Ultrasonographic Evaluation of Chronic Pancreatitis with ERCP Correlation

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Abstract

Objective: *This study was performed to assess the diagnostic accuracy of transabdominal ultrasonography in suspected patients of chronic pancreatitis correlating with ERCP.*

Materials and methods: *This cross-sectional study was performed on patients with chronic pancreatitis in the department of radiology and imaging, in collaboration with department of Gastroenterology of BSMMU and BIRDEM from 1st June 2008 to 31st may 2009. Total 60 consecutive patients of different age groups referred for USG of upper abdomen with a suspicion of chronic pancreatitis. At first all the patients were evaluated by detail history and clinical examination. USG of pancreas was performed in all cases. Then all patients underwent ERCP in the Gastroenterology department. The ERCP reports were collected and correlated with USG findings. Among all patients 4 refused to do ERCP and 6 patients had ERCP cannulation failure. Finally, 50 patients were considered as study sample.*

Results: *Sonographically abnormalities were detected in 43 (86%) cases; 1 of them was diagnosed as normal by ERCP. Out of 7 (14%) sonographically normal, 3 were proved normal by ERCP and 4 cases, which were missed by sonography, were diagnosed as chronic pancreatitis by ERCP. Sensitivity of ultrasonography in diagnosing chronic pancreatitis was 91.3% and specificity was 75%, positive predictive value was 97.7%, negative predictive value was 42.9% and accuracy was 90%.*

Conclusion: *Ultrasonography has significant sensitivity, specificity, positive predictive value and accuracy in the diagnosis of chronic pancreatitis and we consider ultrasonography as an appropriate imaging tool for diagnosis of chronic pancreatitis.*

Key words: *Chronic pancreatitis, ultrasonography, ERCP.*

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Introduction:

Chronic pancreatitis (CP) is a syndrome involving progressive inflammatory changes in the pancreas that results in permanent structural damage, which leads to impairment of exocrine and endocrine function.[1] In patients presenting with chronic abdominal pain and alcohol abuse of many years, diagnosis of chronic pancreatitis is usually made by pathognomic findings in the imaging. The challenge is to correctly diagnose patients with chronic pancreatitis in earlier stages of disease. In early stages of chronic pancreatitis, morphologic examinations and function tests can be helpful to establish the diagnosis.

Non-invasive imaging methods are the tools of choice for supporting the diagnosis of chronic pancreatitis in clinical settings. Sensitivity and specificity of different imaging methods vary significantly and are dependent on the stages of the disease and the operator's expertise. Endoscopic Retrograde Cholangio-Pancreatography (ERCP) is still the gold standard among all imaging methods, but in the near future Magnetic Resonance Cholangio-Pancretography (MRCP) is replacing ERCP in the field of diagnosis.[2]

The sensitivity in various series of 75-95% and a specificity of 90% or more, ERCP remains the most

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is also difficult, toxidrome could not be applied due to nonspecific presentation.

Clusters of different poisoning is also rising in Bangladesh at different location like copper and Puffer fish in southern area, and aluminium phosphate poisoning in eastern area. Herbal products, methanol, hydrocarbon, household products specially corrosive ones are also commonly consumed poisons. Suicidal copper sulphate poisoning is prevalent in southern parts of Bangladesh. It has high mortality rate, death occurs due to acute renal failure and acute hepatic failure

Poisoning was the second of top ten diseases dealt in medicine wards of Dhaka medical college hospital in 2012. Acute poisoning accounts for 1% of hospital admission in the UK. Even in developed worlds poisoning is a major cause of death in young adults, most death occurred before patients reach medical attention. The mortality is much lower than 1% in those admitted to hospital. Most important thing is that much of these deaths are preventable if appropriate measures are taken at right time.

Besides organophosphorus and commuter poisoning, poisonous snake envenoming is a reality in our riverine and agricultural land. Varieties of Kraits, Cobras, Green viper are identified as notorious snakes living widespread in the bushy land of ours. Many of us are not acquainted with the syndromic effect of their poisons. We are yet to develop ways to diagnosis the species and the ways to evaluate the effect of anti-snake venom. Anti- snake venom is not being manufactured in our country; we are to depend on the poly valent antivenom from the neighbouring country.

