Current Trends in the Management of Acute Pancreatitis at MKCG Medical College, Berhampur - A Prospective Study

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ABSTRACT

BACKGROUND

Acute pancreatitis is an emergency condition presenting with abdominal pain and is usually associated with increased pancreatic enzyme levels in blood or urine as an outcome of inflammatory disease of pancreas showing characteristic findings of pancreatic inflammation on contrast enhanced computerized tomography (CECT). The severity of the disease varies widely from mild disease needing conservative treatment to severe and complicated disease with high morbidity and mortality. We intend to determine the current trends in the diagnosis and management of acute pancreatitis in M.K.C.G Medical College and Hospital, Berhampur, Odisha.

METHODS

This was a prospective observational study. All the patients of acute pancreatitis of both the sexes and of different ages, who were admitted in the Department of General Surgery of M.K.C.G. Medical College and Hospital, Berhampur, Ganjam, Odisha from August 2018 to July 2020 (including 6 months of follow up period) were included in this study.

RESULTS

Out of 80 patients in our study group, 68 patients (85 %) were males with mean age of 39.06 years. Pain was the most common mode of presentation (100 %) followed by nausea and vomiting (92.5 %), abdominal distension (43.8 %), fever (18.8 %) and jaundice (5 %). Lipase supported the diagnosis in 78.8 % cases while amylase in 67.5 % cases. CECT had a sensitivity of 100 %, specificity of 80 % in diagnosing acute pancreatitis while ultrasonography (USG) had a sensitivity of 89.3 %. Majority of the patients were managed conservatively (86.25 %) whereas only 13.75 % patients required surgical management.

CONCLUSIONS

The most common aetiological factor in acute pancreatitis is alcohol consumption and the most accurate diagnostic investigation is serum lipase and CECT abdomen. Most of the cases were mild to moderate and were managed conservatively. Octreotide has a definite role in medical treatment of acute pancreatitis.

KEYWORDS

Pancreatitis, Alcohol, Cholecystitis

BACKGROUND

Acute pancreatitis is a common disorder encountered in our emergency department. It has been noticed in most of the studies that there is a rise in the disease incidence by 10 times in the last 30 years. The reason for this may be due to an increase in alcohol abuse and a better ability to diagnose the disease early. Both genders are equally affected by acute pancreatitis. 80 % of acute pancreatitis is due to alcohol or biliary tract stone disease. The remaining 10 % is related to metabolic factors, drugs and other conditions and 10 % are idiopathic. However, the frequency of different forms of pancreatitis varies from source to source and depends on the area and the study population.[1,2,3]

Acute pancreatitis includes a wide spectrum of disease, from those with mild self-limiting symptoms, to fulminant processes with multi organ failure and high mortality. Most of them experience generally minor episodes characterized by mild parenchymal oedema with no other organ involvement and an uneventful recovery. Severity of the disease is characterised by extensive pancreatic necrosis, development of the systemic inflammatory response syndrome (SIRS), multi organ failure, rapid clinical deterioration and even death.[2] Acute pancreatitis is one of the major causes of morbidity and mortality.[4,5,6] The overall mortality rate for acute pancreatitis is 2 – 10 % which is primarily seen in patients with severe disease characterized by pancreatic and peripancreatic necrosis.[7]

Confirmation of acute pancreatitis requires at least two out of the following three diagnostic features: abdominal pain consistent with acute pancreatitis, a threefold or greater rise in the serum lipase or amylase levels, and findings of acute pancreatitis on cross-sectional imaging computed tomography (CT) or magnetic resonance imaging (MRI).[8,9,10]

Endoscopic ultrasonography (EUS) also plays an important role in the diagnosis of acute pancreatitis. EUS may diagnose chronic pancreatitis better than endoscopic retrograde cholangiopancreatography (ERCP) and CT. EUS is superior to CT and magnetic resonance cholangio pancreatography (MRCP) for the detection of microlithiasis in acute biliary pancreatitis.[11]

A high mortality rate associated with the disease is due to the inability to assess the disease severity at the outset. Several prognostic scoring systems have been developed concerning multiple factors at the time of admission and after 48 hours. The disadvantage of the modern-day severity scoring system is that they may be bulky and time consuming and lack sensitivity and specificity. In reality their necessity has been questioned.[12]

