Original Article

The Comparative Study of Endoscopic Ultrasound (EUS) versus Esophagogastroduodenoscopy (EGD) plus Transabdominal Ultrasound (TUS) for Diagnosed Dyspepsia in Elderly Patients

Rattanasupar A
Attasaranya S
Ovartlarnporn B

ABSTRACT

Background: Dyspepsia is common in clinical practice and the etiologies may be from diseases in both the luminal and extraluminal upper GI tract. Esophagogastroduodenoscopy (EGD) provides information on the intraluminal pathology. Whereas endoscopic ultrasound (EUS) that combined endoscopic imaging with US imaging may be an ideal, single-step diagnostic test for detecting, or excluding underlying causes of dyspepsia.

Patients and Methods: Patients older than 50 years with uninvestigated dyspepsia were recruited. All patients underwent EUS followed by EGD in the same day. Transabdominal US was performed 1 week before or after the endoscopic examination. Each of these studies was performed by an independent operator blinded to the results of the other examinations.

Results: Fifty patients were recruited. The EGD significantly detected more abnormal intraluminal lesions than EUS, 33 vs 23 patients ($p = 0.046$). TUS insignificantly detected more extra abdominal lesions than EUS, 30 vs 10 patients respectively, ($p = 1$). EUS detected more pancreaticobiliary tract lesions than TUS, 7 vs 4 patients, even though, it failed to reach statistical significant ($p = 0.167$).

Conclusions: EUS did not provide additional useful information in elderly patients with dyspepsia. EUS should not be considered a routine diagnostic tool in elderly patients unless some suspicious clinical parameters were identified.

Key words : EUS, transabdominal ultrasound, endoscopic ultrasound, dyspepsia

[Thai J Gastroenterol 2010; 11(2): 74-79.]

Division of Gastroenterology/Hepatology, Department of Medicine, Faculty of Medicine, Prince of Songkla University, Hat-Yai, Songkla, Thialand

Address for Correspondence: *Siriboon Attasaranya, M.D., Division of Gastroenterology/Hepatology, Department of Medicine, Faculty of Medicine, Prince of Songkla University, Hat-Yai, Songkla, Thailand.*

INTRODUCTION

Dyspepsia, defined as pain or discomfort centered in the upper abdomen[1], such as upper abdominal fullness, early satiety, bloating, epigastrium burning. Dyspepsia is a common clinical syndrome affecting up to 25% of the population[2]. Diseases arising in both the luminal and extraluminal upper GI tract may be responsible for the symptoms. The etiologies of dyspepsia include peptic ulcer disease (PUD), atypical gastroesophageal reflux disease (GERD), functional and drug-induced dyspepsia, symptomatic biliary stones, chronic pancreatitis and gastrointestinal malignancies such as gastric cancer, liver cancer and pancreatic cancer[3,4].

Esophagogastroduodenoscopy (EGD) is the main standard investigation for dyspepsia[1]. However, EGD provides information on the intraluminal pathology only. Transabdominal ultrasound (TUS) is used commonly for identifying extra-luminal pathology of the abdomen due to low cost, non-invasive and widely available procedure. However, TUS had limitation for examination of stone in the common bile duct and pathological change of pancreas due to overlying bowel gas.

Endoscopic ultrasoud (EUS) combines the endoscopic luminal and sonographic extraluminal examination including biliary tree, submucosal lesions, parts of the liver, pancreas and other organs adjacent to the gut wall. EUS is highly accurate for the diagnosis of various comparable pancreaticobiliary tract diseases. Several studies demonstrated that EUS has a accuracy rate for detecting intraluminal lesion with EGD and is superior to transabdominal ultrasound for detecting pancreaticobiliary lesion[5-9].

The incidence of pancreaticobiliary tract disease and GI malignancy increases in elderly patient[10]. The database from cancer unit of Songklanagarind Hospital[11] showed the high incidence rate of pancreatic and biliary tract cancer in patients with age more than 50 years. Since this malignancy may produce the symptoms of dyspepsia, so EUS may be an ideal, single-step diagnostic test for detecting, or excluding underlying causes for dyspepsia in elderly patients.

PATIENTS AND METHODS

The study was a prospective study recruiting the patients at out-patient clinic of Songklanagrarind Hospital from May 2007 to January 2008. Fifty years-old patients or older presented with dyspepsia, as defined by Rome II criteria, were eligible for the study. The patients were excluded if there was one or more of the followings; dysphagia, prior gastric surgery, EGD within 6 months, previous history of hepatobiliary tract disease, predominant symptoms of acid regurgitation and heartburn suggestive of GERD, and recurrent abdominal pain with bowel habit change indicative of irritable bowel syndrome. The study protocol was a proved by the Ethic Committee of our faculty. Written informed consents were obtained for all patients before entry to the study.

