

Endoscopic and anesthetic feasibility of EUS and ERCP combined in a single session versus two different sessions

Juan J Vila, Marcos Kutz, Silvia Goñi, Miriam Ostiz, Edurne Amorena, Carlos Prieto, Cristina Rodriguez, Ignacio Fernández-Urien, Francisco J Jiménez

Juan J Vila, Marcos Kutz, Silvia Goñi, Miriam Ostiz, Edurne Amorena, Carlos Prieto, Cristina Rodriguez, Ignacio Fernández-Urien, Francisco J Jiménez, Endoscopy Unit, Gastroenterology Department, Complejo Hospitalario de Navarra, Pamplona 31008, Spain

Author contributions: Vila JJ was responsible for the study design, manuscript draft and coordination; Kutz M was responsible for writing corrections and data collection; Ostiz M and Amorena E were responsible for data collection; Prieto C and Rodríguez C performed statistical analysis and interpretation; Fernández-Urien I provided a critical review; and Jiménez FJ gave the final approval.

Correspondence to: Juan J Vila, MD, Endoscopy Unit, Gastroenterology Department, Centro Hospitalario de Navarra, Pamplona 31008, Spain. juanjvila@gmail.com

Telephone: +34-848-422114 Fax: +34-848-422303

Received: November 08, 2010 Revised: February 16, 2011

Accepted: February 23, 2011

Published online: March 16, 2011

Abstract

AIM: To discuss the feasibility of single session endoscopic ultrasonography (EUS) to discuss and endoscopic retrograde cholangiopancreatography (ERCP) execution.

METHODS: Retrospective endoscopic and anesthetic outcome comparison of performing both EUS and ERCP in a single endoscopic session (Group I) versus performing each procedure in two different sessions (Group II) was made. The following variables were evaluated: epidemiological variables, American Society of Anesthesiologists Physical Status Classification (ASA) level, procedural time, propofol dose, anesthetic complications, endoscopic complications and diagnostic yield, and therapeutic procedures on both groups. T-student, Chi-Square and Fisher test were used for comparison.

RESULTS: We included 39 patients in Group I (mean

age: 69.85 ± 9.25 ; 27 men) and 46 in Group II (mean age: 67.46 ± 12.57 ; 25 men). Procedural time did not differ significantly between both groups (Group I vs Group II: 93 ± 32.78 vs 98.98 ± 38.17 ; $P > 0.05$) but the dose of propofol differed (Group I vs Group II: 322.28 ± 250.54 mg vs 516.96 ± 289.06 mg; $P = 0.001$). Three patients had normal findings on both explorations. Three anesthetic complications [O_2 desaturation (2), broncoaspiration (1)] and 9 endoscopic complications [pancreatitis (6), bleeding (1), perforation (1), cholangitis (1)] occurred without significant differences between both groups ($P > 0.05$). We did not find any significant difference regarding age, sex, ASA scale level, diagnostic yield or therapeutic maneuvers between both groups.

CONCLUSION: The performance of EUS and ERCP in a single session offers a similar diagnostic and therapeutic yield, does not entail a higher complication risk and requires a significantly smaller dose of propofol for sedation compared with performing each exploration in a different session.

© 2011 Baishideng. All rights reserved.

Key words: Endosonography; Endoscopic Retrograde Cholangiopancreatography; Feasibility Studies; Endoscopy; Gastrointestinal; Anesthesia

Peer reviewer: Perminder Phull, MD, FRCP, FRCPE, Gastrointestinal and Liver Service, Room 2.58, Ashgrove House, Aberdeen Royal Infirmary, Foresterhill, Aberdeen AB25 2ZN, United Kingdom

Vila JJ, Kutz M, Goñi S, Ostiz M, Amorena E, Prieto C, Rodríguez C, Fernández-Urien I, Jiménez FJ. Endoscopic and anesthetic feasibility of EUS and ERCP combined on a single session versus two different sessions. *World J Gastrointest Endosc* 2011; 3(3): 57-61 Available from: URL: <http://www.wjgnet.com/1948-5190/full/v3/i3/57.htm> DOI: <http://dx.doi.org/10.4253/wjge.v3.i3.57>

INTRODUCTION

Endoscopic ultrasonography (EUS) and endoscopic retrograde cholangio-pancreatography (ERCP) have become two essential diagnostic and therapeutic tools in patients with biliary and pancreatic diseases. Performing both procedures in a single anesthetic and endoscopic session has theoretical advantages, as reported by some authors^[1]. But this tandem approach is currently a topic of debate and is discouraged by other authors based on the observation of complications seen after performing EUS with fine needle aspiration (EUS-FNA) followed by ERCP^[2,3]. Development of cardiac complications has also been described in relation with prolonged ERCP procedures^[4].

