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ROLE OF TRANSABDOMINAL ULTRASONOGRAPHY AND ENDOSCOPIC ULTRASONOGRAPHY IN DIAGNOSIS OF CHRONIC PANCREATITIS

Radiology

Patil Yugandhar V* MD, Radio-diagnosis, Senior Resident, PIMS, Islampur, Maharashtra.*Corresponding Author

Wadhwani Nitin D MD, DNB, FRCR, Head of department, Dept. of Radiodiagnosis, D. Y. Patil Medical College, D. Y. Patil University, Kolhapur.

Amte Aneesh P MD Medicine, DM Gastroenterology

ABSTRACT

The aim of the study was to investigate the role of transabdominal ultrasonography (TAS) and endoscopic ultrasonography (EUS) in diagnosis of chronic pancreatitis (CP). The objectives of our study were to assess the advantages and disadvantages of TAS and EUS in diagnosis of chronic pancreatitis and further evaluate the effectiveness of TAS and EUS in grading severity of CP. We included 30 clinically suspected patients of CP. All patients were initially evaluated by TAS followed by EUS. EUS was found to be more sensitive in detection of calcification (80% v/s 46.7%), heterogeneity (100% v/s 87%) and intraductal calculi (69% v/s 66%) as compared to TAS while TAS was more sensitive than EUS in detection of ductal dilatation (80% v/s 69%). TAS is considered as first imaging modality in evaluating patients of CP while EUS can be helpful in early diagnosis and prognostication of CP.

KEYWORDS

endoscopic, heterogeneity, ultrasonography.

I. INTRODUCTION

The prevalence of chronic pancreatitis ranges from 3.5 to 10 per 1,00,000 in the population.[1] Chronic pancreatitis (CP) is an irreversible and progressive inflammatory process featuring pathological modifications of fibrosis, inflammatory infiltration, and destruction of exocrine and endocrine tissue, resulting in characteristic morphological changes in the parenchyma and pancreatic ducts.[2] Alcoholism is the predominant cause of chronic pancreatitis.[3] Classically , the clinical presentation is abdominal pain which may be recurrent or persisting , malabsorption resulting from exocrine pancreatic insufficiency and in most severe cases diabetes mellitus may result due to endocrine insufficiency caused by progressive destruction of pancreatic parenchyma.

The imaging diagnosis of chronic pancreatitis depends on detecting the structural changes associated with advanced disease. Despite the common belief that transabdominal ultrasonography (TAS) is diagnostically inferior to overall to endoscopic ultrasonography (EUS) [4], TAS is often recommended as the first diagnostic test.[5] TAS provides a low cost non-invasive method for screening of patients with suspected chronic pancreatic diseases. The normal pancreas has a homogeneous fine granular (salt and pepper) echogenic pattern. The sonographic features of chronic pancreatitis include alteration in pancreatic size and echotexture, focal masses, calcification, ductal dilatation and pseudocyst formation.[6]

EUS was introduced 30 years ago. Its purpose was improved visualization of the pancreas, particularly in comparison with TAS where intervening air often hampers clear and full demonstration of the organ. With the advent of EUS, this tool has increasingly been used for diagnosis of chronic pancreatitis. High frequency US probes (7.5-12 MHz) attached to the tip of endoscope enables good visualization of head and body of pancreas.[7,8] In 2009, the Rosemont classification is proposed as new EUS diagnostic criteria. This classification system was an attempt to standardize and define more explicitly the endosonographic features and thresholds for the diagnosis of chronic pancreatitis, with grouping of criteria into major and minor importance categories.[9]

The purpose of our study was to evaluate comparative usefulness of TAS and EUS in diagnosing and severity grading of chronic pancreatitis.

