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A MODIFIED CT SEVERITY INDEX FOR EVALUATING ACUTE PANCREATITIS AND ITS CORRELATION WITH CLINICAL OUTCOME

Surgery

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ABSTRACT

Background: The pancreas is a large flattened gland located in the abdomen. The pancreas is an elongated retroperitoneal organ; 15-20 cm in length; lies against L1 –L2 vertebra. It lies posterior to stomach, separated by lesser sac. The pancreas has two main functions; firstly, exocrine releases powerful digestive enzymes into the small intestine to aid the digestion of food. Secondly, endocrine releases the hormones insulin and glucagon into the bloodstream for regulation of blood sugar.[1] These hormones also help in converting the food we eat into fuel for the body cells. Pancreatitis is the inflammation of the pancreatic parenchyma. Pancreatic damage happens when the digestive enzymes are activated before they are released into the small intestine and begin attacking the pancreas. There are two forms of pancreatitis: acute and chronic.[2]

Aim: The paper aims at studying the role of Modified Computed Tomography Severity Index (MCTSI) in cases of Acute Pancreatitis. The study focuses on studying various presentations of Acute Pancreatitis, stratifying the severity and course of Acute Pancreatitis, and to correlate Modified CT Severity with clinical picture in Acute Pancreatitis. Thus the objectives were early identification of patients requiring Surgical Intensive Care Unit monitoring and to avoid aggressive treatment to patients of Acute Pancreatitis identified with mild and moderate disease.

Material and Methods: This was a hospital-based prospective study and was carried out in the Department of General Surgery, Geetanjali Medical College and Hospital, Udaipur. Data was collected from various indoor departments of the hospital with a clinical laboratory, and USG findings suggestive of Acute Pancreatitis. For all the patients suffering from acute pancreatitis, the Consecutive and Random Sampling method was used to support the study and carry out the observations among all the 46 patients in a randomized manner and sometimes using the consecutive sampling as well.

Results: There were 30 male and 16 female patients with a mean age of 43.33 years. Biliary Pancreatitis was found in the 41% patients (n = 19) followed by Alcoholic Pancreatitis (n = 17). During the study, 4.3% (n = 2) patients had mild MCTSI, 84.7% (n = 39) patients had moderate MCTSI and 11.0% (n = 5) patients had severe MCTSI. Further, there was a statistically significant interaction between Disease Severity and MCTSI. Also, there was a statistically significant interaction between a hospital stay and MCTSI. Higher the MCTSI, higher is the hospital stay of the patient.

Conclusion: MCTS score almost correctly assesses the patient having moderate and severe disease but patient having the mild disease are sometimes assessed more aggressively by MCTSI and vigorous treatment is given to them, which is actually appropriate for the patients with moderate severity. The scale of study is very low, but it would be good to conclude on the note that a MCTSI system for Acute Pancreatitis is an essential requirement of present time and it can predict the outcome and progression of the disease more accurately than any individual clinical or earlier CT grading systems.

KEYWORDS

Pancreas Pancreatitis, Acute Pancreatitis, Modified Computed Tomography Severity Index (MCTSI)

INTRODUCTION

According to Busnardo et al. (1983)[3], the name of the Pancreas (Greek: pan=all, kreas=flesh) was first given by Rufus of Epheus in about 100 A.D., but the first description of this organ was documented 400 years earlier by Herophilus of Chalkaidon. The pancreas is a large flattened gland located in the abdomen. The pancreas is an elongated retroperitoneal organ; 15-20 cm in length; lies against L1 –L2 vertebra. It lies posterior to stomach, separated by lesser sac. The pancreas has two main functions; firstly, exocrine releases powerful digestive enzymes into the small intestine to aid the digestion of food. Secondly, endocrine releases the hormones insulin and glucagon into the bloodstream for regulation of blood sugar.[1] These hormones also help in converting the food we eat into fuel for the body cells. Pancreatitis is the inflammation of the pancreatic parenchyma. Pancreatic damage happens when the digestive enzymes are activated before they are released into the small intestine and begin attacking the pancreas. There are two forms of pancreatitis: acute and chronic.[2]

Acute pancreatitis is a sudden inflammation that lasts for a short time. It may range from mild discomfort to a severe, life-threatening illness. In severe cases, acute pancreatitis can result in bleeding into the gland, serious tissue damage, infection, and cyst formation. Severe pancreatitis can also harm other vital organs such as the kidneys, lungs, and heart.[4]