On comparison of scoring systems in predicting the severity of acute pancreatitis, acute physiology and chronic health evaluation (APACHE) - II score appeared to have highest accuracy for predicting severe acute pancreatitis. Several other scoring systems used are: Ranson's, Glasgow, CT severity index, and modified CT severity index.[13]

The preliminary management of acute pancreatitis is essentially supportive, with fluid substitute and optimization of electrolyte balance, providing adequate calorie support, providing frequent parenteral analgesia, and preventing or identifying and treating local and systemic complications. Aggressive early debridement was commonly used for all patients with pancreatic necrosis in the past, but now most pancreatic surgeons have adopted a more conservative algorithm for selective and delayed pancreatic debridement.[3,14] Auto digestion by proteases have been shown to play an important role in acute pancreatitis; therefore, protease inhibitors would theoretically provide benefits in the treatment of acute pancreatitis. However, studies on gabexate mesliate and aprotinin have not shown an improvement in patient outcomes. Platelet activating factor antagonists such as lexipafant, antioxidants, corticosteroids, nitroglycerin, IL-10 or TNF-α antibodies are being studied in the treatment of acute pancreatitis. The surgical management for acute pancreatitis may be divided into surgical management of acute gall stone pancreatitis and the surgical management of complications of acute pancreatitis.[15,16,17,18]

Objectives

1. To determine the common age group, sex distribution, aetiological factors of acute pancreatitis.
2. To assess the clinical features, mode of presentation and progress of the disease.
3. To determine various diagnostic and prognostic factors of the disease.

METHODS

This is a prospective observational study including all the patients of acute pancreatitis of both the sexes and of different ages, who were admitted in the Department of General Surgery of M.K.C.G. Medical College and Hospital, Berhampur, Ganjam, Odisha from August 2018 to July 2020 (including 6 months of follow up period).

Detailed history and examination was done in each patient according to the pro forma attached in annexure. The present study was restricted especially to early diagnosis of the disease with help of non-invasive methods like USG, CT scan and various biochemical tests such as serum amylase and lipase estimation.

Ethical Clearance

The present study was approved by the institutional ethical committee (IEC NO. 719) of M.K.C.G Medical College and Hospital, Berhampur on human subject research. Patients were included in the study after obtaining their informed consent.

Inclusion Criteria

All patients, irrespective of age and sex, with clinical suspicion of acute pancreatitis who were admitted to General Surgery ward of M.K.C.G Medical College and Hospital.

Exclusion Criteria

1. Known case of chronic calcific pancreatitis.
2. Previous pancreatic or gastrointestinal bypass.
3. Pregnant or lactating mother.
4. Those who were not willing to be part of the study.

Management Plan

A. The investigations possible in our hospital setup on emergency basis was USG abdomen, CECT abdomen, complete blood examination along with serum amylase, lipase, RBS, calcium and BUN were done.
B. Modified CT severity index was calculated, and patients were grouped as mild, moderate or severe cases.
C. The results of various investigations were noted after the patient's admission through SOPD or emergency department. After arriving at a tentative / definitive diagnosis the patients were prepared for management, either conservative or surgical.
D. Conservative management was given for alcoholic, idiopathic and biliary pancreatitis, and surgical management for biliary pancreatitis.
E. Conservative methods used are fluid and electrolyte resuscitation, analgesics, nasogastric aspiration, antibiotics, octreotide.
F. Surgical techniques used are:
G. Cholecystectomy for gall stone pancreatitis
H. Choledocholithotomy for patients with gall stone and CBD stone.
I. Investigations and treatment methods used will be analysed and compared with similar studies and other published references.

Statistical Analysis

All the data was entered into an Excel sheet and were expressed in means and proportions. The sensitivity, specificity, positive predictive value and negative predictive values of serum amylase, lipase, USG against CECT scan were calculated according to the following formula:

Sensitivity = TP / (TP + FN)
Specificity = TN / (TN + FP)
Positive predictive value = TP / (TP + FP)
Negative predictive value = TN / (TN + FN)

RESULTS

In the current study, the most common aetiological factor was alcohol, accounting for 52 cases (65 %), 16 cases (20 %) had biliary pancreatitis and 15 % of the patients had idiopathic acute pancreatitis.