We need to come out of the traditional belief and introduce state-of-the art management of envenoming.

There was an outbreak of intoxication with Puffer fish tetradotoxin where 91 consumed the fish with 14 casualties in costal belt in 2008 .There was another report of Ghagra shak intoxication in 2007 in Sylhet where 81 persons identified and 4 died with severe liver damage.

The medically important groups of (insects) Hymenoptera are the Apoidea (bees), Vespoidea (wasps, hornets, and yellow jackets), and Formicidae (ants) who deliver their venom by stinging their victims. Hymenopterid stings and subsequent allergic reactions are a common indication for emergency department visits worldwide including Bangladesh. Unrecognized anaphylactic reactions to hymenopterid stings is a significant cause of sudden and unanticipated deaths among young people, with or without atopic histories. Unfortunately, severe cases of insect bites are still underreported in our country and no taxonomical study so far been done in Bangladesh. Deliberate contamination of food materials with prohibited, inferior or deleterious substances is called adulteration. Adulteration has reached an epidemic proportion recently. All types of agricultural, dairy, poultry, fishery, packaged, bottled and canned food are adulterated. The whole population, sadly, has been slow poisoned.

We need to adopt public health policy like different communicable diseases for mass awareness regarding the wide and far-reaching adverse and detrimental effects of poisons and toxins.

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sensitive imaging tool for diagnosing chronic pancreatitis during past 30 years.[3] However, it is invasive and carries significant morbidity (3% to 40%) and mortality (0.1% to 1.0%).[4]

A new endoscopic procedure, endoscopic ultrasonography, provides high resolution ultrasound images of the pancreas and biliary ducts and complements the findings of ERCP. With continued improvements in instrumentation, small-diameter catheters will permit even better imaging of the ductal systems with high resolution endoscopy and ultrasonography.[5] Trans-abdominal sonography is a non-invasive, easy and cheaper imaging modality. In this study, we evaluated the role of trans abdominal sonography in the diagnosis of chronic pancreatitis and its correlation with ERCP.

Materials and methods:

This cross-sectional study was carried out from June 2008 to May 2009, on consecutively selected 60 patients of different age groups who were referred for ultrasonogram of upper abdomen with a suspicion of chronic pancreatitis from department of Gastroenterology Department of BSMMU and BIRDEM Hospital. At first all the patients were evaluated by detail history and clinical examination. Ultrasonogram for pancreas was performed in all cases by SIEMENS sonoline prima with 3.5 MHz curvilinear probe. Then ERCP was approached to all patients in the gastroenterology department. Among them 4 refused to do ERCP and 6 patients had ERCP cannulation failure. Finally we collected 50 patients and they were considered as study sample. All these information were collected in a predesigned structured data collection sheet. Information includes questionnaires, clinical findings, ERCP and ultrasonographic findings.

Selection of patients:

Patients of chronic pancreatitis, diagnosed on the basis of clinical or biochemical findings and among them those patients were excluded who did not undergo or refused to do ERCP.

Study procedure:

Patients who were suspected for chronic pancreatitis were evaluated by detailed history and clinical examination. Patients were given appropriate bowel preparation for 2-3 days and were nothing by mouth for at least 8 hours preceding the examination. Position of the patients was supine and often in oblique or both decubitus positions. Ultrasonogram was done by SIEMENS sonoline prima with 3.5 MHz curvilinear probe. Transducer was placed at the top of abdomen (the xiphoid angle), and transverse upper abdominal scan was done by moving transducer from side to side from the costal margins towards the umbilicus. Then longitudinal scan was done by moving up and down across the upper abdomen. If bowel gas obscured the image, patients were given 3 or 4 glasses of water, and repeated the examination after few minutes with patients sitting or standing, viewing the pancreas through the water-filled stomach.

Then all patients underwent for ERCP in Gastroenterology department and reports were collected and correlated with USG findings.

Data collection and measurement:

Data were collected by a predesigned proforma. Patient's information was obtained through using patient's information sheet which involves questionnaire, clinical findings, ERCP and USG findings.

