysts in 16.2% including rare locations like renal sub-capsular, hepatic sub-capsular, splenic sub-capsular, peri-nephric and retro-vesical sites and walled-off necrosis in 4.6%. Infection pseudocyst was seen in 0.7% of and infected necrosis was seen in 0.7%.

Extra-pancreatic complications were seen in 84.5% (109). Vascular complications (Table.8) were seen in 24.8%, among which, thrombosis was seen in 20%, pseudo-

aneurysm in 0.7%, hemorrhage in 3.1% and collaterals in 10% of the cases. Other extra-pancreatic complications like (Table. 9) Pancreatico-pleural fistula was seen in 2.3%, groove pancreatitis in 0.7%, ascites in 72.8% and Pleural effusion was seen in 43.4% of the cases.

Table 1: Age distribution of patients studied (n= 129)

Age in years	No. of patients	%
0-10	01	0.77%
11-20	08	6.2%
21-30	31	24%
31-40	40	31.0%
41-50	26	20.1%
51-60	17	13.1%
61-70	05	3.87%
71-80	01	0.77%

Table 2: Gender distribution of patients studied (n= 129)

Gender of the Patients	No. of Patients	%
Male	114	88.3%
Female	15	11.6%

Table 3: Distribution of type of pancreatitis in patients studied (n= 129)

Type of pancreatitis	Subtypes of pancreatitis	No. of patients	%
Acute pancreatitis	Interstitial edematous	60	46.5%
	Necrotising	33	25.5%
Acute on chronic	Interstitial	7	5.4%
	Necrotising	6	4.6%
Chronic	Calcific	14	10.8%
	Atrophic	8	6.2%
	Groove pancreatitis	1	0.7%

Table 4: Distribution of cases with acute pancreatitis (n=106)

Subtype of acute pancreatitis	No. of patients	%
Interstitial	67	63.3%
Necrotizing	39	36.7%

Table 5: MCTSI of patients with acute pancreatitis (n = 106)

MCTSI	No. of patients
2	7
4	16
6	49
8	25
10	9

Table 6: Severity of acute pancreatitis (n=106)

Severity of acute pancreatitis	No. of patients
Mild	7
Moderate	65
Severe	34

Table 7: Distribution of peripancreatic fluid collections in patients studied (n= 129)

Type of pancreatic fluid collection	No. of patients	%
Acute peri-pancreatic fluid collections (APFC)	56	43.4%
Acute necrotic collections (ANC)	7	5.4%
Pseudocyst	21	16.2%
Walled off necrosis	6	4.6%

Table 8: Distribution of vascular complications in patients studied (n=129)

Type of vascular complication	No. of patients	%
Thrombosis	26	20%
Pseudo-aneurysm	1	0.7%
Hemorrhage	4	3.1%
Collaterals	13	10%

Table 9: Distribution of other extra-pancreatic complications in patients studied (n= 129)

Type of extra-pancreatic complication	No. of patients	%
Ascites	94	72.8%
Pleural effusion	56	43.4%
Pancreatico-pleural fistula	03	2.3%

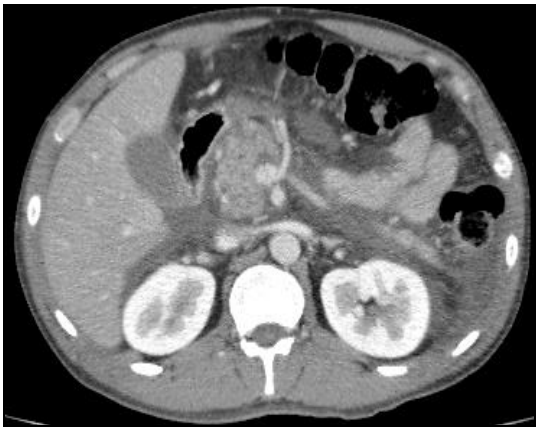

Fig 1: Contrast enhanced axial CT images of a patient with acute peripancreatic collection

Fig 2: Contrast enhanced axial and coronal CT image of a patient with near total necrosis of pancreas

Fig 3: Contrast enhanced axial CT image in a 50 year old male showing thin walled multiloculated septate collection → Pseudocyst