Despite encouraging results referring to feasibility of tandem procedures described in some series^[5,6], comparative studies are lacking, so controversy still remains and this issue should be further clarified. Thus, the aim of this study was to compare the feasibility, clinical, endoscopic and anesthetic outcomes of performing EUS and ERCP in a single session versus performing each procedure in a different session. Although retrospective, this is the first comparative study to our knowledge reported in the literature regarding this topic.

MATERIAL AND METHODS

We compared the outcomes of a group of consecutive patients who underwent EUS and ERCP in a single session (Group I) versus a group of consecutive patients who underwent EUS and ERCP in two different sessions (Group II) from January 2006 until May 2009. Data were collected retrospectively from a review of the electronic medical record and endoscopy database from our hospital. Patients included in Group II underwent EUS and ERCP as part of the diagnostic and therapeutic work-up for the same disease. The decision to perform both explorations on the same day or on two different days was made by the referring clinician.

In Group I, both explorations were performed in a fluoroscopy suite specifically dedicated to this type of intervention during the same sedation procedure. In Group II, EUS was performed in an endoscopy unit lounge without fluoroscopy equipment and ERCP was performed some days later in the same suite as Group I. All the explorations were performed under sedation with propofol, administered by an anesthetic team comprised of an anesthesiologist and a nurse. To reduce duodenal motility during ERCP, intravenous hyoscine butylbromide was given following the anesthesiologist's criteria.

EUS was accomplished first in all patients, followed by ERCP. EUS explorations were performed by two endoscopists and ERCP by three endoscopists, assisted on both explorations by a nurse. EUS was done using a radial echoendoscope (Pentax EG3630UR, Pentax Europe, Hamburg, Germany) with evaluation of the entire pancreas, ampulla, extrahepatic bile duct, liver, retroperitoneal space and posterior mediastinum. When a pancreatic mass, liver metastasis or distant lymph nodes

in patients with oncological disease were seen, FNA was performed with a linear array echoendoscope (Pentax EG3830UT, Pentax Europe, Hamburg, Germany) using a 22 G needle (Echo-Tip, Wilson-Cook medical, Inc., Winston-Salem, NC, USA). When a thickened extrahepatic bile duct was found, brush cytology or biopsy was obtained during ERCP following our team's policy. ERCP was performed using a lateral view duodenoscope with therapeutic channel (Olympus TJF160VR, Olympus Medical Systems Corp, Tokyo, Japan). When EUS-FNA was performed, the specimens were immediately assessed on-site for adequacy by a dedicated cytopathologist.

The following variables were recorded: age, gender, American Society of Anesthesiologists Physical Status Classification (ASA), procedural time, administered propofol dose, cardiopulmonary complications, endoscopic complications and diagnostic yield of both explorations. The procedural time was considered from the moment that cardiopulmonary monitorization was initiated before sedation to the moment the patient left the exploration room. In Group II, the procedural time and total propofol dose were calculated by adding the values of each individual exploration. All ERCPs were performed on an in-patient basis, observing the patient for at least 24 h after ERCP before discharge.

Statistical analysis

Quantitative variables are presented as mean value \pm standard deviation. T-student test was used for the comparison of quantitative variables and Fisher exact test was used for the comparison of qualitative variables. The normal distribution of quantitative variables was evaluated with the Kolgomorov-Smirnoff Z test. Statistical significance was considered for *P* values under 0.05.

RESULTS

A total of 39 patients were included in Group I with a mean age of 69.85 ± 9.25 years. Twenty-seven of these patients were men. On the other hand, 46 patients were included in Group II. This group mean age was 67.46 ± 12.57 years and 25 were men. The indication for endoscopic study was suspected choledocolithiasis in 9 patients (11%), pancreatic cancer in 18 patients (21%), ampulloma in 5 patients (6%), cholangiocarcinoma in 4 patients (5%), chronic pancreatitis in 3 patients (3%), pancreatic pseudocyst in 1 patient (1%) and suspected pancreatobiliary disease without definitive diagnosis prior to endoscopic explorations in 45 patients (53%). Seventy three patients (86%) were studied with transabdominal ultrasonography prior to the endoscopic procedure, 61 (72%) with a CT and 25 (30%) with magnetic resonance cholangiopancreatography. No significant differences regarding age, sex and indication of endoscopy were seen between both groups.