Statistical analysis of data:

Statistical analyses of the results were obtained by window based computer software devised with Statistical Packages for Social Sciences (SPSS-15). The results were presented in tables and figures. For the validity of study outcome, sensitivity, specificity, accuracy, positive predictive value and negative predictive value of ultrasonogram in the diagnosis of chronic pancreatitis were calculated after confirmation of the diagnosis by ERCP. A 'p' value <0.05 was considered as significant.

The validity of the ultrasonogram of chronic pancreatitis was evaluated using a receiver operating characteristics (ROC) curve analysis. The area under the curve (AUC) of the ROC plot described the accuracy of the test; "1" indicated complete accuracy and "0.5" no discriminatory power.

Results

This study was performed in total 50 patients. Mean age (+SD) of patients was 29.48 ± 4.67 years ranging from 18 to 40 years. Age of patients less than 25 years is 22%, ages between 25 to 30 years 36%, between 30 to 35 years 36% and more than 35 years 6%. In our series, 100% of the patients of chronic pancreatitis were

presented with both abdominal pain and vomiting. Muscle guard was found on examination in 94% of cases. 58% complained of weight loss and 68% of steatorrhoea. Sonographically abnormalities were diagnosed 43 (86%) cases; 1 of them was diagnosed as normal by ERCP. Out of 7 (14%) sonographically normal, 3 were proved normal by ERCP and 4 cases, which were missed by sonography were diagnosed as chronic pancreatitis by ERCP.

Sensitivity of ultrasonography in diagnosing chronic pancreatitis was 91.3% and specificity was 75%, positive predictive value was 97.7%, negative predictive value was 42.9% and accuracy was 90%.

Distribution of the patients by US findings:

By transabdominal US pancreas was visualized in 50 cases, echogenicity was normal in 5 cases, increased in 36 cases, decreased in 9 cases and pancreatic duct dilatation was found in 50 cases.

Contour change was noticed in 49 cases, focal lesion was found in 16 cases, peripancreatic collection, pancreatic calcification and ascites were found in 20, 31 and 14 cases, respectively. Biliary calculus and obstruction were found in equal 4 cases.

Distribution of the patients by ERCP findings:

On ERCP, the course was normal in 9 cases and abnormalities were found in 41 cases. Dilatation of ducts was found in 49 cases. Irregularities were found in 40 cases and filling defect in 28 cases. Cavitation was found in 5 cases.

Table I

Distribution of patients' US findings by ERCP findings

	ERCP findings		Total
US findings	Pathology	No pathology	
Pathology	42 (91.3)	1 (25.0)	43 (86.0)
No pathology	4(8.7)	3 (75.0)	7 (14.0)
Total	46 (100.0)	4 (100.0)	50 (100.0)

Kappa=0.494, p value=0.001

Kappa value indicates moderate agreement between these two tests which was statistically significant.

Table II

Validity test for ultrasonogram

Test	Value	Confidence interval
Sensitivity	91.3%	87.6-93.1
Specificity	75.0%	32.6-95.2
PPV	97.7%	93.7-99.6
NPV	42.9%	18.6-54.4
Accuracy	90.0%	83.2-93.2

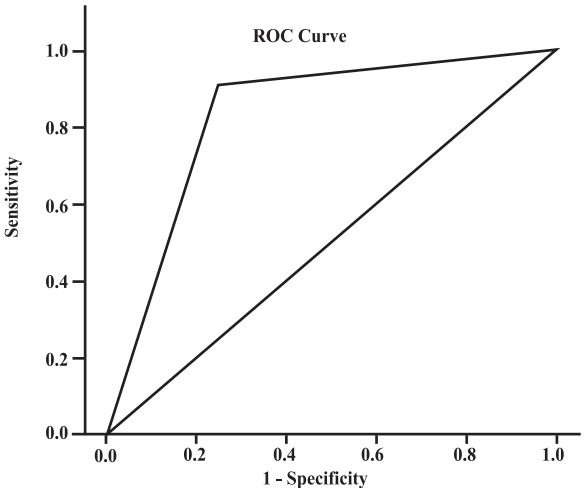

Fig 1: *ROC curve of USG findings by ERCP findings*

Fig. - I

Area under the curve

	Area
USG	0.832

The area under the curve of USG is 0.832

Discussion:

