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Endosonography and magnetic resonance cholangiopancreatography show similar efficacy in selecting patients for ERCP in mild-moderate acute biliary pancreatitis

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Background/aims: *We aimed to compare the value of endoscopic ultrasonography and magnetic resonance cholangiopancreatography in identifying the patients with mild-moderate acute biliary pancreatitis who require endoscopic retrograde cholangiopancreatography.* ***Material and Methods:*** *The study was prospectively conducted in a tertiary hospital between June 2006 and October 2009. Ninety-five patients without urgent endoscopic retrograde cholangiopancreatography requirement and with mild-moderate acute biliary pancreatitis were included in the study. Patients whose amylase, C-reactive protein, and bilirubin levels had decreased more than 50% on the fifth day compared to admission levels were randomized to magnetic resonance cholangiopancreatography or endoscopic ultrasonography, and the common bile duct was evaluated. Endoscopic retrograde cholangiopancreatography was performed in patients with stone detected with endoscopic ultrasonography or magnetic resonance cholangiopancreatography. With regard to the presence of common bile duct stone in endoscopic retrograde cholangiopancreatography, endoscopic retrograde cholangiopancreatography performances were classified as therapeutic or diagnostic.* ***Results:*** *Endoscopic retrograde cholangiopancreatography was performed in 16 of the 48 patients (33.3%) in the endoscopic ultrasonography group and in 18 of the 47 patients (38%) in the magnetic resonance cholangiopancreatography group. Therapeutic endoscopic retrograde cholangiopancreatography was performed in 14/16 patients (87%) in the endoscopic ultrasonography group and in 16/18 patients (88%) in the magnetic resonance cholangiopancreatography group. The ratio of total number of endoscopic retrograde cholangiopancreatographis was not significantly lower in the endoscopic ultrasonography (16/48) than in the magnetic resonance cholangiopancreatography (18/47) group, and the ratio of therapeutic endoscopic retrograde cholangiopancreatographis (14/16) was not higher in the endoscopic ultrasonography group than in the magnetic resonance cholangiopancreatography group (16/18).* ***Conclusions:*** *The necessity of therapeutic endoscopic retrograde cholangiopancreatography was determined with similar efficacy by endoscopic ultrasonography and magnetic resonance cholangiopancreatography in mild-moderate acute biliary pancreatitis.*

Key words: Endoscopic ultrasonography, endoscopic retrograde cholangiopancreatography, biliary pancreatitis, common bile duct stones, magnetic resonance cholangiopancreatography

Endosonografi ve manyetik rezonans kolanjiyopankreatikografi: Hafif-orta şiddete akut biliyer pankreatit hastalarının ERKP'ye seçiminde endosonografi ve manyetik rezonans kolanjiyopankreatikografi benzer etkinliktedir

Amaç: *Hafif-orta şiddette akut biliyer pankreatitli hastalarda endoskopik retrograd kolanjiyopankreatografi gereksinimini belirlemede endosonografi ve manyetik rezonans kolanjiyopankreatografinin değerlerini karşılaştırmayı amaçladık.* ***Metod:*** *Çalışma üçüncü basamak bir hastanede Haziran 2006 ile Ekim 2009 arasında prospektif olarak yürütülmüştür. Acil endoskopik retrograd kolanjiyopankreatografi gereksinimi olmayan hafif-orta şiddette akut biliyer pankreatitli 95 hasta çalışmaya alınmıştır. Beşinci günde amilaz, C-reaktif protein ve bilirubin değerleri başvuru değerlerine göre %50'den daha fazla düşen hastalar manyetik rezonans kolanjiyopankreatografi veya endosonografi gruplarına randomize edilmişlerdir ve ana safra kanalı değerlendirilmiştir. Endoskopik retrograd kolanjiyopankreatografi, endosonografi veya manyetik rezonans kolanjiyopankreatografi ile taş tespit edilenlerde yapılmıştır. Endoskopik retrograd kolanjiyopankreatografideki taş varlığına göre endoskopik retrograd kolanjiyopankreatografi işlemleri tedavi ya da tanısal amaçlı olarak sınıflandırılmıştır.* ***Bulgular:*** *Endosonografi grubundaki 48 hastanın 16'sına (%33) ve manyetik rezonans kolanjiyopankreatografi grubundaki 47 hastanın 18'ine (%38) endoskopik retrograd kolanjiyopankreatografi yapılmıştır. Terapötik endoskopik retrograd kolanjiyopankreatografi oranı, endosonografi grubunda (14/16) (87%), manyetik rezonans kolanjiyopankreatografi grubundakinden (16/18) (88%), istatistiksel olarak farklı değildi. Toplam endoskopik retrograd kolanjiyopankreatografi sayısı oranları da endosonografi grubunda (16/48) ve manyetik rezonans kolanjiyopankreatografi grubunda (18/47) benzer bulundu.* ***Sonuç:*** *Hafif-orta şiddette akut biliyer pankreatitte terapötik endoskopik retrograd kolanjiyopankreatografi gerekliliği endosonografi ve manyetik rezonans kolanjiyopankreatografi ile benzer etkinlikte saptanabilmektedir.*