Age in Years	Males (N = 68)	%	Females (N = 12)	%	Total (N = 80)	%
0 - 10	0	0	0	0	0	0
11 - 20	4	5	0	0	4	5
21 - 30	11	13.75	3	3.75	14	17.5
31 - 40	27	33.75	3	3.75	30	37.5
41 - 50	15	18.75	3	3.75	18	22.5
51 - 60	11	13.75	3	3.75	14	17.5
61 - 70	0	0	0	0	0	0
Table 1. Age and Sex Distribution in Acute Pancreatitis						

In the present study, the youngest was 15 years old and the oldest was 60 years old. The highest incidence was found in the age group of 31 - 40 years, accounting for 33.75 % of the patients. The mean age at presentation was 39.06 years.

In the current study, we had a male preponderance that accounted for 85 % of the patients and the females accounted for 15 % of the total patients with a male to female ratio of 5.6:1.

According to the present study, in females gall stone was the most common cause of acute pancreatitis accounting for 75 %, followed by idiopathic causes accounting for 25 %. Whereas in males the most common cause was alcoholism accounting for 76.4 %, followed by gall stone 10.3 %, and idiopathic in 13.2 %.

		Aetiology (%)							
		Alcoholic		Gall Stone		Gall Stone + CBD Stone		Idiopathic	Total
Sex	Female	0	0 %	8	66.67 %	1	8.33 %	3 25 %	12
	Male	52	76.4 %	5	7.35 %	2	2.94 %	9 13.23 %	68
	Total	52		13		3		12	80
Table 2. Aetiological Factors & Sex Distribution									

In the present study, 100 % (80 cases) of the patients had abdominal pain, 92.5 % (74) with nausea / vomiting, 43.8 % (35) had abdominal distension, 18.8 % (15) with fever and 5 % (4) with jaundice.

In the present study 98.8 % (79 cases) of the patients had epigastric tenderness, 5 % (4 cases) had mass abdomen due to peripancreatic fluid collection, 20 % (16 cases) had ascites, and 13.8 % (11 cases) of the patients presented in shock.

Sensitivity, specificity, positive and negative predictive value of serum amylase, lipase, USG and CECT scan were calculated according to the following formula:

Sensitivity = TP / (TP + FN)
Specificity = TN / (TN + FP)
Positive predictive value = TP / (TP + FP)
Negative predictive value = TN / (TN + FN)
Out of 80 patients, 54 had serum amylase > 240 IU / L, showing diagnostic accuracy of this test about 67.5 %. 61.5 % alcoholic patients, 78 % gall stone pancreatitis patients and 83.3 % of the idiopathic pancreatitis patients had raised amylase level. Serum amylase levels are more important in biliary pancreatitis when compared to alcoholic pancreatitis.

Serum Amylase (IU / L)	Pancreatitis (CECT Confirmed)		
	Present	Absent	
> 240	51	3	54
< 240	24	2	26
Total	75	5	80
Table 3. Serum Amylase Sensitivity, Specificity, Positive and Negative Predictive Values			

The sensitivity, specificity, positive and negative predictive values of serum amylase in diagnosing acute pancreatitis was estimated. Sensitivity: 68 %, specificity: 40 %, positive predictive value: 94.4 %, negative predictive value: 7.7 %

In the present study out of total 80, 63 (78.8 %) patients showed serum lipase level more than 480 IU / L. On evaluation of aetiological factors, 73.1 % alcoholic, 81.25 % biliary and 100 % of idiopathic pancreatitis patients showed

serum lipase levels > 480 IU / L. Diagnostic accuracy of this test was found to be 73.8 % in our study.

