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RESEARCH ARTICLE

EVALUATION OF PANCREATITIS AND ITS COMPLICATIONS BY ULTRASOUND AND COMPUTED TOMOGRAPHY

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ABSTRACT

Objective: To know the role of USG and CT in pancreatitis, compare the findings of USG with CT, correlate USG and CT findings with biochemical parameters, evaluate the occurrence of complications, and predict the outcome of patients with pancreatitis

Materials and Methods: Ultrasound and CT (plain and contrast) evaluation was done in 55 patients clinically suspected of pancreatitis of all age groups and both sexes. The Ultrasound and CT findings were compared and correlated with the biochemical parameters. Cases are evaluated for the occurrence and complications & outcome .Discrepancies found between ultrasonographic and CT findings were analysed.

Results: 55 cases were studied and they were subjected to USG and CT (plain and contrast). Most of the patients were males with male to female ratio 13:1. Most common etiology was chronic alcohol consumption (42 cases, 76.33%) followed by idiopathic (11 cases, 20%) and trauma (2 cases, 3.66%). Multiple sites of involvement (35 cases, 63.65%) was more common than focal involvement of pancreas. Severe form of pancreatitis (37 cases, 67.27%) was the most common type according to MCTSI. The most common complication was ascites (36 cases, 65.45%) followed by pseudocyst (31 cases, 56.36%) and pleural effusion (16 cases, 29.09%).

Conclusion: The sensitivity of USG in detecting acute pancreatitis was 41.8% .The sensitivity of CT (pain and contrast) in detecting pancreatitis was 100%.Modified CT severity index shows significant correlation between severity of pancreatitis and patient outcome. Serum lipase is more accurate in detecting acute pancreatitis than serum amylase. Thus, from the present study it can be concluded that CT (plain and contrast) is superior in detecting and evaluating pancreatitis. Hence, CT (plain and contrast) should be performed in all cases of clinically suspected pancreatitis especially with positive serological findings.

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INTRODUCTION

Pancreatitis is defined as an inflammatory state of the pancreas. It is an important cause of acute abdominal pain. It was classified into Acute, Chronic, Autoimmune, Groove pancreatitis, Tropical and Hereditary types. Acute pancreatitis is conventionally categorized as either mild or severe disease. Approximately 80% to 85% of patients with acute pancreatitis will have the mild form with an uncomplicatedclini cal course whereas 15% to 20% develop a complicated clinical course characterized by organ failure and/or localcomplications (Frossard *et al*., 2008). Imaging plays a central role in establishing the clinical diagnosis, etiology and severity of acute pancreatitis, early detection of complications, management of selected cases and its complications, exclude alternative causes of abdominal pain complementing laboratory investigations such as serum amylase and lipase levels that have relatively high sensitivity and specificity. The usefulness of transabdominal ultrasound (USG) in pancreatitis is limited. In early stage of pancreatitis, USG is used to evaluate biliary dilatation, stones in the gall bladder and common bile duct. The major limiting factors of USG were difficulty to visualize the pancreas due to paralytic ileus that is common in these patients, inability to differentiate fluid collections from pancreatic necrosis, hence limiting its role in the assessment of disease severity. USG however is useful to follow up of pseudocysts

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and guiding percutaneous interventions. CT now has revolutionized pancreatic imaging and offers high spatial resolution imaging with the ability to accurately detect pancreatitis and its complications, involvement of vascular structures around the pancreas, pancreatic psuedocyst formation and gall bladder calculi exclude other acute abdominal catastrophes. The modified CT severity index proposed included a simplified assessment of pa ncreatic inflammation and necrosis as well as an assessment of extrapancreatic complications and it helps clinicians to discriminate among mild, moderate, and severe forms of pancreatitis.