All patients underwent procedures by the gastroenterologists and scheduled for EUS and EGD on the same day. After an overnight fast, EUS was firstly performed by a single gastroenterologist with the EUS experience of more than 500 procedures in standard manner after intravenous administration of sedative medication. The complete endoscopic examination was carried out first, followed by EUS evaluation of biliary tract, pancreas and left lobe of the liver. The EUS scopes were GF-UM130, or GF-UM 160 Olympus Optical. After EUS examination, patients underwent EGD (GIF-160, Olympus) by a second endoscopist. All examinations were performed by independent investigators without knowledge of the results of the other investigations. CLO® test and biopsies were done as the discretion of the endoscopist performing the EGD. The TUS (Sonoline Antares Semen Ultrasound) was performed one week before or after EGD and EUS without knowing the results of the other investigations.

All patients were re-evaluated at 1 month after examination and follow-ups were done until dyspeptic symptoms improved or patients default.

The final diagnosis of the patients was based on standard criteria for esophagitis, peptic ulcer, and various forms of gastritis. The diagnosis of malignancy must be confirmed by pathology or clinical course of the patients where histology was not available. Stone in the biliary tree were confirmed by surgery, ERCP or MRCP when there is discrepancy between the two ultrasound examinations. Stone was diagnosed without further confirmation if the results of EUS and TUS are both positive.

Statistical Analysis

All statistic analysis was performed using the Epidata version 3.1. The percent, chi square and fisher test were calculated for 95% Confidence Interval.

Table 1. Demographic data of 50 patients with dyspepsia

Demographic data	Number	%
Age (years)		
Mean 59.64 ± 7.44 (min 50, max 82)		
Sex		
Female	33	66
Duration		
1-2 month	5	10
> 2 months	45	90
Symptoms		
Epigastric burning	32	64
Bloating	29	58
Abdominal fullness	19	38
Weight loss	11	22
Early satiety	9	18
Previous treatment		
PPI	49	98
Prokinetic drugs	38	76
H_2 blocker	2	4

RESULTS

There were 50 patients, (33 female, 17 male) with the mean age ± SD of 59.64 ± 7.44 years included in the study. Forty five (90%) patients had duration of dyspepsia longer than 2 month. The frequency of dyspeptic symptoms were epigastrium burning 32 patients (64%), bloating 29 patients (58%), abdominal fullness 19 patients (38%), early satiety 9 patients (18%) and significant weight loss 11 patients (22%). The previous treatments included proton pump inhibitor 49 patients (98%), prokinetic drugs 38 patients (76%) and H_2 receptor antagonist 2 patients (4%) (Table 1).

EGD detected abnormal endoluminal lesions in 33 patients (66%) patients including various forms of gastritis (27), duodenitis (6), gastric polyp (5), esophagitis (3), gastric ulcer (2), duodenal ulcer (2), CA stomach (1), duodenal polyp (1), hiatal hernia (1), Schatzki ring (1), pyloric obstruction (1), lipoma of duodenum (1), and subepithelium mass at EG junction (1) (Table 2).

TUS detected abnormal lesions in 30 patients (60%) including fatty liver (21), hepatic cyst (4), gall

Table 2. Intraluminal lesion detected by the EGD and EUS investigation

Intraluminal lesion	Detected by EGD alone (n)	Detected by EUS alone (n)	Agreement by EGD + EUS (n)
Gastritis (erosive, atrophic, hemorrhagic)*	11	2	16
Duodenitis	6	2	0
Gastric polyp	4	0	1
Esophagitis	2	0	1
Gastric ulcer	2	0	0
Duodenal ulcer	2	0	0
Duodenal polyp	1	0	0
CA stomach	0	0	1
Other	4	4	1
Hiatal hernia	1	0	0
Schatzki ring	1	1	0
Pyloric obstruction	0	0	1
Lipoma of duodenum	1	0	0
Subepithelium mass at EG junction	1	0	0
Intestinal metaplasia	0	1	0
Antral ring	0	1	0
Fundal diverticulum	0	1	0
Total abnormality	14	4	19