Fig 4: Contrast enhanced axial CT image in a 45 year old male showing multiple pseudocysts in splenic and hepatic subcapsular locations, splenic vein thrombosis and left sided pancreaticopleural fistula

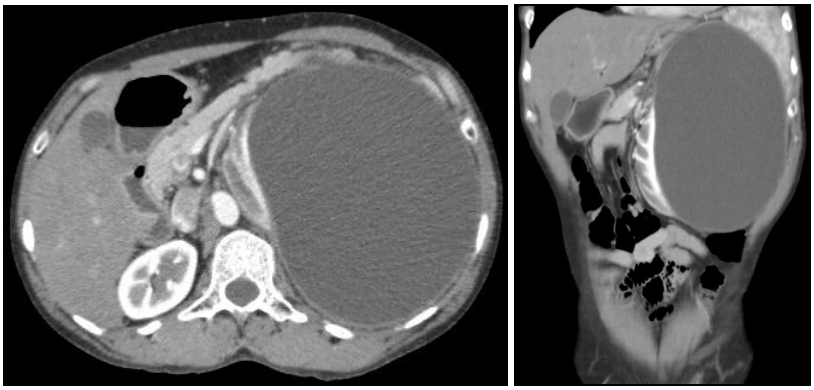

Fig 5: Contrast enhanced axial and coronal CT image in a 38 year old male showing small pseudocyst in the tail of pancreas and a large renal subcapsular pseudocyst on left side with communication between the two cysts

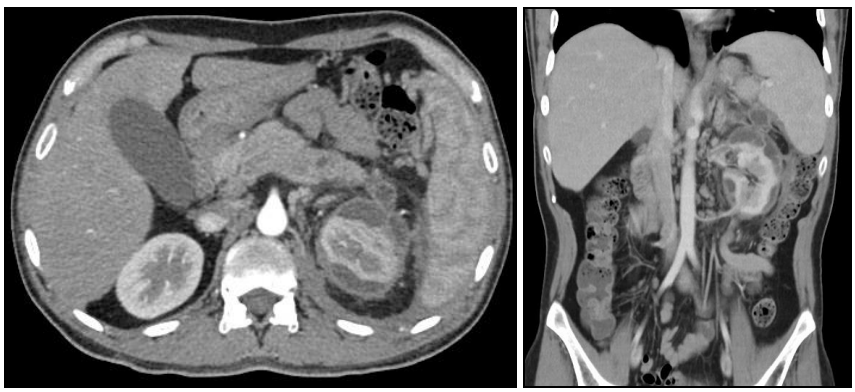

Fig 6: Contrast enhanced axial and coronal CT image showing a loculated perinephric pseudocyst

Fig 7: Contrast enhanced axial CT image showing a retro-vesical pseudocyst

Fig 8: Contrast enhanced axial CT image showing a pseudocyst in the spleen

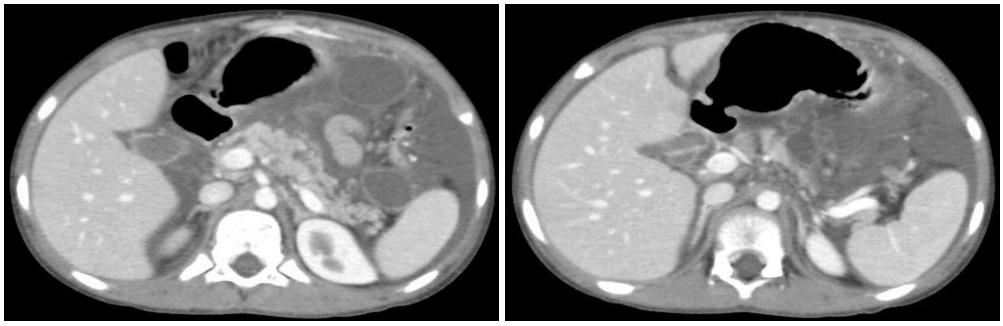

Fig 9: Contrast enhanced axial CT image in a 9 year old female child showing acute necrotising pancreatitis with walled off necrosis