On the other hand, chronic pancreatitis is continuing inflammatory disease of pancreas characterised by irreversible morphological change causing pain and permanent loss of function. It commonly occurs after an episode of acute pancreatitis. Heavy alcohol drinking is another important cause. Damage to the pancreas from heavy alcohol use may not cause symptoms for many years, but then the person may suddenly develop severe pancreatitis symptoms.[5]

Balthazar et al. (1990)[6] created the CT Severity Index (CTSI) by combining the original grading system with the presence and extent of pancreatic necrosis. The combined score of CTSI proved to have better prognostic accuracy than the Balthazar score but it, too, had some drawbacks. The score obtained with the index did not significantly correlate with the subsequent development of organ failure, extra-pancreatic parenchymal complications or peripancreatic vascular complications. To overcome these limitations, a modified and simplified CT scoring system was hypothesized by Mortele et al. (2004).[7] Thus, the present study aims to evaluate the efficacy of a clinical scoring system versus Modified CT severity index to triage the patient into intensive care and aggressive management of a patient with acute severe pancreatitis. To our knowledge, no validation of the MCTSI in a larger cohort has been performed in the Southern part of Rajasthan. Also, the study attempts to correctly segregate patients of Acute Pancreatitis as per their disease severity so that limited high-quality health facilities and resources can be properly channelized.

MATERIAL AND METHODS

This was a hospital-based prospective study and was carried out in the Department of General Surgery, Geetanjali Medical College and Hospital, Udaipur. Data was collected from various indoor departments of the hospital with a clinical laboratory, and USG findings suggestive of Acute Pancreatitis. For all the patients suffering from acute pancreatitis, the Consecutive and Random Sampling method was used to support the study and carry out the observations among all the 46 patients in a randomized manner and sometimes using the consecutive sampling as well.

Inclusion Criteria

The inclusion criteria comprised of the key features of the target audience in the total sample population that the investigators will use to answer their research queries. It includes the demographic, clinical, geographic characteristics. In this research, it comprises of clinically

suspected cases of Acute Pancreatitis of all ages, for those who were willing to undergo, CECT whole abdomen.

Exclusion Criteria

The exclusion criteria are termed as the features that have the potential study participants who meet the inclusion criteria but still present with the additional characteristic features that could interfere with the success of the study or increase the risks involved for an unfavourable outcome or result. In this project, the following were the exclusion criteria in respect to acute pancreatitis.

1. Patients not willing or do not give consent.
2. Pregnant females.
3. Patients with chronic pancreatitis suggested by intra-ductal calculi, ductal structure and parenchymal calcification.
4. Other pancreatic pathologies like pancreatic malignancy or cyst.
5. Any previous pancreatic surgery.
6. Contraindicated cases for contrast study.

Statistical Analysis

The collected data was analysed through statistical tests through SPSS-20 (Statistical Package for Social Science). Statistical tests such as descriptive analysis, correlation, regression, chi-square test, etc. were performed.

RESULTS

Parameter		No. of Patients	Percent
Gender	Male	30	65.21
	Female	16	34.78
Etiology	Biliary Pancreatitis	19	41.3
	Alcoholic Pancreatitis	17	36.95
	Idiopathic	8	17.39
	Post ERCP	2	4.34
Respiratory Distress	Yes	28	60.9
	No	18	39.1
Disease Severity	Mild	6	13
	Moderate	33	71.74
	Severe	7	15.25
Modified CT Severity Index (MCTSI)	Mild (0-2)	2	4.3
	Moderate (4-6)	39	84.7
	Severe (8-10)	5	11
Hospital Stay	1-3 Days	7	15.21
	4-6 Days	15	32.6
	7-9 Days	16	34.8
	10-12 Days	1	2.2
	13-15 Days	7	15.21
Clinical Presentation	Pain in abdomen	46	100
	Vomiting	25	54.35
	Abdominal distension	16	34.78
	Obstipation	20	43.48
Necrotizing Pancreatitis	Yes	12	25
	No	36	75
Elevated Amylase	39	84.78	
Elevated Lipase	40	86.95	

From the above table, it can be observed that the majority of the patients were males and Biliary Pancreatitis was the most common etiology among the patients. Majority of the patients were suffering from respiratory distress, and most number of patients had moderate disease severity and moderate MCTSI. Sixteen patients had around 7-9 days of hospital stay. All the patients had complained about pain in abdomen and majority of them reported vomiting. Finally, 84.78% of the patients had elevated amylase and 86.95% of the patients had elevated lipase.