*$p = 0.004$

Table 3. Extraluminal lesion detected in dyspeptic patients

Extraluminal lesion*	Detected by TUS alone (n)	Detected by EUS alone (n)	Agreement by TUS and EUS (n)
Liver disease	25	0	0
Fatty liver	24	0	0
Liver cyst	1	0	0
Pancreaticobiliary tract disease	2	5	2
Gall stone	0	1[a]	2
Gallbladder polyp	2	3	0
CBD dilatation	0	1[b]	0
Chronic pancreatitis	0	1[c]	0
Other	3	1	1
Renal cyst	0	0	1
Renal stone	1	0	0
Hydronephrosis	1	0	0
Cyst of bladder	1	0	0
Polycystic kidney	0	1	0
Total	**27**	**7**	**5**

[a]normal by MRCP and repeat EUS, [b]normal by MRCP, [c]Chronic pancreatitis and pancreatic duct dilated by CT abdomen
*p >0.05

stone (2), gall bladder polyp (2), Renal cyst (1), renal stone (1), bilateral hydronephrosis (1) and cyst of urinary bladder (1) (Table 3).

EUS detected abnormal lesions in 29 patients (58%). There were 23 patients with intraluminal lesions including various forms of gastritis (18), duodenitis (2), gastric polyp (1), esophagitis (1), CA stomach (1), Schatzki ring (1), pyloric obstruction (1), intestinal metaplasia (1), antral ring (1), and fundal diverticulum (1). There were 10 patients with extraluminal lesions including gall stone (3), gall bladder polyp (3), chronic pancreatitis (1), CBD dilated (1), renal cyst (1) and polycystic kidney (1) (Table 2 and 3).

The total intraluminal lesions concordantly detected by both EGD and EUS occurred in 37 patients (74%), these included gastritis (58%), duodenitis (16%), gastric polyp (10%), esophagitis (6%), gastric ulcer (4%), duodenal ulcer (4%), CA stomach (2%), duodenal polyp (2%) and other lesion (18%). The EGD significantly detected more abnormal intraluminal lesion than EUS in 33 vs 23 patients respectively (p = 0.046) and the most pronounced difference is the detection of gastritis lesion particularly the non-specific gastritis (p = 0.005) (Table 2).

The total extraluminal lesions detected by both TUS and EUS were found in 37 patients (74%), these included fatty liver (42%), liver cyst (8%), gallbladder polyp (10%), gall stone (6%), CBD dilated (2%), chronic pancreatitis (2%) and urinary tract disease (10 %). The TUS detected extra-abdominal lesion more than EUS especially fatty liver, 30 vs 10 patients respectively. Whereas EUS could detect pancreaticobiliary tract lesion more than TUS could in 7 vs 4 patients, respectively. However, the difference between the EUS and TUS was not statistically significant (p = 1 and p = 0.1667).

The discrepancy between EUS and TUS occurred in 7 patients. One gallstone detected by EUS was not found by TUS. Subsequent MRCP showed no stone. Repeated EUS confirmed no stone. This was accounted false-positive EUS. There were 5 discrepancies in the gallbladder polyp findings and this remained unresolved at the time of manuscript writing. One chronic pancreatitis was not shown by TUS but was demonstrated by EUS. This was confirmed by CT scan. One patient had dilated duct by EUS but this could not be detected by subsequent TUS and MRCP.

DISCUSSION

The overall detection rate of abnormal intraluminal lesions in this study was higher than that of Lee

et al[9] study; 74% vs 32.5% respectively. The difference may be explained by the different population selected, in our study we recruited patients over 50 years of age where as the study of Lee *et al*[9] enrolled patients with 18 years or more. The higher incidence of lesions is expected in elderly than younger.

In our study, the extraluminal lesions were detected in 74%. Most of them were not associated with dyspepsia (such as fatty liver, liver cyst, renal disease). Only 14 % of the patients had pancreaticobiliary tract disease which may account for their dyspeptic symptoms.

The incidence of pancreaticobiliary tract disease in our study was lower than our previous study by Siriboon *et al* study[12] (14% vs 41% respectively). This may be explained by patient selection bias, since in the previous study included only patients with persistent dyspeptic symptoms suggesting biliary problem. However, our study has similar result to that of Lee *et al*[9] (14% vs 22.5% respectively).

In our study, EGD detected more intraluminal lesions than EUS (66% vs 46%, $p = 0.047$), and this was in contrast to the study of Lee *et al*[9], which showed that EUS was as accurate as EGD (accuracy rate of 92-100%). The discrepancy between the EGD and EUS findings regarding intraluminal lesions may be due to many factors. One is the use of EUS scope in our study was old model of EUS scope with poor endoscopic vision (GF-UM130, Olympus Optical), another is the inclusion of gastritis in the abnormal findings with non-specific gastritis accounted for the majorities of the mucosal lesion and this type of gastritis is subjected to enormous inter-observer variation.