In current study, 62% of patients were male and 38% were female. Mean age (+SD) of patients was 29.48±4.67 years. On comparing a cohort of 220 patients with ICP studied in 1984 with another cohort of 244 patients seen. In 2004, Balakrishnan et al. found that the clinical profile and presentation of the disease have changed. They found that the ICP in the recent group occurred in older people, with mean age of onset being 30.6 years in contrast to 20.7 years in the 1984 cohort. [6]

Pain was the dominant symptom in patients with early (95.1%) and late onset (100%) ICP. [7]

In our series 100% of patients of chronic pancreatitis were presented with both abdominal pain and vomiting.

In cohort study done by Balakrishnan et al. the frequency of pain was found 95.9% in 2004 and 81% in 1984.[6]

The findings may occur in various combinations with differing frequencies depending on the duration of the disease.[8] Cheng et al. presented a case that had all the morphological alterations described above except for calcification and obstruction of the portal venous system.[9]

Moorthy et al. in their study, 25 cases were diagnosed by sonography as chronic pancreatitis, duct dilatation (98%) and demonstration of calculi were the most common ultrasound findings. [10] In our study duct dilatation was found in 50 cases.

Sensitivity for diagnosis of chronic pancreatitis was 58% in transabdominalsonography (TAS) and 74% in ERCP. The specificity being 100% for ERCP and 75% for TAS. [11] Moorthy et al. compared with ERCP, ultrasonography has a sensitivity of 94% and specificity of 100%. [10]

In our study sensitivity of ultrasonogram in diagnosing chronic pancreatitis was 91.3% and specificity was 75%.

This study had some limitations. There was no control group of normal healthy population with which findings of chronic pancreatitis could be compared and the sample size was small i.e. fifty. A large controlled study should be carried out to observe corresponding biochemical, histological and sonographic changes in chronic pancreatits.

Conclusion

In the light of this study we can consider trans-abdominalultrsonography as a useful tool for diagnosis of chronic pancreatitis correlating with ERCP.

References

1. Steer ML, Waxman I, Fredman SD. Chronic pancreatitis. N Eng J Med 1995; 332:1482.
2. Fry LC, Monkemuller K, Malfertheiner P. Diagnosis of chronic pancreatitis. Am J Surg 2007; 194(4): S45-S52.
3. Mitchell RMS, Byrne MF, Baillie J. Pancreatitis. Lancet 2003; 350:1379-85.
4. Czako L, Endes J, Takacs T, Boda K, Lonovics J. Evaluation of pancreatic exocrine function by secretin-enhanced magnetic resonance cholangiopancreatography. Pancreas; 2001; 23: 323-28.
5. Burge WR, Vandam J. N E J M 1999; 341(24):1809.
6. Balakrishnan V, Nair P, Radhakrishnan L. Tropical pancreatitis distinct entity, or merely a type of chronic pancreatitis? Indian J Gastroenterol 2006; 25:74-81.
7. Bhasin DK, Singh G, Rana SS, Chowdhury SM Shafique N. Clinical profile of idiopathic chronic pancreatitis in north India (article on press). Clinical gastroenterology and hepatology 2009.
8. Bolondi L, Bassi SL, Gaiani S. Sonography of chronic pancreatitis. Radiology CZin North Am 1989; 27: 815-33.
9. Cheng M, Lee C, Wu C, Min-Chiu Su, Wen-Haur Wu. Sonographic presentation of chronic pancreatitis complicated with acute duodenal obstruction in battered child. J Clin Ultrasound 1994; 22(6): 334-37.
10. Moorthy TRK, Nalini N, Narendranathan M. Ultrasound imaging in tropical pancreatitis. J Clin Ultrasound 1982; 20: 389-93.
11. Buscail L. Endoscopic ultrasonography in pancreatobiliary disease using radial instruments. Gastrintes Endos Clin North Am 1995; 5: 81-87.