Aims and Objectives

This study was intended to know to evaluate the role of USG and CT in pancreatitis, compare the findings of USG with CT, correlate USG and CT findings with biochemical parameters ,evaluate the occurrence of complications, predict the outcome of patients with pancreatitis

MATERIALS AND METHODS

This was a hospital based prospective study of 55 patients done from November 2013 to JULY 2014. The patients clinically suspected cases of pancreatitis of all age groups and both sexes referred to the department of Radio -diagnosis, from Casualty, Department of General Medicine and from the Department of General Surgery, Mamata General Hospital were included in the study and Cases of pancreatic neoplasm's were excluded. In all the 55 patients both Ultrasound and CT evaluation was done. Ultrasound examination is performed with. "SONOSCAPE SSI 5000" and "ESAOTE MY LAB 60" ultrasonography machines with 3-13MHz curvilinear array and linear array transducers after at least 6 hours of fasting to improve visualization of the pancreas. In this way, the presence of bowel gas is limited, the stomach is empty of food, and hence the entire organ can be visualized (Martinez-Noguera and D¨Onofrio, 2007). USG is performed along multiple scan planes, including transverse, longitudinal, and angled oblique, to visualize the entire organ: the head with the uncinate process, the body, and the tail. When visualization of the pancreas is limited, use other scanning techniques, such as moving the transducer and applying compression to displace bowel gas, filling the stomach with water, examining the patient in suspended inspiration or expiration, and changing the patient to a decubitus position are used. Doppler analysis of peripancreatic vessels was done. The USG findings encountered in case of acute pancreatitis depend on the severity of the inflammatory process. Acute edematous pancreatitis is usually characterized by gland enlargement and decreased parenchymal echogenicity. Necrotic pancreatitis also produce gland enlargement, and they appear as areas of heterogeneous, increased parenchymal echogenicity. The complications of acute pancreatitis, such as intra pancreatic or fluid collections, pseudo cysts, and abscesses can often be revealed by carefully performed USG. The most typical imaging findings for the diagnosis of chronic pancreatitis are intraductal calcifications and pancreatic duct dilation (Luetmer *et al*., 1989). Pancreatic enlargement or atrophy, ductal dilatation, and pseudocysts may be observed (Steer *et al*., 1995). CT scans were performed on SIEMENS SOMATOM SPIRIT (dual slice) CT Scanner. With CT high quality images can be obtained by increasing the conspicuity of pancreas by vascular opacification, oral contrast agents and by eliminating respiratory motion artifacts and misregistration. Oral contrast agent (Iohexol) 20 ml mixed in 1000 ml of water is routinely given an hour prior to the study, 250 ml each given every 15 minutes, the last 100 ml given on the table immediately before the scanning. Ideally a limited non contrast scan through the pancreas is obtained followed by a rapid IV bolus injection of 50 – 60 ml of IV contrast material at a rate of 3.5ml/sec. This results in a homogenous enhancement of gland from 40 – 50 HU (unenhanced value) to 100 – 120 HU. A helical scan is obtained from the top of diaphragm to the iliac crest using 5 mm collimation and a pitch of 2, starting 20 – 25 seconds after beginning the IV contrast from domes of diaphragm upto ischial tuberosities. Use of spherical or helical CT has improved pancreatic imaging tremendously as the entire pancreatic evaluation can be performed in a single breath hold .Since the scanners are fast, no respiratory or peristaltic artifacts are seen. A two phase imaging technique is used for acquiring the arterial and venous / portal phases. Marked gland enlargement is the most common CT feature in the presence of acute pancreatitis. In pancreatic necrosis, initially the gland is enlarged and normal margins become convex while parenchyma decreases in attenuation and in degree of contrast enhancement. The CT diagnosis of acute pancreatitis is aided by identification of the complications of the inflammatory process such as intrapancreatic and peripancreatic fluid collections, pancreatic ascites, pseudo cyst and abscess. Modified CT severity index was used for prognostic evaluation. Classical CT features of chronic Pancreatitis include scattered parenchymal or intraductal calcifications, parenchymal atrophy, ductal dilatation. Intraductal calculi are the most reliable sign of chronic pancreatitis and can range from millimeters to more than a centimetre. Parenchymal atrophy often coexists with ductal dilatation.