Serum Lipase (IU / L)	Pancreatitis (CECT Confirmed)		
	Present	Absent	Total
> 480	62	1	63
< 480	13	4	17
Total	**75**	**5**	**80**

Table 4. Serum Lipase Sensitivity, Specificity, Positive and Negative Predictive Values

Sensitivity, specificity, positive and negative predictive values of serum lipase in diagnosing acute pancreatitis was estimated in our study. The results obtained were as follows: sensitivity: 82.7 %, specificity: 80 %, positive predictive value: 98.4 %, negative predictive value.

USG Suggestive of Pancreatitis	Pancreatitis (CECT Confirmed)		
	Present	Absent	Total
Yes	67	2	69
No	8	3	11
Total	**75**	**5**	**80**

Table 5. Sensitivity, Specificity, Positive and Negative Value of USG Abdomen in Acute Pancreatitis

From the present study, sensitivity, specificity, positive and negative predictive values of USG abdomen in diagnosing acute pancreatitis were calculated. The result obtained were as follows: sensitivity: 89.3 %, specificity: 60 %, positive predictive value: 97.1 %, negative predictive value: 27.2 %

87.5 % (70 cases) of the study population showed bulky and oedematous pancreas, 31.25 % (25 cases) had peripancreatic inflammation, 17.5 % (13 cases) cholelithiasis, 3.75 % (3 cases) choledocholithiasis, 2.5 % (2 cases) pseudocyst, 17.5 % (14 cases) ascites, 15 % (12 cases pleural effusion, 11.25 % (9 cases) peripancreatic acute fluid collection and 13.75 % showed normal pancreas.

In the present study 92.5 % (74 cases) CT scan study showed bulky and oedematous pancreas, peripancreatic inflammation was seen in 18.75 % (15 cases), pancreatic fluid collection in 17.5 % (14 cases), features of necrosis in 1 patient. Gall bladder stones were found in 16.25 % (13 cases) and CBD stones in 3.75 % (3 cases). 16.25 % (13 cases) patients had ascites and 5 % (4 cases) were found to have normal pancreas.

In the present study, among the 80 patients 55 (68.75 %) were found to have mild and 25 (31.25 %) moderate pancreatitis according to modified CT severity index scoring system.

Among 80 patients with acute pancreatitis 69 patients (86.25 %) received conservative treatment, and 11 patients (13.75 %) required surgical management.

Out of 80 cases 52 had alcoholic pancreatitis and were treated conservatively. Among 16 cases of biliary pancreatitis 11 cases were treated surgically and 5 cases were managed conservatively. 12 idiopathic pancreatitis cases were managed conservatively

In the present study 100 % of the patients required fluid resuscitation and analgesic support, 92.5 % (74 cases) required nasogastric aspiration to provide bowel and pancreatic rest. Antibiotics were given to 36 % patients, and 50 % received somatostatin.

In the present study, octreotide was given to 40 cases (50 % of the study population). In the patients who received octreotide 85 % had > 50 % fall in the level of serum amylase in the first 48 hours. Among the study population who did not receive octreotide, 70 % had > 50 % fall in serum Amylase level in the first 48 hours.

In the present study 72.5 % of the cases who received octreotide had > 50 % fall in serum lipase level in 48 hours, and 55 % cases who did not receive octreotide had > 50 % fall in serum lipase level in 48 hours.

Among 80 patients 16 patients had biliary pancreatitis and 11 among them underwent surgical management. 13 patients had cholelithiasis and 8 of them underwent cholecystectomy, and 5 were managed conservatively. 3 patients had CBD stone and they underwent choledocholithotomy. 69 patients did not require any surgical intervention.

Among the 55 mild cases, 51 were treated conservatively, and 4 required surgical management, whereas among the 25 moderate cases 18 were managed conservatively and 7 surgery.

In the present study 58.75 % (47 cases) patients did not meet any complications. 18.75 % (15 cases) patients had ascites, 17.5 % (14 cases) had acute fluid collections, and 15 % (12 cases) had pleural effusion. Pancreatic pseudocyst was found in 2 cases (2.5 %) and pancreatic necrosis was found in 2 cases (2.5 %).

In the present study 55 patients with mild pancreatitis recovered well in a mean duration of around 6 days (~ 5.56), and 25 patients with moderate pancreatitis recovered in a mean duration of around 12 days (~ 11.62). The range being 2 - 11 days and 6 - 24 days respectively.