ASA scale distribution of patients is shown in Table 1. When we analyzed patients regrouped as low ASA grade (including patients with ASA I and II) and high

Table 1 ASA Physical Status Classification distribution of patients in Group I and Group II

American Society of Anesthesiologists (ASA) Physical Status Classification				
	I	II	III	IV
Group I	3	19	15	2
Group II	4	17	23	2

ASA: American Society of Anesthesiologists

ASA grade (ASA III and higher), no differences between both groups were found, with 21 patients with a low ASA grade in Group I and 22 patients in Group II.

During ERCP, brush cytology was obtained in 20 patients (23%), retrieving an adequate specimen in 14 of them (diagnostic yield of 70%). Nine of these patients were included in Group I and 11 in Group II. Forceps biopsy was taken in 15 patients, 4 from Group I and 11 from Group II. The histological study was diagnostic in all of them. Eight of these patients had an ampullary tumor. EUS-PAAF was required in 19 patients in Group I and 13 in Group II, resulting in a correct specimen extraction in 17 patients in Group I and 12 patients in Group II. No significant differences were seen regarding the distribution or the diagnostic yield of EUS-FNA, brush cytology or forceps biopsy between both groups ($P > 0.05$).

Mean procedural time was 93 ± 32.78 min in Group I and 98.98 ± 38.17 min in Group II, without significant differences between them. Regarding the amount of administered propofol, patients included in Group I received a mean dose of 322.28 ± 250.54 mg while the dose administered to patients included in Group II was 516.96 ± 289.06 mg, significantly higher ($P = 0.002$). Age, procedural time and propofol dose variables followed a normal distribution.

Three patients in Group I suffered desaturation during the tandem exploration. Two episodes resolved after increasing inhaled oxygen flow and jaw thrust and the other required oro-tracheal intubation. One of the former was later diagnosed with aspiration pneumonia and had an uneventful recovery. Only one patient in Group II suffered desaturation which resolved with jaw thrust and oro-pharyngeal cannulation. No other cardiopulmonary complications were seen. None of these complications prevented our team from completing the endoscopic procedure.

Endoscopic complications appeared in 9 patients (11%), all of them related to ERCP. In Group I, one patient developed post-ERCP pancreatitis and another suffered sphincterotomy bleeding requiring endoscopic therapy. In Group II, five patients developed post-ERCP pancreatitis, one developed post-ERCP cholangitis and one suffered a retroperitoneal perforation. This latter patient developed a retroperitoneal abscess and required percutaneous drainage. The rest of the patients had an uneventful recovery with conservative management.

No significant differences between both groups were seen with regard to presentation of cardiopulmonary or

Table 2 Therapeutic maneuvers performed on Group I and II

		Group I	Group II	P
Sphincterotomy	Yes	17	22	0.69
	No	22	24	
Common bile duct stone extraction	Yes	9	5	0.13
	No	30	41	
Biliary plastic stent	Yes	14	24	0.18
	No	25	22	
Biliary metallic stent	Yes	6	3	0.29
	No	33	43	
Pancreatic plastic stent	Yes	0	3	0.24
	No	39	43	
Endoscopic therapy	Not Necessary	8	1	0.006
	Necessary	31	45	

endoscopic complications ($P > 0.05$).

Final diagnosis after both explorations was pancreatic cancer in 30 patients, cholangiocarcinoma in 9, ampulloma in 8, choledocolithiasis in 23, chronic pancreatitis in 7 and other findings in 3 patients. Three patients had normal findings on both explorations. No significant differences between Group I and II were observed regarding the final diagnostic yield.

Patients who did not undergo any therapeutic procedures were more common on Group I ($P < 0.05$). No other therapeutic differences were seen between both groups (Table 2).

DISCUSSION

EUS and ERCP are currently two complementary techniques in the diagnosis and therapeutic work-up of patients with pancreatic and biliary diseases. Performing both explorations in the same session is an appealing policy which is in common use in some tertiary centers and is supported by published data and expert opinion^[1,5,6]. This policy has important advantages for endoscopists as has been previously stated^[1]. These advantages include performing EUS in naïve conditions which might be important in pancreatic and biliary cancer staging^[7,8]. Only one sedation procedure would be necessary for the same patient and this, in the opinion of some authors, could reduce the demand on anesthetic resources^[5]. Performing EUS initially could guide the biliary or pancreatic access and therapy on ERCP since the endoscopist gets useful clinical and anatomical information. Cost-effectiveness could be another advantage of the tandem approach since the procedure time and endoscopic and anaesthetic resources could be lowered. To these theoretical advantages reported previously, we would add the lowering of social costs by means of reducing the length of hospital admissions and avoiding the attendance of the patient and relatives at the hospital for two days for each individual exploration. This policy would also facilitate the endoscopy room's workload planning, resulting in a more efficient organization of endoscopic resources.

