IMAGING OF THE PANCREAS IN COVID 19 PATIENTS: SARS CoV 2, AN UNUSUAL SUSPECT OF ACUTE PANCREATITS

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Abstract

Background-The corona virus disease 2019 (COVID-19) is an infectious pulmonary disease with a potential to affect other organs to a varying extent. The involvement of pancreas is less frequent and can range from mild to severe form. Contrast enhanced computerised tomography (CECT) plays an invaluable role in the diagnosis of acute pancreatitis (AP); it also helps in the identification of complications and assessment of response to treatment.
Materials and methods-This is a descriptive cross-sectional study conducted in our tertiary care institute from May 2021 to February 2022. A total of 21patients with COVID-19 who presented with severe abdominal pain and underwent CECT of the abdomen on a 16 slice CT scanner. **Results-**In our study 19 (90.5%) cases were of interstitial edematous pancreatitis and 2 (9.5%) cases were of necrotizing pancreatitis. Associate complications seen were, 4(19%) cases had acute peri pancreatic collections, 1(4.7%) cases had acute necrotic collections, 6(28.5%) cases had pleural effusion, 4(19%) cases had ascites and 2 (9.5%) patients had portal vein thrombosis. **Conclusion-** Acute pancreatitis and its complications can be seen in COVID-19 patients. CECT is a fast and highly sensitive in diagnosing and identifying complications of acute pancreatitis and hence can play a very crucial role in its management.

Key words
COVID-19, Acute interstitial edematous pancreatitis, acute necrotizing pancreatitis

Introduction

The corona virus disease -2019 (COVID-19) is a respiratory illness caused by severe acute respiratory syndrome corona virus 2 (SARS-CoV-2). The disease was first discovered in Wuhan, China in December 2019 and soon became a global emergency and was characterized as pandemic by world health organization (WHO) on 11th March 2020. It has caused more than half a million deaths in India alone. The infection can cause a wide range manifestation from asymptomatic form to fatal disease a consequence of acute lung injury and multi organ failure.

The disease predominantly affects the lungs and causes pneumonia which presents with cough, fever and fatigue. However, extra-thoracic involvement like the gastrointestinal and hepatobiliary systems, among other systems, has also been documented. COVID-19 can cause pancreatic damage and present as acute pancreatitis with varying severity [1].

Acute pancreatitis is an acute inflammatory process of the pancreas which may involve adjacent peripancreatic soft tissue and can affect various other organs.

Morphologically it is classified into two forms: Acute interstitial edematous pancreatitis (AIEP) & acute necrotizing pancreatitis (ANP) (Fig 1). The severity is classified into mild, moderate and severe.

The diagnosis of acute pancreatitis requires two of the following three features of revised Atlanta classification [2].

1. Typical abdominal pain consistent with AP.
2. Serum lipase or amylase levels that are at least 3 times the upper limit of the normal range, and
3. Findings of AP on CECT and other imaging modalities.

Table 1 Revised Atlanta Classification: CT criteria for local pancreatic complications [3]

Local Complication	Morphologic CT Criteria
Acute peripancreatic fluid collection (APC)	< 4 weeks after onset of symptoms Occurs in interstitial edematous pancreatitis. Fluid density collection Confined by normal peripancreatic fascial planes No fully definable wall. Adjacent to pancreas
Pseudocyst	> 4 weeks after onset of symptoms Occurs in interstitial edematous pancreatitis Homogeneous collection with fluid density Well-defined wall No non-liquid component Adjacent to pancreas
Acute necrotic collection(ANC)	< 4 weeks after onset of symptoms In necrotizing pancreatitis Heterogeneous collection No fully definable wall. Located intra and/or extrapancreatic
Walled-off necrosis (WON)	> 4 weeks after onset of symptoms In necrotizing pancreatitis Heterogeneous collection Well-defined wall. Located intra and/or extrapancreatic

CT severity index (CTSI):

A CECT based 10point grading system was developed by Balthazar et al to assess the severity of AP which incorporates quantification of pancreatic/peripancreatic inflammatory changes (0–4 points) with the extent parenchymal necrosis (0–6 points) [4]. This grading system is shown to have prognostic value (table 2). A score of 0-3 is classified as mild AP, 4-6 is moderate AP and a score of 7-10 is considered Severe AP [5].

Table 2: CTSI

Characteristics	Points
Pancreatic inflammation	
Normal pancreas	0
Enlargement of the pancreas	1
Peripancreatic inflammation	2
Single acute peripancreatic fluid collection	3
Two or more acute peripancreatic fluid collections	4
Pancreatic parenchymal necrosis	
None	0
Less than 30%	2
Between 30% and 50%	4
More than 50%	6

The literature survey revealed limited studies done on imaging of AP on COVID-19 patients. Most of the studies have measured the serum amylase and lipase levels with clinical suspicion in the diagnosis of pancreatitis.

Pancreatic density measurement using CT can be used in the early diagnosis of pancreatitis in COVID-19 patients [6].

Aims and Objectives:

1. To study the imaging appearance of AP in patients with COVID-19.
2. To assess the usefulness of CECT in the diagnosis and identification of complications of AP in COVID-19 cases.

Materials and Methods

This is a hospital based cross sectional descriptive study performed between May 2021 and February 2022 in our tertiary care institute. A total of 21COVID- 19 patients who presented with severe abdominal pain who were either reverse transcriptase polymerase chain reaction (RTPCR) positive or had typical findings of COVID-19 on CT thorax were studied.

The imaging was performed on a 64 slice CT scanner, Siemens Somatom. Plain and contrast CT scan of the abdomen was performed by taking continuous axial sections of 5mm thickness from xiphisternum to pubic symphysis. The post contrast images were acquired after intra venous (i.v) injection of non ionic

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contrast media appropriate to body weight in arterial, portal venous and delayed phase.