		MCTSI			p-value
		Mild	Moderate	Severe	
Diet	Fatty	1	28	4	<0.05
	Non-Fatty	1	11	1	
Habits	Alcohol	1	19	3	<0.05
	Tobacco	1	12	1	
	Smoking	0	8	1	
Occupation	Housewife	0	9	2	>0.05
	Private Job	0	3	0	
	Teacher	1	5	0	
	Business	0	8	0	
	Retired	1	3	1	
	Student	0	2	1	
	Bank Employee	0	2	0	
	Salesman	0	1	0	
	Mason	0	1	0	
	Unemployed	0	1	0	
	Compounder	0	1	0	
	Driver	0	0	1	
	Farmer	0	1	0	
	Clerk	0	1	0	
	Cook	0	1	0	
Disease Severity	Mild	2	4	0	<0.05
	Moderate	0	33	0	
	Severe	0	2	5	
Hospital Stay	1-3 Days	0	7	0	<0.05
	4-6 Days	2	13	0	
	7-9 Days	0	16	0	
	10-12 Days	0	1	0	
	13-15 Days	0	2	5	
Shifted to ICU	0	1	5	<0.05	

- There is a statistically significant interaction between Diet and MCTSI. That is, patients with fatty diet have higher chances of Acute Pancreatitis.
- People with smoking and drinking habits are more like to have moderate or severe MCTSI.
- There is no statistically significant interaction between Occupation and MCTSI.
- There is a statistically significant interaction between Disease Severity and MCTSI.
- There is a statistically significant interaction between a hospital stay and MCTSI. That is, patients having severe MCTSI will have longer hospital stay as compared to other patients.
- There is a statistically significant interaction between ICU admission and MCTSI. That is, if a patient is diagnosed with severe CT severity in MCTS score, there are higher chances that the patient will be admitted in ICU.

DISCUSSION

It was observed that the main etiology of the disease was found to be biliary, alcohol and idiopathic. Near about 41% of the patients administered the disease due to gall stone. This is because; gall stone is the main cause of acute pancreatitis in females. Further, 36.95% of the patients administered the disease due to alcohol. The outcome of the study correlated with the studies of Harshit and Griwan (2018)[8], and Bandy et al. (2015)[9], as their studies also found biliary, followed by alcohol was the major cause for acute pancreatitis. Further, the present study supports the findings of Dugum et al. (2018)[10] that there is a statistically significant interaction between fatty food and cholelithiasis; and there are higher chances that people with drinking and smoking habits have acute pancreatitis. The present study also found that hospital stay and ICU admission for severe acute pancreatitis is higher because, in such patients, there are higher chances of occurrence of infection, organ failure, or other complications. Moreover, all the patients had pain in the abdomen, more than 50% patients had vomiting and nearly half of the patients reported with obstipation Both the above findings are in line with the finding of Harshit and Griwan (2018)[8] and Sahu et al. (2017)[11]. During the study, it was found that majority of the patients had elevated amylase and lipase as inflammation of the pancreas causes amylase and lipase levels to be increased up to 3 times normal. The study by Batra et al. (2015)[12] also revealed similar findings. Finally, the present study revealed that MCTSI makes an accurate diagnosis of CT severity than the clinical outcome and other CT grading systems. This is in-line with the study of Sahu et al. (2017)[11] and Rehan et al. (2016).[13]

CONCLUSION

Several clinical and radiologic scoring systems have been used for diagnosing patients with pancreatitis, such as Ranson's Criteria, The Acute Physiology and Chronic Health Evaluation scoring system (APACHE II) and the Modified CT Scan Severity Index. The present study aimed at studying the role of Modified Computed Tomography Severity Index (MCTSI) and stratifying the severity and course of Acute Pancreatitis. The study concluded that females were

comparatively less prone to acute pancreatitis because they are less likely to have an alcohol-related etiology as compared to men. It also concluded that fatty food is one of the causes of cholelithiasis and thus Acute Pancreatitis. The present study revealed that moderate and severe disease patients had more respiratory complications (fall in SPO_2). This is because acute pancreatitis is complicated by multiple organ system dysfunctions, most importantly by pulmonary complications which include hypoxia, acute respiratory distress syndrome, atelectasis, and pleural effusion.

Subtle variation reflected in the severity of the disease by clinical monitoring and CECT abdomen led us to compare clinical severity with MCTSI so that an attempt can be made to predict and effectively managed the disease severity and patient outcome at the earliest. MCTSI almost correctly assesses the patient having moderate and severe disease but patient having the mild disease are sometimes assessed more aggressively by MCTS score and vigorous treatment is given to them, which is actually appropriate for the patients with moderate severity. The scale of study is very low, but it would be good to conclude on the note that a MCTS scoring system for Acute Pancreatitis is an essential requirement of present time and it can predict the outcome and progression of the disease more accurately than any individual clinical or earlier CT grading systems.

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