Anahtar kelimeler: Endoskopik ultrason, endoskopik retrograd kolanjiyopankreatografi, biliyer pankreatit, manyetik rezonans kolanjiyopankreatografi

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INTRODUCTION

Gallstones are the most commonly encountered cause of acute pancreatitis and are seen in 40-60% of the patients (1). Although the majority of patients with acute biliary pancreatitis (ABP) have a benign course, for patients who require hospitalization, the mortality rate is 5-10%. On examinations with imaging modalities, no residual stones are usually seen in the common bile duct (CBD) in the patients with ABP. The stones initiating the disease frequently fall into the duodenum spontaneously (2,3).

Patients with ABP can be divided into two groups according to the therapy requirement. The first group consists of patients in whom biliary stones have passed spontaneously from the CBD through the papilla of Vater; these patients need only conservative therapy. The second group includes patients who have retained CBD stones. It is now well established that only this second group of patients benefits from endoscopic retrograde cholangiopancreatography (ERCP) with endoscopic sphincterotomy (ES) and stone removal, whereas patients from the first group do not.

In preventing recurrences after an attack of acute pancreatitis, detection of gallbladder or CBD stone and execution of the relevant treatment is the most important factor. In patients with cholelithiasis, cholecystectomy should be performed in the early period (4). After an attack of ABP, magnetic resonance cholangiopancreatography (MRCP), endoscopic ultrasonography (EUS) and ERCP are the most frequently utilized for the detection of retained CBD stones. Since ERCP has considerable complications such as pancreatitis, bleeding and perforation, it should be employed for therapeutic purpose particularly (5).

We aimed to evaluate the efficacy of EUS versus MRCP in selecting patients for therapeutic ERCP in mild-moderate ABP.

MATERIALS AND METHODS

This study was prospectively conducted in the tertiary care İzmir Atatürk Training and Research Hospital, Gastroenterology Clinic, between June 2006 and October 2009. Ninety-five patients with mild-moderate ABP and without urgent ERCP requirement were included in the study. Patients were assigned to EUS or MRCP groups by simple randomization. The patients describing belt-type severe abdominal pain before admission and having serum lipase levels >500 U/L, amylase >400 U/L, total bilirubin >2.0 mg/dl, alanine transferase (ALT) > x3 normal, aspartate aminotransferase (AST) > x3 normal, alkaline phosphatase 2x higher than upper limit of normal, and C-reactive protein (CRP) >1.5 mg/dl were considered as having ABP. All of the patients were either cholecystectomized because of cholelithiasis or had cholelithiasis. Patients will biliary pancreatitis who had a history of malignancy in the pancreas, biliary tract or gastrointestinal system, those in whom malignancy was detected during hospitalization, and those who had undergone gastrectomy-gastroenterostomy were excluded. The patients with severe pancreatitis according to the Atlanta Clinical Scoring and Balthazar's computed tomography (CT) scoring system underwent emergent ERCP and ES regardless of presence of gallstones. Data from these patients were not included in the analysis.

AST, ALT, gamma-glutamyl transferase (GGT), CRP, amylase, lipase, bilirubin levels, and white blood cell (WBC) count were determined in the first 12 hours after admission to the emergency service room. Gallbladder and CBD were examined through transabdominal USG with Hitachi EUB 500 3.5 MHz convex ultrasound probe within the first 24 hours. On the fifth day of admission, amylase, CRP and bilirubin levels were determined, and patients whose levels had decreased more than 50% relative to admission levels were randomized to two groups. CBD evaluations were performed with radial endosonography (using Hitachi EUB 6000 ultrasound device combined with Pentax EG 3630 UR 270 5-10 MHz Doppler radial EUS probe) in Group 1 patients and with MRCP (Philips-Achieva 1.5 T SE) in Group 2 patients. Presence of stone in CBD, CBD dilatation and distal CBD stenosis were evaluated.

In the EUS group, hyperechogenic structures with acoustic shadow within the CBD were regarded as CBD stone and therapeutic ERCP was contemplated. On MRCP, patients with an image compatible with CBD stone and filling defect in CBD were directed to therapeutic ERCP (CV 160 Olympus Exera system, Olympus, Tokyo, Japan). ERCP was performed with standard therapeutic duodenoscope, and sedative anesthesia was provided with midazolam and propofol. Images were obtained with non-ionic contrast, and after ES, stones and particles were swept with stone extraction balloon. Plastic stents were applied in patients with failed stone extraction.