But all these are theoretical advantages not previously proved since a prospective comparative study of single

versus a two session approach is lacking. Two feasibility studies have been published supporting the tandem approach^[5,6]. The first one published by Tarantino *et al*^[6] aimed to report the complication rate of performing EUS-FNA followed by ERCP in 25 patients with biliary or pancreatic disease. No early or late complications were seen in this series. The authors concluded that performing both explorations the same day was feasible and safe and should be considered the reference standard. Ross *et al*^[5] also published a feasibility retrospective study including 114 jaundiced patients who underwent EUS ± FNA followed by ERCP. They concluded that combined EUS and ERCP is a feasible approach to establish a tissue diagnosis, complete local staging and relieve biliary obstruction in a single session with a complication rate no greater than that for the component procedures.

These feasibility studies were preceded by discouraging clinical observations. Mergener *et al*^[2] published a case of a 77 year old woman who developed pneumoperitoneum after EUS-FNA of a peripancreatic lymph node followed by ERCP. This complication was asymptomatic and no intervention was required so the clinical importance of this observation remained unclear. The authors postulated that the pneumoperitoneum resulted from insufflated air tracking through the FNA site during ERCP and recommended that in a tandem approach, ERCP should precede FNA. Di Matteo *et al*^[3] reported two cases of biliary leakage complicating ERCP performed after EUS-FNA of a pancreatic head mass. They postulated that FNA would create subclinical bile duct injuries which would be aggravated by manipulation during ERCP. Furthermore, Fisher *et al* reported a significant association between myocardial ischemia or injury, defined by the release of cardiac troponin I, with a longer duration of ERCP (37.7 ± 28.9 min *vs* 24.2 ± 12.3 min in this study, $P = 0.007$). This was true only for patients older than 65 years and predominant in men. The critical time cut-off value in this study was 30 min of duration for ERCP. Although there are other investigators^[9,10] who, based on ECG intraoperative studies, concluded that, even in patients with severe coronary artery disease, ERCP and other endoscopic procedures do not increase the risk of myocardial ischemia. Taking into account these data, the benefits of the tandem approach would be questioned by a potentially higher risk of cardiac and endoscopic complications.

With this background, we decided to evaluate the benefits and complications of the tandem approach compared with the two session approach by means of a comparative retrospective study, including consecutive patients who underwent EUS and ERCP in our endoscopy unit for a 41 mo period. In our study, both groups were comparable regarding age, sex, indication for endoscopy and ASA grade, and no significant differences were seen regarding diagnostic yield, cardiopulmonary complications, endoscopic complications or procedural time between both groups. This latter aspect might be surprising since it has been previously postulated that the tandem approach would lower the procedure time^[5,6]. Ross *et al* reported a mean procedure time for the combined

procedure of 73.6 ± 30 min and Tarantino *et al* 58.6 ± 16.14 min. In our study, the mean intervention time for the tandem procedure reached 93 ± 32.78 min, lower although not significantly different than the mean 98.98 ± 38.17 min corresponding to the two session group. The explanation for this “high” procedure time can be found on the retrospective nature of our study since the procedural time we registered ranged from the moment the patient was monitored to the moment he left the endoscopic room which includes a large period without any endoscopic maneuver. In this sense, we think that our study does not properly clarify this aspect.

The only significant difference we found between both approaches was the propofol requirements, favoring the tandem approach which required a lower propofol dose. This is undoubtedly an important issue and supports the tandem approach, confirming the previous hypothesis raised by other authors^[5].

We performed EUS with FNA in 32 patients without related complications and with a diagnostic yield of 90.6%. No pneumoperitoneum or biliary leakage was detected after EUS-FNA and the only perforation in our series occurred in a patient in Group II.

The main limitation of our study lies in its retrospective nature, as already discussed. Moreover, it is a single center study including a heterogeneous group of patients, resulting in a selection bias since the decision to perform combined or separated EUS and ERCP depended on the referring physician. Referring clinicians were, in many cases, non-specialized gastroenterologists who were not implicated in the trial and many were not familiarized with the latest high-level endoscopic innovations. Therefore, their choice of exploration was determined either by their usual clinical practice or by the latest information on the subject that had reached them. This makes a selection bias which could not be controlled due to the characteristics of the study.

In conclusion, our results show that the performance of EUS followed by ERCP in a single session is feasible and safe, does not entail a higher cardiopulmonary or endoscopic complication risk and requires a significantly smaller dose of propofol for sedation compared with performing each exploration in two different sessions. Furthermore, the tandem approach does not lower the diagnostic yield of EUS or ERCP.