DISCUSSION

While diagnosing a case of acute pancreatitis, a thorough history, a complete physical examination and biochemical assessments are necessary. Imaging confirmation is also needed. During this study, analysis of clinical presentation of acute pancreatitis was done. Relevant investigations have been done and patients aptly managed relying upon the aetiology and severity of acute pancreatitis.

Aetiology	Kashid A. et al.[19]	Choudhuri G. et al[21]	Pupelis G. et al.[22]	Sand J. et al.[20]	Buchler MW et al.[23]	Present Study
Alcoholic %	29.1	45.83	54	70	33	65
Biliary %	36.4	26.04	19	20	45	20
Idiopathic %	14.5	19.37	27	10	22	15

Table 6. Distribution of Aetiological Factors

The mean age of presentation in the current study was 39.06 years and was equivalent to the study by Kashid A et al.[19] This was probably because alcohol was the main aetiological factor in our study (~ 65 %) which presents frequently in the younger age group.[19] There was a male preponderance in the current study, accounting for 85 % of patients with a M:F : 5.6:1. This again could be attributed to

alcohol which was the main aetiologic agent. This was comparable to the study by Sand J et al. at Finland. The percentage of idiopathic cases was comparable.[20]

In the present study alcohol was the main aetiological agent in males accounting for 76.4 %, gall stones 10.3 % and idiopathic causes in 13.2 % cases. In females most common cause for acute pancreatitis was biliary in 75 %, followed by idiopathic causes in 25 %. This study was comparable to the study by Lankisch et al. and Anderson et al.[24,25]

In the present study 100 % of the patients had abdominal pain, 92.5 % with nausea / vomiting, 43.8 % an abdominal distension, 18.8 % with fever and 5 % with jaundice. This study was comparable with Kashid A et al.[19]

The sensitivity of serum amylase was 67.5 % in the current study and was equivalent to the study by Kashid A et al. and Anderson et al. But in the study by Thomson et al,[26] it was 95.6 % sensitive and this could be attributed to the late presentation of patients to our institution and also because alcohol was the main aetiological agent, where the rise of S. Amylase was less compared to biliary pancreatitis.

The present study also extensively studied the diagnostic importance of serum lipase. Out of 80 cases 63 had raised serum lipase level at presentation amounting to a sensitivity of 82.7 %, and specificity of 80 %. This is consistent with the study by John Treacy et al.[27] where they found sensitivity about 67 % and specificity of 97 %, and with Keim V et al.[28] in which serum lipase had 85 % sensitivity and 82 % specificity. USG was diagnostic in 87.5 % of patients in the current study and this was equivalent to the study by Ammori et al. and Lalith et al. It was diagnostic in 66.67 % of the patients in the study by Kashid A et al. and this might be as a result of USG, which is operator dependent and also the view can be obscured by overlying bowel gas.[29,30] The present study CT scan was diagnostic in 92.5 % cases, with a sensitivity of 100 % and specificity of 80 %. This was consistent with the study by Lalith et al. where the sensitivity of CT scan was 100 %, and also to the study by Shahzad et al.[31] in which CT scan was diagnostic in 91.4 % cases.[30] In our study 1.25 % cases had pancreatic necrosis which was not detected by USG. So CECT scan is superior to USG in this respect. In our study 68.8 % patients were found to have mild pancreatitis and 31.3 % had moderate pancreatitis according to modified CT severity index, which helps to plan for the management and predicts mortality according to Balthazar.[32]

In the present study 86.3 % of the cases were managed conservatively and 13.8 % required surgical management. This was comparable with the study conducted by Samanta et al.[33] Conservative approaches used in the present study were fluid resuscitation and analgesics in 100 % cases. Antibiotics were given to 36 % cases, 92.5 % cases required naso gastric aspiration. Somatostatin analogue (Octreotide) was given to 50 % cases.