Therapeutic ERCP is regarded as the intervention in which stone and/or microparticles are demonstrated and extracted. The interventions in which stone and/or microparticles cannot be demonstrated are regarded as diagnostic ERCP.

In order to evaluate the risk of recurrent pancreatitis, patients were called every two months for the following one year. Laboratory values and findings on US, MRCP, EUS, and ERCP were evaluated.

Categoric data were assessed by chi-square test and continuous data by Student's t test. Statistical significance level was considered as $p<0.05$.

RESULTS

There were 95 patients with ABP. Radial EUS was employed in 48 patients and MRCP in 47 patients for examination of the CBD. No statistically significant difference was found between the two groups in demographics (age, gender), hospitalization times, or first and fifth day bilirubin, amylase, AST, CRP, and WBC counts ($p>0.05$) (Table 1). In the MRCP group, ERCP was performed in 18 of the patients (18/47, 38%). On MRCP, there were 18 patients with CBD stone and 3 patients with suspicious filling defects or abrupt cut-off of the distal CBD, and these were not included in the analysis. No stone or suspicious filling defect was determined in 26 patients on MRCP. In the EUS group, ERCP was performed in 16 of the patients (16/48, 33%). On the EUS, 14 patients had CBD stone and 2 patients had dilated CBD with CBD stone (Table 2). No CBD stone was determined in 32 patients on EUS, and ERCP was performed only in the presence of stone. The number of patients that required ERCP was not different between the EUS and MRCP groups ($p>0.05$). Twenty-three patients (49%) in the MRCP group and 25 patients (52%) in the EUS group were cholecystectomized. In the MRCP group, MRCP was performed 7±3 days (range: 5–10 days) after admission, while in the EUS group, EUS was performed 4±3 days (range: 0-9 days) after admission. ERCPs were performed the day after EUS or MRCP, if necessary.

ERCP showed stones in 16 of the 18 patients (88%) in the MRCP group and in 14 of the 16 patients (87%) in the EUS group. The ratio of therapeutic ERCP was not different between the EUS and MRCP groups ($p>0.05$). ERCP showed no stones in the 2 patients with stones on MRCP. Two of 3 patients with suspicious filling defects or abrupt cut-off of distal CBD who were not included in the analysis also showed no stones in ERCP. In the EUS group, ERCP showed no stones in 1 patient without dilated CBD and in another patient with dilated CBD and CBD stone. With regard to the number of patients with stone in the ERCP, there was no difference between the MRCP and EUS groups. There was no major complication such as bleeding, perforation or acute pancreatitis related to ERCP (Table 3).

Table 1. Demographics and laboratory findings in the MRCP and EUS groups

	MRCP group (n=47)	EUS group (n=48)	p value
Mean age (years) (range)	57.2±7.2 (28-82)	54.8±6.3 (31-79)	NS
Male gender	29 (61%)	26 (54.1%)	NS
Mean amylase day 1 (U/L)	1148±324 (654-4637)	1087±303 (543-3870)	NS
Mean amylase day 5 (U/L)	134±26 (61-398)	175±35 (69-370)	NS
Mean admission AST (U/L)	194±36 (125-680)	217±38 (103- 625)	NS
Mean bilirubin day 1 (mg/dl)	4.2±3.3 (2.2-11.5)	3.9±3.1 (2.2-8.9)	NS
Mean bilirubin day 5 (mg/dl)	1.6±1.2 (0.9- 2.8)	1.4±1.1 (0.7-3.1)	NS
Patients with cholecystectomy	23 (49%)	25 (52%)	NS

AST: Aspartate aminotransferase. NS: Not significant.

Table 2. MRCP and EUS findings

	MRCP group (n=47)	EUS group (n=48)
Patients with CBD stones	18 (38.2%)	16 (33.3%)
Patients with suspicious filling defect	3 (6.3%)	0
Normal findings	26 (55.3%)	32 (66.6%)

CBD: Common bile duct.

Table 3. ERCP findings in the EUS and MRCP groups

	MRCP group (n=47)	EUS group (n=48)	p value
Number of ERCPs performed	18 (38%)	16 (33.3%)	p>0.05
Positive stone on ERCP (%)	16 (88%) (16/18)	14 (87%) (14/16)	p>0.05
Days of MRCP or EUS from admission	7±3 days (5-10)	4±3 days (0-9)	p>0.05

In the follow-up (1 year), only 2 patients in the MRCP group had a recurrent acute pancreatitis. One of them had stone removal in ERCP, and the other was a cholecystectomized patient without a stone demonstrated in MRCP at the first admission. Three recurrent pancreatitis cases were observed in the EUS group. Two of them had stone removal in the ERCP, and 1 did not have ERCP at the first admission. No mortality was reported during one year of follow-up. There was no significant difference between the two groups related to recurrent pancreatitis (p>0.05).