II. METHODOLOGY

A prospective cross sectional study on 30 patients was carried out, who presented with clinical features and past history suggestive of chronic pancreatitis. The study was conducted in Department of Radiodiagnosis, Dr. D. Y. Patil Medical College, Hospital and Research Institute, Kolhapur over a duration of 2 years, i.e. from May 2014 to May 2016. All patients who were critically ill and had severe co-morbidities were excluded.

The study was approved by Ethical Committee of the Institute and written informed consent was obtained from all patients.

All patients were initially evaluated by TAS followed by EUS. TAS was performed using a Mindray DC7 ultrasound machine and the probe which was used for the study was a 3.5MHz convex array transducer. Transverse and sagittal scan were performed with patient lying in supine position. OLYMPUS Endoscopy EU ME1 with high frequency (5-12 MHz) ultrasound probe at its tip was used for EUS. EUS was performed on patients after six hours fasting. Radial scanning with the echoendoscope placed in the descending duodenum and linear scanning from the stomach were performed with patient lying in the left lateral decubitus position.

Statistical analysis was performed using Z-test for proportion. By using this test, percentages of TAS and EUS different parameters were compared. P<0.05 is considered statistically significant.

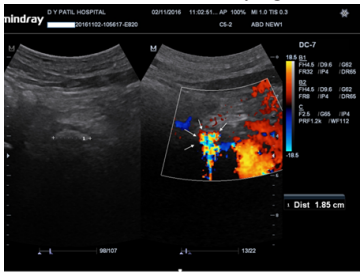

Fig. 1: TAS of pancreas shows a large pancreatic ductal calculus (calipers). On Doppler, it shows 'color comet-tail' artifact (small white arrows).

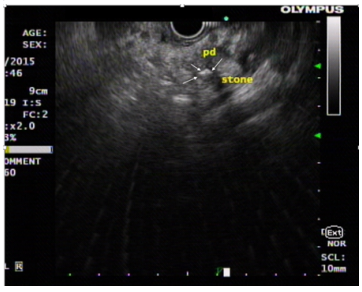

Fig. 2: EUS of pancreas shows presence of intraductal calculus (small white arrows).

III. RESULTS

Out of 30 patients, 24 males (80%) and 6 females (20%). The most common age group presenting with chronic pancreatitis was > 51 years (46.67%). Alcohol abuse was the most common aetiological factor (53%) noted in our study. Abdominal pain was the most common presenting feature followed by diabetes and constipation.

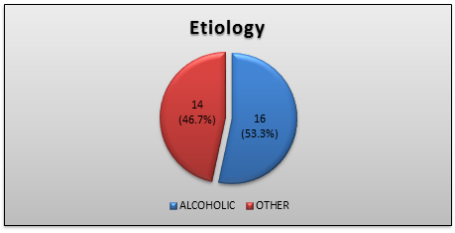

Fig. 3: Etiology of chronic pancreatitis among the study population.

TAS detected heterogeneous echotexture, parenchymal calcification, duct dilatation and intraductal calculi in 26(86.7%), 14(46.7%), 24(80%) and 20(67%) patients respectively. EUS detected parenchymal findings like hyperechoic foci, hyperechoic strands, lobularity and calcification were noted in 24(80%), 28(93.3%), 22(73.3%) and 24(80%) patients respectively. Duct dilatation and intraductal calculi were noted in 18(60%) of patients. EUS detected calcification in 80% as compared to 46.7% on TAS. This difference was statistically significant (i.e. p value: 0.0064).

According to Rosemont criteria of EUS, 16 (53.33%) patients belonged to category- consistent with CP, 6 belonged to category- suggestive of CP, 4 (13.3%) belonged to category- indeterminate for CP and remaining 4 belonged to category- normal.

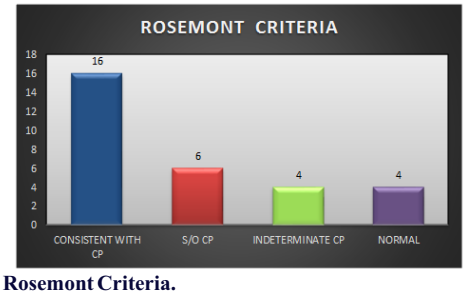

Fig. 4: Rosemont Criteria.

