Section: Radiodiagnosis

Research

RADIOLOGICAL STUDY TO ASSESS THE SEVERITY OF ACUTE PANCREATITIS USING REVISED ATLANTA CLASSIFICATION AND ITS CORRELATION WITH CLINICAL OUTCOMES

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Abstract

Background: Acute pancreatitis is an acute inflammatory condition, with a range of severity as well as various local and systemic complications. Revised Atlanta classification is a standardized clinical and radiologic nomenclature for acute pancreatitis. Present study was aimed to assess the severity of acute pancreatitis using revised Atlanta classification and its correlation with clinical outcomes. **Materials and Methods:** Present study was single-center, prospective, observational study, CECT imaging of 75 confirmed cases of acute pancreatitis was done. **Result:** In present study, maximum cases reported in 31 to 40 years (52 %), mean age of presentation was 37.69 ± 7.4 years in the study.Most of the cases were moderate severity (61.33 %) followed by mild cases (29.33 %) and severe cases (9.33 %). In present study, majority cases were Acute Edematous Pancreatitis (32 %), Acute Necrotising Pancreatitis with ANC (16 %), Acute Edematous Pancreatitis with Apfc (14.67 %), Acute Necrotising with walled off Necrosis (10.67 %) & Acute Necrotising Pancreatitis (6.67 %). 6.67 % cases showed the evidence of infection. Persistent organ failure observed in 7 patients of severe pancreatitis (9.33 %). 24 (32%) cases underwent various interventions. Ascites was seen in 32 cases (42.67 %) of acute pancreatitis cases. Reactive pleural effusion was observed in 34.67 % cases. 4% cases were associated with vascular complications. 5.3% of Mortality was observed in study population. Duration of Hospital stay (days), ICU admission, Organ failure, Need for Intervention & Mortality were related to severe acute pancreatitis cases & difference was statistically significant. **Conclusion:** Revised Atlanta classification-based severity assessment was very well comparable with clinical outcome and predicting the severity accurately.

INTRODUCTION

Acute pancreatitis is an acute inflammatory condition, with a range of severity as well as various local and systemic complications.[1] Gallstones and alcohol are the first and second most common causes of acute pancreatitis.[1,2] Serum amylase and lipase levels are the most commonly used measures to diagnose pancreatitis. Unfortunately, these values are elevated in only 80% to 90% of patients with acute pancreatitis.

The 2012 revised Atlanta classification is an update of the original 1992 Atlanta classification, a standardized clinical and radiologic nomenclature for acute pancreatitis and associated complications based on research advances made over the past two decades.[3,4] The classification system defined pancreatitis as the presence of any two of the following three criteria being present in the patient: Abdominal pain consistent with that of Acute Pancreatitis, serum amylase and/or lipase levels greater than three times the upper limit of normal, and characteristics findings of AP seen in cross-sectional abdominal imaging.

The classification of severity is primarily based on presence of organ failure (OF) which is assessed by modified Marshall scoring system, and local or systemic complications (exacerbation of co-morbid conditions).[5,6] These patients are at an increased risk of death, with a mortality reported as high as 36–50% which may increase further with the development of infected necrosis. Present study was aimed to assess the severity of acute pancreatitis using revised Atlanta classification and its correlation with clinical outcomes.

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MATERIALS AND METHODS

Present study was single-center, prospective, observational study, conducted in department of radiodiagnosis, at Madurai medical college & hospital, Madurai, India. Study duration was of 2 years (January 2020 to December 2021). Study approval was obtained from institutional ethical committee.

CECT imaging of 75 confirmed cases of acute pancreatitis was done in present study. Written informed consent was obtained from study participants. Severity of pancreatitis was assessed using revised Atlanta classification. Organ failure was assessed using modified Marshall scoring system. Patients categorized into mild, moderate and severe pancreatitis and followed till discharge from hospital. Patient's clinical details, imaging findings, morbidity parameters, complications and interventional procedures were recorded.

CECT abdomen done by using TOSHIBA Acquilion lightening 16 slice MDCT machine. Non-ionic (iohexol) contrast agent was used intravenously (1ml /kg) after checking the renal parameter. The best diagnostic images are obtained by achieving optimal vascular and parenchymal enhancement and avoiding respiratory motion. A rapid 4 mL/s intravenous bolus of 100 mL of 60% Non-ionic contrast material is injected. We routinely use a two-phase imaging technique. Images in the pancreatic (60 – 70 sec) and hepatic venous phases (80- 90 sec) are obtained with 2- to 3-mm slice thickness. Oral contrast was not used routinely.

Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Frequency, percentage, means and standard deviations (SD) was calculated for the continuous variables, while ratios and proportions were calculated for the categorical variables. Difference of proportions between qualitative variables were tested using chi- square test or Fisher exact test as applicable. P value less than 0.5 was considered as statistically significant.