DISCUSSION

The necessity of ERCP and ES in the treatment of mild-moderate ABP is a controversial issue, and ES is suggested only in the presence of CBD stone and acute cholangitis in the setting of mild-moderate ABP (6,7). In most patients, the occluding gallstone has already passed, rendering ERCP and sphincterotomy unnecessary. Furthermore, patients with cholelithiasis without CBD stone are scheduled for laparoscopic cholecystectomy on the same admission with acute pancreatitis, which accentuates the importance of exclusion of choledocholithiasis (8,9).

In the diagnosis of CBD stone, ultrasound, ERCP, MRCP, and EUS are employed. ERCP is highly sensitive and specific for detection of CBD stones, and if CBD stones are present, extraction by ES can be performed during the same session. The complication rate was reported to be 1.4-1.8% when ERCP is a purely diagnostic procedure. Diagnostic ERCP carries a mortality rate of 0-0.2 %, and when ES is also performed, the mortality rate increases to 0.5-0.9 % (11). MRCP is an accurate and non-invasive method of imaging the biliary tree (12). On MRCP images, observation of stones in the CBD and detection of dilated CBD, filling defect or narrowing at the distal CBD require ERCP (13). EUS has proved to be highly accurate for detecting CBD stones (14). It is able to detect very small stones because of the proximity of the probe to the CBD during the investigation and because of the high frequency used. EUS has been shown to have great sensitivity (up to 97%) in the diagnosis of even tiny stones that can be easily masked by contrast medium during ERCP, without any procedure-related complications and with a negative predictive value reaching 100% (15). Arguedas et al. (17) compared EUS, MRCP, intraoperative cholangiography, and ERCP in the evaluation of biliary pancreatitis. In the context of cost-minimization, in patients with low probability for choledocholithiasis, intraoperative cholangiography is suggested. EUS takes place in the intermediate-risk patients, and ERCP is directly employed in high-risk patients for choledocholithiasis. Since EUS is less costly, MRCP was disregarded in the analysis (17). Another study has denied the role of MRCP in centers where EUS is available (18). We performed 18 (38%) ERCPs in the 47-patient MRCP group based upon the MRCP results, and 16 ERCPs (33%) in the 48-patient EUS group based upon the EUS results. In the MRCP group, patients with CBD stone and with suspicious filling defects were directed to ERCP. In the EUS group, likewise, presence of stone determined the indication for ERCP. We did not perform ERCP in patients showing peribiliary edema and mural edema in the distal CBD and luminal narrowing in the CBD on EUS. In the MRCP group, we performed ERCP in three patients because of filling defects or abrupt cut-off of distal CBD, but these data were not included in the analysis.

Sensitivity and specificity of EUS in detecting CBD stone in ABP were reported as 96% and 92% by Stabuc et al. (4). Similar findings were reported by other groups (19). Since we did not perform ERCP in patients with negative MRCP or EUS, we cannot report the sensitivity and specificity of EUS or MRCP. In the follow-up of one year, five patients had recurrent acute pancreatitis. In three of the five patients, stones were detected with EUS or MRCP and extracted with ERCP. After the recurrent pancreatitis, ERCP was performed in five of them and stones were extracted in two them.

We identified CBD stone in 16 of 18 patients (88%) who underwent ERCP in the MRCP group. In the EUS group, stones were detected in 14 of 16 patients (87%) who underwent ERCP. The ratio of therapeutic ERCP was not different between the EUS and MRCP groups. MRCP findings of patients who had only diagnostic ERCP were dilated CBD without CBD stone in two and dilated CBD with a stone in two. EUS showed stones in both of the patients who had two diagnostic ERCPs.

Age of the patient, history of cholecystectomy, and edema due to pancreatitis may explain the presence of CBD dilatation without CBD stone (20). EUS reveals the CBD wall, edema in the pericholedochal region, and impression of the edematous pancreas on the CBD. MRCP reveals only the CBD lumen; evaluation of the pericholedochal region and CBD wall cannot be made. Because of this drawback of MRCP, postponing MRCP for a few days for the evaluation of the CBD in ABP would save some patients from undergoing ERCP.

In this study, we showed that in patients with ABP, EUS is not a more effective diagnostic strategy than MRCP in determining the patients requiring therapeutic ERCP. We suggest performing either EUS or MRCP before hospital discharge in ABP patients.

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