Complications like pseudocyst and pleural effusion was seen in 7% of cases. GB calculi and sludge were noted in 13.3% patients.

The sensitivity of TAS for detecting heterogeneity, calcification, duct dilatation and intraductal calculi were 87%, 47%, 80% and 66% respectively. According to Rosemont criteria, the sensitivity of EUS for detecting heterogeneity, calcification, duct dilatation and intraductal calculi were 100%, 92%, 69% and 69% respectively. EUS showed 100% specificity of diagnosis of chronic pancreatitis.

TABLE.1: Sensitivity of TAS and EUS variables.

Sr. No.	Variable	TAS sensitivity	EUS sensitivity
1.	Heterogeneity	87%	100%
2.	Calcification	47%	92%
3.	Ductal dilatation	80%	69%
4.	Intraductal calculus	66%	69%

IV. DISCUSSION

Age group > 51 years, male predominance (80%) and alcoholism (53%) was seen in our study. It was consistent with other studies.[10,11,12,13]

Abdominal pain was the most common presenting feature followed by diabetes and constipation. D.I. Gheonea, P. Vilmann et al., in their study of 80 patients of chronic pancreatitis had 93.5% patients with presenting symptom as abdominal pain.[11]

TAS detected heterogeneous echotexture, parenchymal calcification, duct dilatation and intraductal calculi in 26(86.7%), 14(46.7%), 24(80%) and 20(67%) patients respectively. D.I. Gheonea, P. Vilmann et al., in their study of 80 patients of chronic pancreatitis showed heterogeneous pancreatic echotexture in 56.25% patients, pancreatic calcifications in 55% patients and dilatation of duct in 47.5%.[11]

EUS detected parenchymal findings like hyperechoic foci, hyperechoic strands, lobularity and calcification were noted in 24(80%), 28(93.3%), 22(73.3%) and 24(80%) patients respectively. Louis Buscail, Jean Escourrou et al., in their prospective study of 81 patients of suspected pancreatic disease, detected heterogeneity in 79.5% of cases. They detected calcification in 100% of cases by EUS.[10] Bhutani M in his study of Endoscopic Ultrasonography: Changes of Chronic Pancreatitis in Asymptomatic and Symptomatic Alcoholic Patients, detected echogenic foci in 71%, lobularity in 84%, cysts in 3% of cases, echogenic main pancreatic duct in 90%, irregularity of pancreatic duct in 29%, dilated main pancreatic duct in 29% and visible side branch dilatation in 19% of cases.[14]

EUS was found to be more sensitive in detection of calcification (80% v/s 46.7%), heterogeneity (100% v/s 87%) and intraductal calculi (69% v/s 66%) as compared to TAS while TAS was more sensitive than EUS in detection of ductal dilatation (80% v/s 69%). Heterogeneity of the gland was detected in more number of patients (79.5%) by EUS as compared to 20% by TAS in the study of Louis Buscail, Jean Escourrou et al. of endoscopic ultrasonography in chronic pancreatitis. They detected calcification by EUS in 100% of cases as compared to 45% by TAS. Their study showed 58% sensitivity of TAS as compared to 88% sensitivity of EUS in diagnosing chronic pancreatitis.[10]

V. CONCLUSION

From our study, we conclude that sensitivity of EUS for detection of parenchymal calcification, heterogeneity and intraductal calculi is more compared to TAS, hence, EUS can be advised for further evaluation in case of poor visualization of pancreas due to bowel gas/ obesity on TAS. As EUS has the advantage of better visualization of pancreatic details, it can also be advised for early diagnosis of CP and can be helpful in prognostication of CP. But we have to consider the expenditure burden and invasiveness of EUS procedure.

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