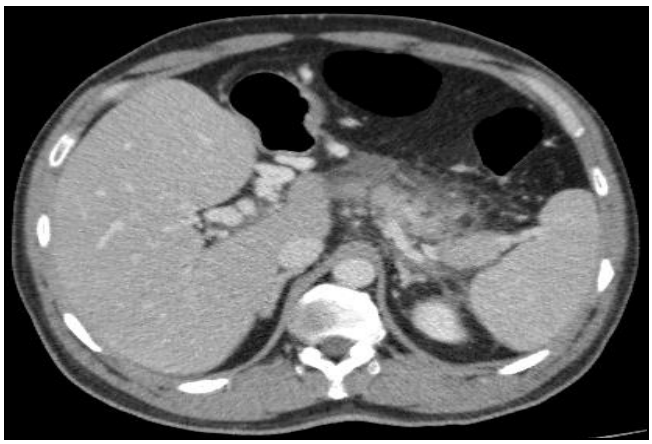

Fig 10: Contrast enhanced axial CT images of a patient with complete thrombosis of portal vein and the portal vein is replaced by collaterals

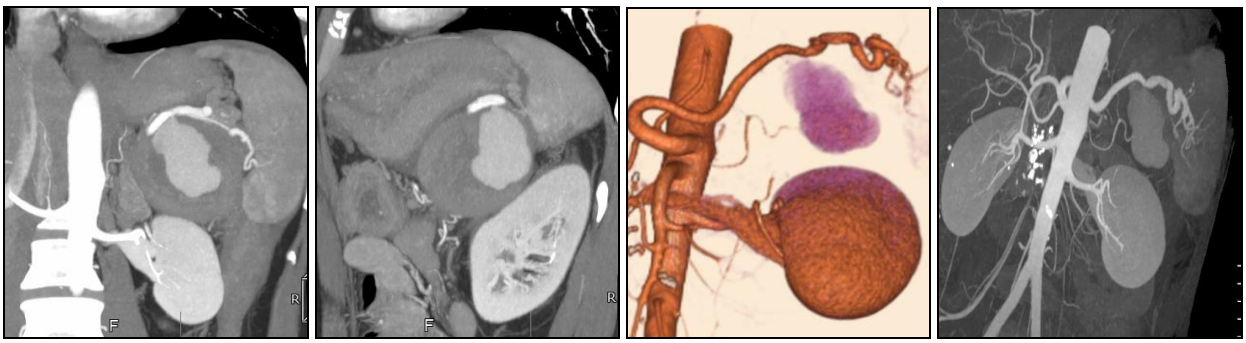

Fig 11: Contrast enhanced coronal, sagittal and reformatted CT images of a 45year old patient with a large splenic artery pseudo aneurysm and multiple peri-gastric collaterals

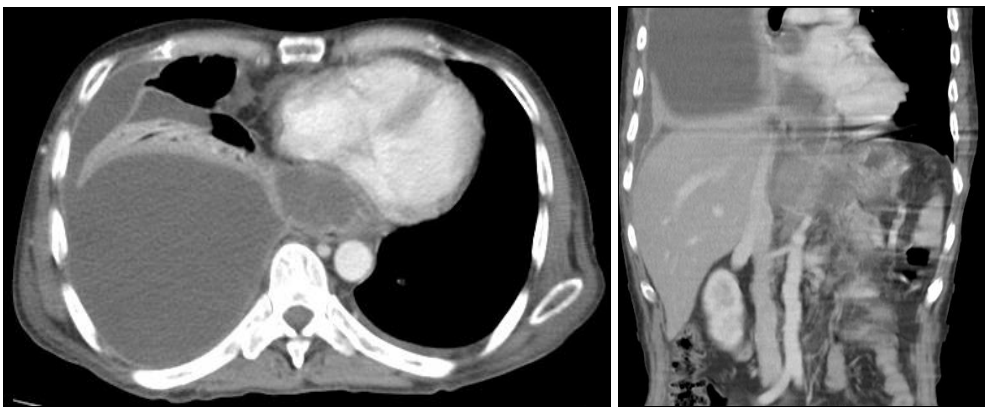

Fig 12: Contrast enhanced axial and coronal CT images of a 42 year old male patient with a large hemorrhagic right pleural effusion with communication with the posterior mediastinum which is in turn communicating with the pancreatic pseudocyst in the abdomen