The collected data was analyzed for the observations & results.

Results

In our study the there were a total of 21 COVID-19 patients who presented with abdominal pain typical for AP .The minimum and maximum age of presentation was 19 yrs and 71yrs respectively with an average of age of about 40yrs.

1(4.7%) case was between the age group of 18 to 20yrs, 13 (61.9%) cases were observed having age from 21 to 40yrs, 3 (14.2%) cases were between the age group of 41 to 60 and 4 (19%)cases were between the ages of 61 to 80.

There were 15 (71.4%) males and 6(28.5%) females in our study.

16 (76.2%) cases were categorized to have severe COVID-19 and 5 (23.8%) had mild illness which was classified according to radiological scoring system on HRCT thorax; a score above 7 was considered severe disease [7].

Severe COVID-19 was found in 12 (57.1%) males and 4 (19%) female and mild disease was seen in 3(14.2%) males and 2 (9.5%) females.

19 (90.5%) cases were found to have acute interstitial edematous pancreatitis and 2(9.5%) cases had necrotizing acute pancreatitis (Fig: 1). All 5 (23.8%) mild COVID patients had interstitial edematous pancreatitis.

All the 21 (100%) cases had bulky pancreas and stranding of peripancreatic fat to a varying degree.

4(19%) cases had acute peri pancreatic collections of which 1(4.7%) case had 2 peripancreatic collection and 3 (14.2%) cases had single peripancreatic collection , 1(4.7%) cases had acute necrotic collection, 6(28.5%) cases had pleural effusion, 4(19%) cases had ascites and 2(9.5%) patients had portal vein thrombosis [Table 3].

There were 10 (47.6%) cases of mild AP, 9(42%) had moderate and 2(9.5%) had severe AP [Table 4].

Table 3: CT Features of acute pancreatitis in COVID-19 Patients

CT-features	No of cases	Percentage (%)
Bulky pancreas	21	100
Peripancreatic fat stranding	21	100
Peripancreatic collections	4	19
Necrotic collections	1	4.7
Portal vein thrombosis	2	9.5
Pleural effusion	6	28.5
Ascites	4	19

Table 4: CTSI score of AP in COVID-19 patients.

CTSI-score	No of cases	Percentage (%)
0-3	10	47.6
4-6	9	42
7-10	2	9.5

Morphological types of AP
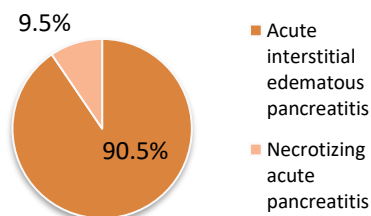
Fig 1: Morphological types of AP in COVID-19 patients.

Discussion

Viral pancreatitis is rare but a well documented cause of AP; most common viruses causing the disease are measles, mumps, hepatitis A and coxsakie virus. Angiotensin converting enzyme-2 (ACE-2) receptors on host cells have a role in COVID-19 pathogenesis, and pancreatic islet cells express these receptors on their cell membranes, making them a target for direct virus invasion. SARS CoV-2 virus particles have

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been isolated from the pseudocyst of pancreas from COVID -19 patients with AP; hence it can be a potential cause in the development of AP [8-9].

In our study it was found that the disease was most prevalent in 3rd and 4th decade and the mean age of presentation was 40yrs. Males were affected more commonly than females (M:F::2.5:1) .

AP was more common in patient with severe pulmonary COVID disease which constituted more than 75 % of cases (Fig 2). The radiological scoring of pulmonary COVID on HRCT lung was assessed based on the findings described by Wasilewski PG et al [7].
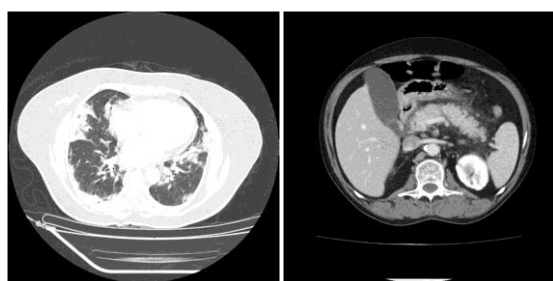

Fig 2: Severe COVID pneumonia   Fig 3: AIPEP, Bulky pancreas with peripancreatic fat stranding

More than 90% of the patients had acute interstitial edematous pancreatitis (Fig 3) and <10% were seen to have acute necrotizing pancreatitis. The patients of mild COVID 19 disease had acute interstitial edematous pancreatitis.

All the cases showed enlarged pancreas and significant peripancreatic fat stranding.

The complications associated with severe AP include pleural effusion, acute peripancreatic collection (5), ascites, portal vein thrombosis (Fig 6) and acute necrotic collection (Fig 4) in the descending order of frequency.

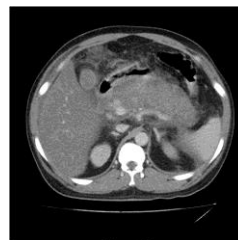Majority o f the cases had a CTSI score of 0-3 consistent with milder form.

Fig 4: ANP   Fig 5: Intrapancreatic collection

Fig 6: Portal vein thrombosis

Conclusion

COVID -19 is a potential cause for acute pancreatitis. Occurrence of AP along with severe pulmonary disease significantly increases the risk of mortality hence early diagnosis is a key to favorable outcome. CT scan plays a very important role in the diagnosis of AP and also helps in the assessment of its complications. Application of various imaging based scoring system can assist in management and has prognostic value. Further imaging can help in guiding percutaneous interventions.

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