RESULTS

In present study, maximum cases reported in 31 to 40 years (52 %), mean age of presentation was 37.69 ± 7.4 years in the study. Most of the cases were moderate severity (61.33 %) followed by mild cases (29.33 %) and severe cases (9.33 %). 73% of cases recovered within 14 days with overall mean duration of hospital stay was 13.05 ± 10.2 days. Only 17% of cases were managed in ICU.

Table 1: General characteristics.

Characteristics	No. of Cases (n=75)	Percentage
Age (in years)		
< 30	13	17.33%
31 – 40	39	52.00%
41 – 50	18	24.00%
> 50	5	6.67%
Mean ± SD	37.69 ± 7.496	
Severity		
Mild	22	29.33%
Moderate	46	61.33%
Severe	7	9.33%
Duration of Hospital Stay (Days)		
< 7	26	34.67%
8 - 14	29	38.67%
15 - 21	7	9.33%
22 - 28	6	8.00%
> 28	7	9.33%
Mean ± SD	13.05 ± 10.2	
ICU Stay (days)		
Nil	62	82.67%
< 7	7	9.33%
8 - 14	3	4.00%
> 14	3	4.00%

In present study, majority cases were Acute Edematous Pancreatitis (32 %), Acute Necrotising Pancreatitis with ANC (16 %), Acute Edematous Pancreatitis with Apfc (14.67 %), Acute Necrotising with walled off Necrosis (10.67 %) & Acute Necrotising Pancreatitis (6.67 %).

Table 2: Diagnosis and associated complication of acute pancreatitis

Diagnosis & Grading as per Revised Atlanta Classification	No. of Cases (n=75)	Percentage
Acute Edematous Pancreatitis	24	32.00%
Acute Necrotising Pancreatitis with ANC	12	16.00%
Acute Edematous Pancreatitis with Apfc	11	14.67%
Acute Necrotising with walled off Necrosis	8	10.67%
Acute Necrotising Pancreatitis	5	6.67%
Acute Edematous Pancreatitis with Pseudocyst	2	2.67%
Acute Necrotising Pancreatitis with peripancreatic necrosis	2	2.67%

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Acute Necrotising Pancreatitis with infected Necrotic Collection	2	2.67%
Acute Edematous Pancreatitis &Pancreatic pleural fistula	1	1.33%
Acute Edematous Pancreatitis with Apfc & Pancreatitis pleural fistula	1	1.33%
Acute Edematous pancreatitis with Pseudocyst & Splenic artery pseudo-Aneurysm	1	1.33%
Acute hemorrhagic Necrotising Pancreatitis	1	1.33%
Acute hemorrhagic Necrotising Pancreatitis with WON	1	1.33%
Acute Necrotising with ANC & Pancreatico pleural fistula	1	1.33%
Acute Necrotising Pancreatitis with splenic artery thrombosis	1	1.33%
Acute Necrotising Pancreatitis with Ruptured Left Gastric Artery Pseudo Aneurysm	1	1.33%
Necrotising Pancreatitis with infected (walled off Necrosis)	1	1.33%

In present study, 6.67 % cases showed the evidence of infection. Persistent organ failure observed in 7 patients of severe pancreatitis (9.33 %). 24 (32%) cases underwent various interventions. Ascites was seen in 32 cases (42.67 %) of acute pancreatitis cases. Reactive pleural effusion was observed in 34.67 % cases. 4% cases were associated with vascular complications.

Table 3: Complications

Characteristics	No. of Cases (n=75)	Percentage
Infections	5	6.67%
Persistent Organ Failure	7	9.33%
Need for Intervention	24	32.00%
Ascites	32	42.67%
Pleural Effusion	26	34.67%
Vascular Complications	3	4.00%

5.3% of Mortality was observed in study population

Table 4: Mortality

Mortality	No. of Cases	Percentage
Expired on day 5 due to haemorrhagic pancreatitis	1	1.33%
Expired due to multi organ failure	3	4.00%

Mean hospital duration was highest in severe cases (22.14 ± 16.32 days) and lowest in mild cases (6.14 ± 3.65 days). 85% of severe cases and 15% of moderate cases managed in ICU for pancreatitis related systemic complications. All the 7 cases of severe pancreatitis had persistent organ failure > 48 hrs and 13% of moderate cases had transient organ failure <48hrs. 57.14 % of severe cases, 41.3 % of moderate cases and 4.55 % of mild cases underwent interventional procedure for acute pancreatitis related complications. 57.14 % of severe cases expired due to acute pancreatitis complications, no mortality observed in mild and moderate cases. Duration of Hospital stay (days), ICU admission, Organ failure, Need for Intervention & Mortality were related to severe acute pancreatitis cases & difference was statistically significant.