In the present study, among the group of patients who received octreotide 72.5 % showed > 50 % fall in serum lipase in 48 hours. In the group who did not receive octreotide 55 % showed > 50 % fall in serum lipase level in 48 hours. These findings were comparable with the study done by Ganguly et al.[34]

11 out of 16 patients with gallstone pancreatitis underwent open cholecystectomy, and the others were managed conservatively. In the whole, only 13.8 % of the present study population were managed surgically. This low rate of intervention in our study was as a result of majority of our patients had mild disease, and also alcohol was the main aetiological factor. The mean duration of stay in mild cases being 5.56 days was equivalent to the Choudhuri G et al. The duration of stay in moderate cases being 11.62 days, was equivalent to Kashid A et al.[19]

CONCLUSIONS

Acute pancreatitis was one of the most common causes of acute abdomen in patients presenting to our surgical emergency department. Timely and accurate diagnosis and management reduces the mortality rate, and the requirement of intensive care in acute pancreatitis patients.

From the study, the following conclusions were drawn:

1. Alcohol is the most common cause of acute pancreatitis in Southern Odisha followed by biliary and idiopathic causes. It is more common in males and usually presents in the 4th decade of life. It is basically a clinical diagnosis supported with biochemical and imaging findings.

2. Among the biochemical studies, serum lipase estimation is more specific than serum amylase in diagnosing acute pancreatitis. Among radiological studies, CECT scan of abdomen is more accurate in diagnosing acute pancreatitis when compared to USG abdomen. Modified CT severity index helps to classify the patients as mild, moderate or severe cases and care can be given accordingly.

3. The most accurate diagnostic investigation is serum lipase and CECT abdomen. Most of the cases were mild to moderate and were managed conservatively. Octreotide has a definite role in medical treatment of acute pancreatitis.

REFERENCES

[1] Moynihan B. Acute pancreatitis. Ann Surg 1925; 81(1):132-142.

[2] Baron TH, Morgan DE. Acute necrotizing pancreatitis. N Engl J Med 1999; 340(18):1412-1417.

[3] Steinberg W, Tenner S. Acute pancreatitis. N Engl J Med 1994; 330(17):1198-1210.

[4] Fitz RH. Acute pancreatitis: a consideration of pancreatic hemorrhage, hemorrhagic, supurative and gangrenous pancreatitis and of disseminated fat necrosis. Boston Med Surg J 1889; 120:229-235.

[5] Opie EL. The etiology of acute hemorrhagic pancreatitis. Bull Johns Hopkins Hosp 1901; 12:182.

[6] Thomson SR, Hendry WS, McFarlane GA, et al. Epidemiology and outcome of acute pancreatitis. Br J Surg 1987; 74(5):398-401.

[7] Clancy TE, Ashley SW. Management of acute pancreatitis. In: Zinner MJ, Ashley SW, eds. Maingot's Abdominal Operations. 12ᵗʰ edn. New York: McGraw-Hill Publishers 2013: p. 1097-1118.

[8] Steinberg WM, Goldstein SS, Davis ND, et al. Diagnostic assays in acute pancreatitis. A study of sensitivity and specificity. Ann Intern Med 1985; 102(5):576-580.

[9] Banks PA, Bollen TL, Dervenis C, et al. Classification of acute pancreatitis--2012: revision of the Atlanta classification and definitions by International Consensus. Gut 2013; 62(1):102-111.

[10] Balthazar EJ. CT diagnosis and staging of acute pancreatitis. Radiol Clin North Am 1989; 27(1):19-37.

[11] Ashkar M, Gardner TB. Role of endoscopic ultrasound in pancreatic diseases: a systematic review. Minerva Gastroenterol Dietol 2014; 60(4):227-245.

[12] De Bernardinis M, Violi V, Roncoroni L, et al. Discriminant power and information content of Ranson's prognostic signs in acute pancreatitis: a meta-analytic study. Crit Care Med 1999; 27(10):2272-2283.

[13] Cho JH, Kim TN, Chung HH, et al. Comparison of scoring systems in predicting the severity of acute pancreatitis. World Journal of Gastroenterology 2015; 21(8):2387.

[14] Büchler MW, Gloor B, Müller CA, et al. Acute necrotizing pancreatitis: treatment strategy according to the status of infection. Ann Surg 2000; 232(5):619-626.