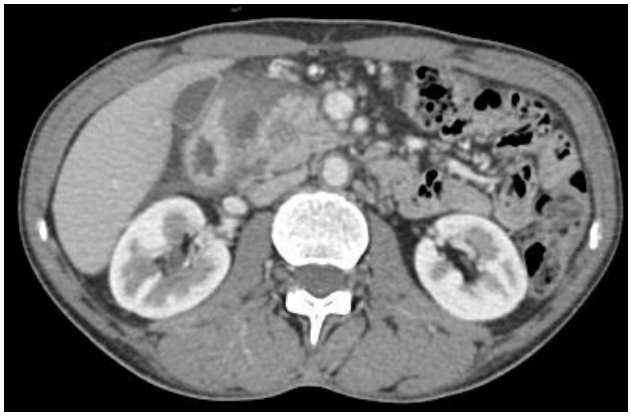

Fig 13: Contrast enhanced axial CT image showing sheet like soft tissue thickening in the pancreaticoduodenal groove with few cysts →Groove pancreatitis

Discussion

This study was conducted in 129 patients with acute, acute on chronic and chronic pancreatitis referred to Dept. of Radio Diagnosis, Kamineni Institute of medical sciences, NARKETPALLY.

Age incidence: The maximum patients were in the age group of 31 to 40 years (31%). The next group with maximum patients was in the 21 to 30 years group (24%). The minimum age of patients was 9 years and maximum age was 73 years with a minimum number of patients seen below the age of 10 years and above 70years. These observations was similar to that of a study conducted by Lankish *et al*., [9] on 602 patients of acute pancreatitis which showed maximum incidence of acute pancreatitis in the age group 31 to 40 years.

Sex Distribution: Most of the patients were male (88.3%) as compared to female (11.6%). These observations was similar to that of a study conducted by Lankish *et al*., [9] on 602 patients of acute pancreatitis which showed no correlation between age, gender with severity of acute pancreatitis.

Out of 106 cases with acute pancreatitis, 67 (63.3%) patients had interstitial edematous pancreatitis. 39 (36.7%) patients showed evidence of pancreatic necrosis. A study by Bollen [10] *et al*., and Casas *et al*., identified necrosis in 18% and 15% of patients with acute pancreatitis respectively.

The CT grades were classified into 2, 4, 6, 8 and 10 according to the MCTSI. We further classified the grades into mild (grade 2), moderate (grade 4 & 6) and severe (grade 8 & 10). The previous studies by Bollen *et al*., [10] and Mortele *et al*., [11] also classified grade 2 as mild, grade 4 and 6 as moderate and grade 8 and 10 as severe.

According to, MCTSI maximum patients were seen to fall in the moderate category 65(61.3%) and minimum patients 7(6.6%) were seen in the mild category while severe category had 34(32%). According to the study by Bollen *et al*., [10] the morphologic severity of pancreatitis was graded as mild in 86(44%), moderate in 75(38%), and severe in 35 (18%) cases.

Extra-pancreatic complications were seen in 84.5% (109). Vascular complications were seen in 24.8%, among which, thrombosis was seen in 20%, pseudo-aneurysm in 0.7%, hemorrhage in 3.1% and collaterals in 10% of the cases. Other extra-pancreatic complications like Pancreatico-pleural fistula was seen in 2.3%, groove pancreatitis in 0.7%, ascites in 72.8% and Pleural effusion was seen in 43.4% of the cases. According to Chishty *et al*., conducted a study in 40 patients of which extra-pancreatic complication was seen in 89%.

Pseudocyst was seen in 21 patients (16.2%) in our study. Pseudocyst formation occurred in 50% of patients in a study conducted by Gonzalez *et al*., [12] Infected necrosis was detected in 1 patients (0.7%). The total percentage of patients developing local complications in the study was 67.4%. Presence of local complications was positively associated with CT grading. There was evidence of development of local complications in patients with mild pancreatitis.

Conclusion

CECT plays an important role in diagnosis and staging of acute pancreatitis. Acute pancreatitis is associated with a wide variety of complications affecting the pancreatic gland, pancreatic duct, and surrounding vasculature.

Some complications of pancreatitis have atypical presentations, in which imaging plays the most important role in assigning the pathology as a complication of pancreatitis.

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