Table 5: Comparison between mild, moderate and severe pancreatitis cases

Severity	Duration of Hospital stay (days)	ICU admission	Organ failure	Need for Intervention	Mortality
Mild (22)	6.14 ± 3.65	0	0	1 (4.55 %)	0
Moderate (46)	14.98 ± 8.27	7 (15.22 %)	6 (13.04 %)	19 (41.3 %)	0
Severe (7)	22.14 ± 16.32	6 (85.71 %)	7 (100 %)	4 (57.14 %)	4 (57.14 %)
p value	<0.001 Significant	<0.001 Significant	<0.001 Significant	0.003 Significant	<0.001 Significant

DISCUSSION

Acute pancreatitis is local inflammatory disease involving pancreas and peripancreatic region with variable systemic involvement and local complications. Systemic complications like multiorgan failure are the cause of death in initial phase of pancreatitis. Late phase mainly determined by local complications, vascular, pleural and GIT involvement. Unlike other classifications revised Atlanta is the only classification includes both organ failure and local complications for the assessment of severity of pancreatitis.[5,6]

In patients with suspected acute pancreatitis, dynamic contrast-enhanced CT(CECT) is the imaging modality of choice. CECT plays a role in establishing the diagnosis, staging the severity of the disease, and assists in the detection of complications.[3] However, it must be borne in mind that the staging of severity and detection of complications depend on the timing of CT scanning. In the first 24–48 hours, the CT findings of necrosis may be equivocal as only 25% of patients with acute pancreatitis develop necrosis. Additionally, pancreatic necrosis may not develop within the first 48 hours. In severe acute pancreatitis, unless the patient is critically ill and in need of emergency intervention, the initial CT scan should ideally be obtained at least 72 hours following symptom onset.[2]

In our study maximum cases were reported in 30 – 40 yrs age group with mean age as 37 yrs. Most

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common type is acute edematous pancreatitis (40cases 53.3%) followed by acute necrotizing pancreatitis (35 cases 46.6%) Incidence of Necrotising pancreatitis is high in this study, which is 10 – 20% in most of this study.[2,5,7]

Previous similar studies Kloppel G et al,[8] shows mild cases high compared to moderate and severe cases. mild (62%), moderately severe (34.3%), and severe AP (3.7%). length of hospital stay, ICU stay and complications more in severe cases. Mortality observed only in severe cases. Arvanitakis M, et al,[7] study shows mild AP in 70% to 85% of patients, moderately severe AP in 10% to 15% of patients, and severe AP in 5% to 15% of patients.

Rau BM,[9] study shows mild, moderately severe, and severe in 72%, 16%, and 12% of patients, respectively. The mean hospital stay was 6, 9, and 13 days for mild, moderate, and severe AP respectively, which is low compared to our study. Radecki PD et al,[10] reported mild, moderate, and severe AP in 30%, 53%, and 17% of patients respectively, which is similar to our study

Most of the study shows high prevalence of Mild cases mostly due to lower utilisation CT as per guidelines in the initial weeks. Most of the clinically mild cases may have minimal fluid collection which should be classified in moderate. 17% cases were managed in ICU. Among ICU cases 85% severe and 15% moderate severity cases. Johnson CD et al,[11] shows 15% of moderate cases shows transient organ failure. Organ failure was mostly seen with necrotizing pancreatitis cases, which is similar to our study.

Overall, 6.6% infection associated with pancreatitis of which 42% severe cases and 4% moderate cases shows the evidence of infection. All the six cases were necrotizing type of pancreatitis. Previous study Beger HG et al,[12] and Traverso LW shows 20 – 35% of necrotising pancreatitis complicated with infection.[13]

Overall vascular complication associated with the cases is 4% of which 28% severe cases and 2% moderate cases (Among three cases, two were necrotizing type and one is edematous type) previous study Safrit HD and Vujic I on gastrointestinal and vascular complication shows 6% cases associated with vascular complications.[14,15]

Overall, 32% of cases underwent various interventional management of which 57%severe ,41% moderate and 4% of mild cases (eight edematous type of cases and 14 necrotizing type of cases). Previous study Balthazar EJ et al,[16] &Freeny PC et al,[17] shows 30 – 40% of pancreatitis cases needed intervention.

Carnovale A, et al,[18] and Jordanov P et al,[19] The overall mortality rate was 10 – 15% and it was different depending on the severity of the disease. Only 2 – 5 % of the patients with a mild disease died, as opposed to 40 - 50% of the patients with a severe form. In our study no mortality observed in mild and moderate pancreatitis.

Ascites (42%) and pleural effusion (34%) were seen in the total studied cases. pleural effusion and ascites were absent in mild cases. Heller SJ, et al,[20] study shows 45% of acute pancreatitis cases associated with reactive pleural effusion. As the severity increases in the cases, Duration of hospital stay, ICU stay, evidence of infection, vascular complication and need for intervention also increases. Mortality observed only in severe cases in the study. Different grades of severity for revised Atlanta classification system were associated with statistically significant differences in terms of clinical outcomes.

CONCLUSION

Revised Atlanta classification-based severity assessment was very well comparable with clinical outcome and predicting the severity accurately. It gives clear differentiation between fluid collection enable stratification among different treatment plans, facilitating the radiologist seamless integration into a multidisciplinary team. Study results shows as the severity increases morbidity, mortality and complications also increased in the patients.

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