Modified ct severity index

Prognostic Indicator	Score
Pancreatic inflammation	
Normal Pancreas	0
Intrinsic pancreatic abnormalities with / without inflammatory changes in peripancreatic fat	2
Pancreatic or peripancreatic fluid collection or peripancreatic fat necrosis	4
Pancreatic Necrosis	
None	0
<= 30%	2
> 30%	4
Extrapancreatic Complications (one or more of pleural effusion, ascites, vascular complications, parenchymal complications, or gastrointestinal tract involvement)	2

RESULTS

This study included 55 patients with clinical suspicion of acute pancreatitis who had undergone both USG and CT (plain and contrast). A total of 31 patients were managed conservatively and 21 patients underwent invasive procedures. The age group of the patients was wide, ranging from 11-80 years. Most common age group was 31-40 years (21 cases) accounting for 38.18% with mean age of 35.5years. In present study, 51

(92.7%) were male and 4 (7.3%) were female. In this study, the most number of cases were acute type of pancreatitis (39 cases) accounting for 69.2% followed by acute on chronic type of pancreatitis (14 cases) accounting for 25.4% and chronic pancreatitis (3 cases) accounting for 5.4%. The most common etiology for pancreatitis was chronic alcohol consumption (42 cases) accounting for 76.33% followed by idiopathic (11 cases) (20%) and trauma (2 cases) (3.63%). The male to female ratio was 13:1 with a male preponderance. USG detected pancreatitis in 23 cases (41.8.%) and CT detected acute pancreatitis in all cases (100%). The most common complication was ascites (36 cases) (65.4%) followed by pseudocyst (31 cases) (56.3%) and pleural effusion (16 cases) (29%). 11cases (20%) showed oedematous thickening of the gastric wall and duodenal walls. Three cases of splenic vein thrombosis were detected. one case of pseudoaneurysm of splenic artery was detected. One portal vein thrombosis was detected. Therefore, in the present study overall 5 cases developed vascular complications (9.09%). One case of avascular necrosis of bilateral heads of femur was also seen. CT with contrast detected all the cases of acute and chronic pancreatitis and were found to have positive correlation with clinical and serological parameters. Serum amylase and lipase levels were used as serological parameters to correlate with CT findings and serum lipase levels were found to be raised in 49 cases (89.09%), where as serum amylase levels were elevated only in 36cases (65.4%). 46 out of 55 cases had follow up USG during their stay in the hospital, of which 44 cases (95.65%) did not show any change from their previous appearances and two cases (4.34%) showed spontaneous resolution of pseudocyst. 9 out of 55 cases could not have follow up scans as they had left hospital against medical advice. Out of 55 patients, 48 patients had survived and 7 patients had died.

Detection of cases by USG and CT (N-55)

S.NO		USG(n) / (%)	CT(n) / (%)
1)	NO OF CASES	23 (41.8%)	55 (100%)

All cases were detected by CT.

Distribution of study subjects according to modified ct severity index (n-55)

Grades	MCTSI	NO.OF CASES (n)/(%)
Mild	0-2	5 (9.09%)
Moderate	4-6	13 (23.63%)
Severe	8-10	37 (67.27%)
Total		55 (100%)

Most of the patients had severe type of pancreatitis

Types of complications (N-55)

S.No.	Complications	Total No. of Cases (n) / (%)	Detected by USG(n) / (%)	Detected by CT(n) / (%)
1)	Pseudocyst	31(56.3%)	23 (75%)	31 (100%)
2)	Pleural effusion	16 (29.09%)	16 (100%)	16 (100%)
3)	Ascites	36 (65.4%)	23 (66.66%)	36 (100%)
4)	Vascular complications	5 (9.09%)	2 (40%)	5 (100%)
5)	Gastrointestinal involvement	11 (20%)	4 (36.36%)	11 (100%)
6)	Avascular necrosis	1 (1.8%)	0 (0%)	1 (100%)