In our study, TUS insignificantly detected extraluminal lesions more than EUS (60% vs 20%, respectively, $p = 1$). This is explained by the fact that TUS can detect the whole abdomen whereas EUS can detect only organ adjacent to the stomach or duodenum. However, most of extraluminal lesions detected by TUS were not associated with dyspepsia. On the otherhand, EUS could detect pancreaticobiliary tract lesions that may be associated with dyspepsia more than TUS (18% vs 8% respectively, $p = 0.167$), this is similar to Lee *et al*[9] and Sahai A et al study[13]. However, EUS was not as highly more accurate than TUS for the detection of gallstone and gall bladder polyp in our study which is contrasted to the findings of other studies[14,15] showing higher accuracy of EUS than TUS for diagnosis gall stone and gall bladder polyp. This may be due to the small number of gallstone in our study.

The discrepancy of EUS and TUS in our study may be explained by many factors. The operator skill is one important factor. EUS showed one false positive for gallstone and in retrospective review of the image the lesion was actually a small bowel loop. The gallbladder polyps in our study is unresolved since no other method short of surgery that can be used to confirm the diagnosis is available. The diagnosis of chronic pancreatitis is the one real advantage of EUS since it is a sensitive tool in detecting this lesion.

CONCLUSION

EGD was significantly superior to EUS for detection of intraluminal lesion; however, the superiority was confounded by including non-specific gastritis in the lesion which is highly subjected to inter-observer variation. TUS was superior to EUS for detecting of extraluminal lesion but most of which did not account for dyspepsia. EUS was superior to TUS for detecting of pancreaticobiliary tract lesion although it was not significant by statistical analysis. EUS did not provide additional useful information in most of the elderly patients with dyspepsia in our study.

REFERENCES

1. Talley NJ, Stanghellini V, Heading RC, *et al*. Functional gastroduodenal disorder. GUT 1999;45(Suppl II):37-42.
2. Talley NJ, Zinmeister AR, Schleck CD, *e t al*. Dyspepsia and dyspepsia subgroups: a popular based study. Gastroenterology 1992;102:1259-68.
3. Klauser AG, Voderholzer WA, Knesewitsch PA, *et al*. What is behind dyspepsia. Dig Dis Sci 1993;38:147-54.
4. Heikkinem M, Pikkarainen P, Takala J, *et al*. Etiology of dyspepsia: four hundred unselected consecutive patients in general practice. Scan J Gastroenterol 1995;30:519-23.
5. Fickling WE, Wallace MB. Endoscopic ultrasound and upper gastrointestinal disorders. J Clin Gastroenterol 2003;36:103-10.
6. Yusuf TE, Bhutani MS. Role of endoscopic ultrasonography in diseases of the extrahepatic biliary system. J Gastroenterol Hepatol 2004;19:243-50.
7. Fusaroli P, Caletti G. Endoscopic ultrasonography: current clinical role. Eur Gastroenterol Hepatol 2005;17:293-301.
8. Fusaroli P, Caletti G. Endoscopic ultrasonography. Endoscopy 2005;37:1-7.

9. Lee YT, Lai ACW, Hui Y, *et al*. EUS in the management of uninvestigated dyspepsia. Gastrointest Endosc 2002;56:842-8.
10. Mark Feldman, Lawrence S. Friedman, Gallstone disease, Sleisenger and Fordtran's gastrointestinal and liver disease. 8th ed. p. 1387-419.
11. Database from Cancer unit, Songklanagrarind Hospital (unpublish).
12. Attasaranya S, Ovartlarnporn B. The possible diagnostic role of endoscopic ultrasound in patients with dyspepsia. J Med Assoc Thai 2005;88: 1660-5.
13. Sahai AV, Mishra G, Penman ID, *et al*. EUS to detect evidence of pancreatic disease in patients with persistent or non-specific dyspepsia. Gastrointest Endosc 2000;52:153-9.
14. Amouyal P, Amouyal G, Levy P, *et al*. Diagnosis of choledocholithiasis by endoscopic ultrasonography. Gastroenterology 1994;106:1062-7.
15. Sugiyama M, Atomi Y, Yamato T. Endoscopic ultrasonography for differential diagnosis of polypoid gall bladder lesions: analysis in surgical and follow up series. Gut 2000;46:250-4.