[15] Andriulli A, Leandro G, Clemente R, et al. Meta-analysis of somatostatin, octreotide and gabexate mesilate in the therapy of acute pancreatitis. Aliment Pharmacol Ther 1998; 12(3):237-245.

[16] Heinrich S, Schäfer M, Rousson V, et al. Evidence-based treatment of acute pancreatitis: a look at established paradigms. Ann Surg 2006; 243(2):154-168.

[17] Bang UC, Semb S, Nøjgaard C, et al. Pharmacological approach to acute pancreatitis. World J Gastroenterol 2008; 14(19):2968-2976.

[18] Jaworek J, Leja-Szpak A, Nawrot-Porąbka K, et al. Effects of melatonin and its analogues on pancreatic inflammation, enzyme secretion and tumorigenesis. Int J Mol Sci 2017; 18(5):1014.

[19] Kashid A. Acute pancreatitis experience. In: Bhansali SK, Shah SC, eds. Appendix 1-A, in management of acute pancreatitis. Bangalore, Manipal Hospital: 2006: p. 173-175.

[20] Sand J, Välikoski A, Nordback I. Alcohol consumption in the country and hospitalizations for acute alcohol pancreatitis and liver cirrhosis during a 20-year period. Alcohol Alcohol 2009; 44(3):321-325.

[21] Choudhuri G. Acute pancreatitis experience at Sanjay Gandhi PGI of Medical Sciences. In: Bhansali SK, Shah SC, eds. Appendix 1-B, in management of acute pancreatitis. Lucknow: Jaslok Hospital 2006: p. 176-178.

[22] Upelis G, Zeiza K, Plaudis H, et al. Conservative approach in the management of severe acute pancreatitis: eight-year experience in a single institution. HPB (Oxford) 2008; 10(5):347-355.

[23] Büchler MW, Gloor B, Müller CA, et al. Acute necrotizing pancreatitis: treatment strategy according to the status of infection. Ann Surg 2000; 232(5):619-626.

[24] Lankisch PG, Assmus C, Lehnick D, et al. Acute pancreatitis: does gender matter? Dig Dis Sci 2001; 46(11):2470-2474.

[25] Anderson F, Thomson SR, Clarke DL, et al. Acute pancreatitis: demographics, aetiological factors and outcomes in a regional hospital in South Africa. S Afr J Surg 2008; 46(3):83-86.

[26] Thomson HJ, Obekpa PO, Smith AN, et al. Diagnosis of acute pancreatitis: a proposed sequence of biochemical investigations. Scand J Gastroenterol 1987; 22(6):719-724.

[27] Treacy J, Williams A, Bais R, et al. Evaluation of amylase and lipase in the diagnosis of acute pancreatitis. ANZ Journal of Surgery 2001; 71(10):577-582.

[28] Keim V, Teich N, Fiedler F, et al. A comparison of lipase and amylase in the diagnosis of acute pancreatitis in patients with abdominal pain. Pancreas 1998; 16(1):45-49.

[29] Ammori BJ, Boreham B, Lewis P, et al. The biochemical detection of biliary etiology of acute pancreatitis on admission: a revisit in the modern era of biliary imaging. Pancreas 2003; 26(2):e32-e35.

[30] Lalith S, Ilangovan G. Comparative study of ultrasonography and computed tomography in diagnosis of acute pancreatitis. Int J Contemp Med Surg Radiol 2019; 4(3):C28-C33.

[31] Shahzad N, Khan MR, Pal IKM, et al. Role of early contrast enhanced CT scan in severity prediction of acute pancreatitis. J Pak Med Assoc 2017;67(6):923-925.

[32] Balthazar EJ. CT diagnosis and staging of acute pancreatitis. Radiol Clin North Am 1989;27(1):19-37.

[33] Samanta J, Dhaka N, Gupta P, et al. Comparative study of the outcome between alcohol and gallstone pancreatitis in a high-volume tertiary care center. JGH Open 2019; 3(4):338-343.

[34] Ganguly NN, Bhattacharjee N, Choudhury P, et al. Effect of octreotide in reducing the serum amylase and lipase levels on patients with acute pancreatitis. Int J Health Res and Med Legal Pract 2016; 2(2):13-17