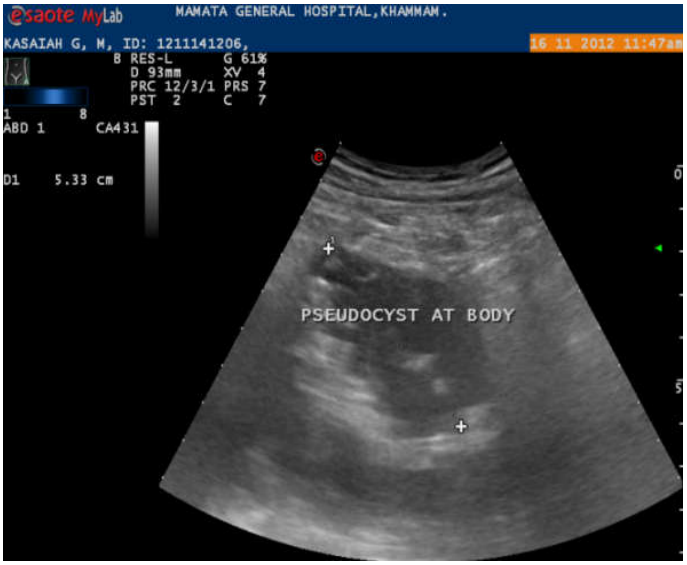
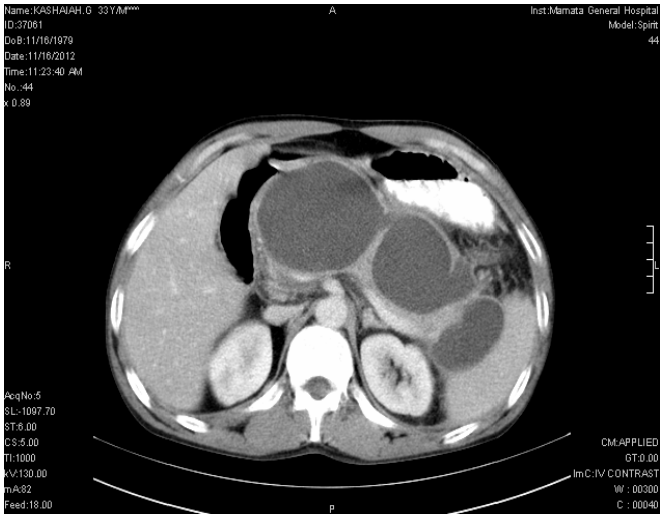


Fig. 1. Case of Acute pancreaitis with multiple Pseudocysts & MCTSI- 6 - USG abdomen shows altered echogenicity of the pancreas with multiple cystic lesions noted in the region of head, body and tail compressing the parenchyma



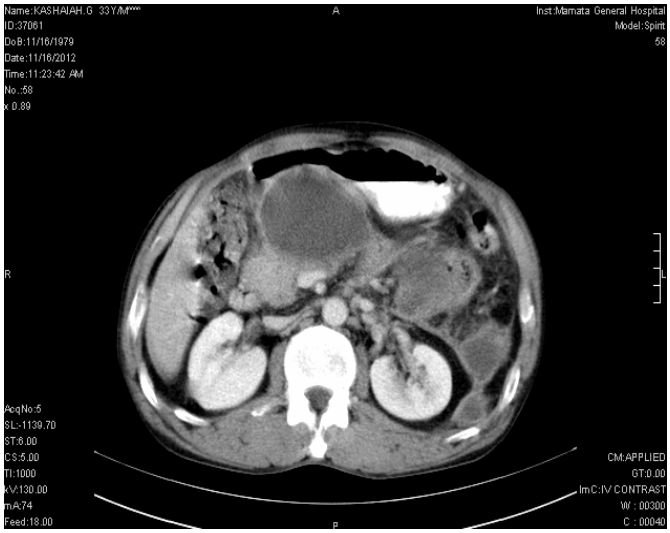
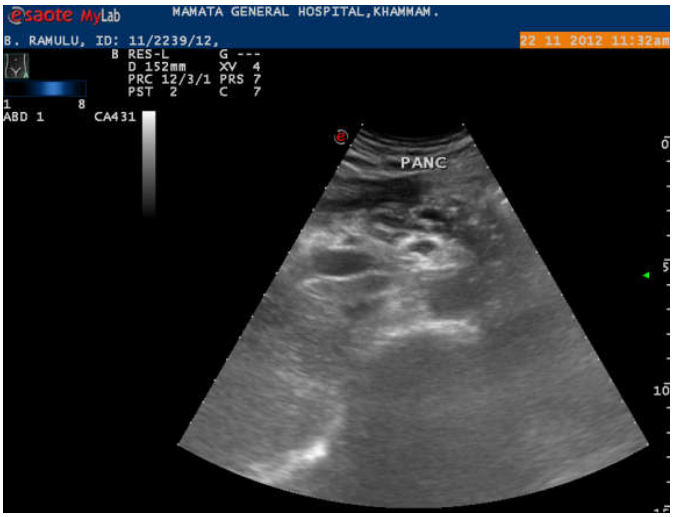