COMMENTS

Background

Nowadays patients with pancreatobiliary disease undergo endoscopic retrograde cholangiopancreatography (ERCP) and Endoscopic ultrasonography (EUS) more frequently as part of their diagnostic and therapeutic management. To perform both explorations in a single anesthetic and endoscopic session has been discouraged by some authors for a possible higher risk of complications.

Research frontiers

To our knowledge, the feasibility and outcomes of performing both explorations in the same session has never been compared with performing them in different endoscopic and anesthetic sessions.

Innovations and breakthroughs

The dose of Propofol administered to patients was the only variable significantly different when comparing both groups. Procedural time, incidence

of complications, diagnostic yield and therapeutic procedures showed no difference between the groups. This is an important finding since the major drawback described to perform ERCP and EUS in the same session was that it may increase the risk of perforation and systemic complications. This has not been confirmed in this study.

Applications

According to our data, to perform both explorations in a single session does not entail a higher risk of complication. This policy can have some advantages and may be important regarding costs and endoscopy room daily work plan organization. In any case, prospective and comparative studies are warranted.

Terminology

ERCP is an endoscopic procedure which allows drainage of the bile and pancreatic ducts through the papilla. It is also useful to diagnose biliary and pancreatic disease and to obtain material for cytological or histological analysis. EUS is also an endoscopic procedure which combines endoscopic and ultrasonographic view, with higher frequencies than transabdominal ultrasonography and thus with a higher resolution. It allows tissue to be obtained for pathological diagnosis and transmural therapeutic procedures to be performed with a low risk of complication.

Peer review

This paper describes a retrospective study of patients undergoing tandem EUS plus ERCP versus separate procedures. No difference was demonstrated in the outcome parameters.

REFERENCES

- 1 **Hollerbach S.** EUS and ERCP: brothers in arms. *Gastrointest Endosc* 2008; **68**: 467-469
- 2 **Mergener K,** Jowell P, Branch M, Baillie J. Pneumoperitoneum complicating ERCP performed immediately after EUS-guided fine needle aspiration. *Gastrointest Endosc* 1998;**47**:541-542.
- 3 **Di Matteo F,** Shimpi L, Gabbriellini A, Martino M, Caricato M, Esposito A, De Cicco ML, Coppola R, Costamagna G. Same-day endoscopic retrograde cholangiopancreatography after transduodenal endoscopic ultrasound-guided needle aspiration: do we need to be cautious? *Endoscopy* 2006; **38**: 1149-1151
- 4 **Fisher L,** Fisher A, Thomson A. Cardiopulmonary complications of ERCP in older patients. *Gastrointest Endosc* 2006; **63**: 948-955
- 5 **Ross WA,** Wasan SM, Evans DB, Wolff RA, Trapani LV, St-aerkel GA, Prindiville T, Lee JH. Combined EUS with FNA and ERCP for the evaluation of patients with obstructive jaundice from presumed pancreatic malignancy. *Gastrointest Endosc* 2008; **68**: 461-466
- 6 **Tarantino I,** Barresi L, Di Pisa M, Traina M. Simultaneous endoscopic ultrasound fine needle aspiration and endoscopic retrograde cholangio-pancreatography: Evaluation of safety. *World J Gastroenterol* 2007; **13**: 3861-3863
- 7 **Fusaroli P,** Manta R, Fedeli P, Maltoni S, Grillo A, Giovannini E, Bucchi L, Caletti G. The influence of endoscopic biliary stents on the accuracy of endoscopic ultrasound for pancreatic head cancer staging. *Endoscopy* 2007; **39**: 813-817
- 8 **Shami VM,** Mahajan A, Sundaram V, Davis EM, Loch MM, Kahaleh M. Endoscopic ultrasound staging is adversely affected by placement of a self-expandable metal stent: fact or fiction? *Pancreas* 2008; **37**: 396-398
- 9 **Cappell MS.** Endoscopic retrograde cholangiopancreatography with endoscopic sphincterotomy for symptomatic choledocholithiasis after recent myocardial infarction. *Am J Gastroenterol* 1996; **91**: 1827-1831
- 10 **Wilcox CM,** Faibicher M, Wenger NK, Shalek KA. Prevalence of silent myocardial ischemia and arrhythmias in patients with coronary heart disease undergoing gastrointestinal tract endoscopic procedures. *Arch Intern Med* 1993; **153**: 2325-2330

S- Editor Zhang HN L- Editor Roemmele A E- Editor Zhang L