Fig. 2. Case of Acute pancreaitis with multiple Pseudocysts & MCTSI-6- CECT abdomen shows mild enhancement of pancreatic parenchyma which is compressed by the adjoining multiple large cysts in head, body and tail. Cyst wall shows enhancement on CECT. Mild ascites also noted



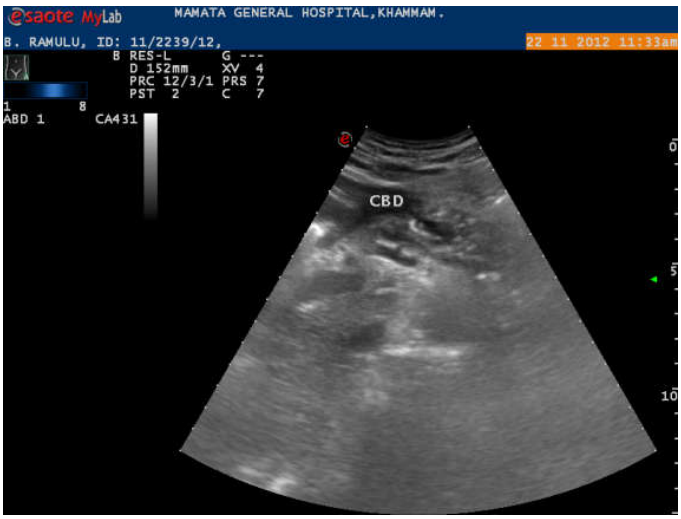


Fig. 3. Case of Chronic pancreatitis-USG abdomen shows heterogenously echoic pancreas with multiple hyperchoic foci in the head, body and tail

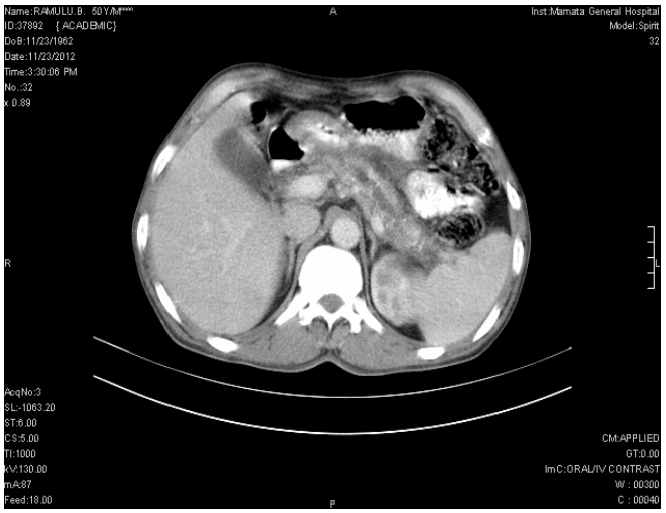


Fig. 4. (NECT & CECT): Case of Chronic pancreatitis- CECT abdomen shows mildly enhancing pancreas with multiple calcific foci in the head, body and tail. Irregularly dilated main pancreatic duct (8mm) and Comman bile duct (7mm). Peripancretic fat planes appear normal

DISCUSSION

Acute pancreatitis is defined as an acute, mainly diffuse, inflammatory process of the pancreas that exhibits great variation in the degree of involvement of the gland, the adjacent retroperitoneal tissues and other remote organ systems. Imaging plays a central role in the management of selected cases of pancreatitis, complementing laboratory investigations such as serum amylase and lipase levels that have relatively high sensitivity and specificity. Although USG can be used in the evaluation of acute pancreatitis, there is high frequency of indeterminate results in critically ill patients stemming from the inability to image the entire gland and peripancreatic spaces. Despite these potential limitations, there are specific indications for selecting USG in the evaluation of patients with known or suspected acute pancreatitis. Owen J. O'Connor *et al*. reported that Ultrasound is potentially a valuable tool in the management and follow-up of various complications of pancreatitis, facilitating rapid bedside imaging, diagnostic aspiration, and drain insertion.

Acute pancreatitis etiology (Ranson, 1982)

Metabolic	Alcohol, Hyperlipo-proteinemia Hyper-calcemia, Drugs, Scorpion venom, Autoimmune Pancreatitis
Mechanical	Cholelithiasis, Postoperative condition (Gastric, Biliary), Post traumatic, Retrograde Pancreato-graphy, Pancreatic duct obstruction, Pancreatic tumour, Ascaris infestation, Duodenal obstruction
Vascular	Post-operative condition (Cardio-pulmonary bypass), Polyarteritisnodosa, Athero-embolism
Infections	Mumps, Coxsackie virus
Drugs	Corticosteroids, azathioprine, 6-mercaptopurine, thiazide diuretics, furosemide, aminosalicylic acid, sulfonamides, tetracycline, procainamide, and opiates
Idiopathic	Biliary sludge, microlithiasis, congenital

Chronic pancreatitis etiology (Etemad and Whitcomb, 2001)

Toxic	Alcohol, cigarette smoking, drugs (valproate, thiazide, azathioprine, estrogens, phenacetin)
Metabolic	Hypercalcemia, hyperparathyroidism, hyperlipidemia, chronic renal failure
Infectioius	HIV, mumps virus, Coxsackie virus, cryptosporidium
Genetic/ hereditary	CFTR mutation (cystic fibrosis) PRSS1 mutation, SPINK1 mutation
Obstruction of main pancreatic duct	Gallstones, Neoplasms: pancreatic/periampullary, Posttraumatic scarring, Sphincter of Oddi dysfunction, Pancreas divisum
Others	Idiopathic, Autoimmune, Tropical pancreatitis Radiation therapy Vascular disease/ischemic

The incidence of recurrence after a single episode of acute pancreatitis is quite high. CT is the dominant imaging modality for initially identifying complications and for assessing response to therapy and hence the preference of CT over USG[7]. The CT findings in acute pancreatitis, reflect the presence and extent of the retroperitoneal inflammatory process. The findings are similar irrespective of etiology with the exception of traumatic pancreatitis in which pancreatic lacerations associated with high density hematomas can sometimes be detected [8,9]. Balthazar *et al*. had divided the spectrum of acute pancreatitis into five grades: grade A normal pancreas, grade B pancreatic enlargement, grade C gland enlargement and peripancreatic tissue inflammatory changes, grade D enlarged gland, peripancreatic inflammatory changes and single peripancreatic fluid collection, and grade E two or multiple fluid collections or presence of gas in adjacent to the pancreas (abscess formation) (Emil J. Balthazar, 2002).

Acute and chronic pancreatitis are thought to be different diseases and only rarely does acute pancreatitis lead to CP. Most cases of true acute pancreatitis, such as recurrent bouts of acute pancreatitis secondary to biliary disease, do not result in CP. However, in patients with chronic alcohol abuse associated with asymptomatic, substantial and diffuse pancreatic fibrosis, the initial bout of clinical pancreatitis heralds the onset of chronic pancreatitis. In alcoholics a strong association with CP has been reported (Forsmark, 2000). One of the most important roles of radiology is in the diagnosis and evaluation of the complications of acute and chronic pancreatitis. These complications are responsible for a significant proportion of the morbidity and mortality of inflammatory disease of the pancreas .Complications of pancreatitis include Pancreatic and extra pancreatic fluid collections, Pancreatic abscess, Pancreatic necrosis, Biliary complications, Vascular Complications like splenic vein & superior mesenteric vein thrombosis, arterial pseudoaneurysms, Pancreatic Ascites, Gastrointestinal Complications, Osseous complications like polyarthritis, avascular necrosis of the femoral or humeral heads, mottled calcific metaphyseal lesions, and focal areas of the cortical destruction in the long bones and in the small tubular bones of the hands and feet (Richard D. Gerle *et al*., 1965), Pulmonary complications. The study included 55 patients with history of clinical suspicion of acute and chronic pancreatitis who had undergone both USG and MDCT. In present study, 51 (92.7%) were male and 4 (7.3%) were female. The etiology of pancreatitis was alcohol in 42 (76.33%) cases; idiopathic in 11 (20%) case; trauma in 2 cases (3.66%). Alcohol was the cause for all the 3 cases of Chronic pancreatitis.

In study by Silverstein *et al*. (1981) the most common etiology of acute pancreatitis was alcohol (57 patients) followed by trauma (17 patients). In the present study alcohol was the most common etiology followed by idiopathic and trauma. Alcohol and trauma as the more common etiological agents can be explained by high prevalence of alcohol intake and RTA in the area where the present study was conducted. All patients in the present study had USG exam. Of them, 18 patients had poor visualization of pancreas (32.72%) while the other 37 patients had partial (40.36%) or total (26.9%) visualization of the pancreas. In study by Silverstein *et al.* (William Silverstein *et al*., 1981), 94 had USG exam. Of them, 38 patients had poor visualization of pancreas (38%) while the other 56 patients had USG exam which had partial (42%) or total (20%) visualization of the pancreas. In present study, 37 patients in whom pancreas was visualized on USG, 23(23/37 i.e. 62.16%) were abnormal, 14 (37.83%) were normal, as affected parts of pancreas were not visible due to the presence of bowel gas. In study by Silverstein *et al.* (1981), the 56 patients in whom pancreas was visualized on USG, 21 (45%) were abnormal while 35 (55%) were normal, as affected parts of pancreas were not visible due to the presence of bowel gas. The sensitivity of USG in detection of pancreatitis in present study was 41.8% (23/55) which was slightly higher than in the study by Silverstein *et al*. 22.3%, which could be due to the small number of subjects as well as the fact that almost all patients were lean and thin built which could have facilitated better visualization of the pancreas and also may be due to more number of the cases of severe pancreatitis which are better detected sonographically. In a study by Poornachandra *et al*. (2011), out of 65 patients, 44 were males, with alcohol as the main etiology in 24 patients (54.5%). 69.2% patients had ascites. On follow up, 34 patients (52.3%) had developed a pseudocyst. In present study, out of 55 patients, 51 (92.7%) were males with alcohol as the main etiology, 36 (65.45%) patients had ascites, On follow up total of 31 (56.36%) patients developed a pseudocysts.

The slightly higher occurrence of pseudocysts in present study could be because of the high frequency of severe pancreatitis, as the present hospital is a referral center and because of the use of CECT of the abdomen as a cross-sectional imaging modality. In a prospective study conducted by Michael C. Hill *et al*. of 91 patients with acute pancreatitis, CT findings were correlated with the clinical type of acute pancreatitis. The overall sensitivity of CT in diagnosing acute pancreatitis was

77% and was higher for acute necrotizing pancreatitis (100%) than for acute superimposed on chronic pancreatitis (80%) or acute edematous pancreatitis (73%) (Michael C.Hill *et al*., 1982). In present study, CT findings co-related with the clinical type of acute pancreatitis. The overall sensitivity of CT in diagnosing acute pancreatitis was 100%. The sensitivity for the diagnosis of acute necrotizing pancreatitis and acute on chronic pancreatitis was also 100%, which is almost similar to the study done by Michael C. Hill *et al*. The higher sensitivity of CT in the present study, in the detection of acute pancreatitis and acute on chronic pancreatitis may be because, most of the cases were of severe cases of pancreatitis with complications and also because of the smaller study group. In a study conducted by Owen J. O'Connor, Sebastian McWilliams *et al*. it was proposed that contrast-enhanced CT was the imaging modality of choice for the diagnosis and staging of acute pancreatitis. CT was 100% specific for necrosis, if greater than 30% of the gland is nonenhancing (Owen J. O"Connor and Sebastian McWilliams, 2011).

In the present study, contrast enhanced CT was 100 % specific for detection of necrosis of pancreas. This finding is consistent with the findings proposed in the study of Owen J. O'Connor, Sebastian McWilliams *et al*. In a study done by Treacy *et al*, it was found that serum lipase gave a sensitivity of 67% and a specificity of 97%.and serum amylase had sensitivity of 45%, and specificity of 97%. Serum lipase is recommended for diagnosis of acute pancreatitis, both in early and late phase of the disease (Treacy *et al*., 2001). In the present study, however the elevated serum lipase was found to have higher sensitivity (89.09%) in detecting the acute pancreatitis than the serum amylase (65.4%). This finding is similar to that of the study done by Treacy *et al*. The higher sensitivity of both in the present study may be due to the fact that most of the cases were of severe pancreatitis and the small study group. In a prospective longitudinal study in 266 patients conducted by Bernades *et al*. it was found that development of pseudocysts, peripancreatic fluid collections, and necrosis of the gland all contribute to inflammatory phlebitis, predisposing to thrombosis and its complications. As a result, chronic inflammation in the pancreas can lead to venous thrombosis of the splenic, superior mesenteric, or portal veins. The prevalence of splenic vein thrombosis was estimated to be 11% (Bernades *et al*., 1992). In the present study, there were five cases (19.04 %) which had vascular complications. Out of these, two cases had splenic vien thrombosis accounting to 5.4%. This discrepancy in the present study may be due to the small number of sample size in this study. In a study done by Nagar *et al*. it was found that about 20% of cases of acute pancreatitis are severe. Most cases of acute pancreatitis are considered mild, with affected patients reporting modest abdominal pain and displaying mild abdominal tenderness. Patients with mild acute pancreatitis have either minimal or no organ and systemic dysfunction (Nagar and Gorelick, 2005). In the present study of 55 cases, 37 cases (67.27%) were detected as severe pancreatitis with MCTSI ranging from 8-10. This is in contrast to the study done by Nagar *et al*. The high incidence of severe pancreatitis may be due to the high volume of alcohol consumption in the area of study and also because of the low socio-economic status of the sample population leading to the delay in hospital admission from the onset of symptoms, and thus leading to increased severity. In a study by Mortele *et al*. (2004), CT scans were performed to assess the correlation between patient outcome and modified CT severity index in 266 patients with acute pancreatitis, significant correlation was found between patient outcome and the length of the hospital stay (modified index p = 0.0054 - 0.0714] and the need for surgical interventions (10/66 patients) (modified index [p = 0.0112]). In present study, a statistically significant correlation was found between patient outcome and the length of the hospital stay (modified index p = 0.0002), patient outcome and the need for surgical interventions (21/55 patients) (modified index [p = 0.0002]. Thus, modified CT severity index has good correlation with patient outcome.

Conclusion

The present study was performed to evaluate the role of CT in pancreatitis in which a total of 55 cases were studied and they were subjected to USG and CT (plain and contrast). Most of the patients were males with male to female ratio 13:1. Most common etiology was chronic alcohol consumption (42 cases, 76.33%) followed by idiopathic (11 cases, 20%) and trauma (2 cases, 3.66%). Multiple sites of involvement (35 cases, 63.65%) was more common than focal involvement of pancreas. Severe form of pancreatitis (37 cases, 67.27%) was the most common type according to MCTSI. The most common complication was ascites (36 cases, 65.45%) followed by pseudocyst (31 cases, 56.36%) and pleural effusion (16 cases, 29.09%). The sensitivity of USG in detecting acute pancreatitis was 41.8%. The sensitivity of CT (pain and contrast) in detecting pancreatitis was 100%. Modified CT severity index shows significant correlation between severity of pancreatitis and patient outcome. Serum lipase is more accurate in detecting acute pancreatitis than serum amylase. Thus, from the present study it can be concluded that CT (plain and contrast) is superior in detecting and evaluating pancreatitis. USG is also a valuable initial investigation in detecting pancreatitis. However, the diagnosis may be missed due to poor visualization by bowel gas. Ultrasound is the first line tool in the management and follow-up of complications of pancreatitis, in bedside imaging and for the interventions. Hence, CT (plain and contrast) should be performed in all cases of clinically suspected pancreatitis with positive serological findings

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