

Pain Score within Twenty-Four Hours Post-Endoscopic Ultrasonography: A Comparison Between with or without Fine Needle Aspiration Procedure

Somchai Amornyotin, Katelamai Saivaew, Kittiya Vichitmala

Somchai Amornyotin, Department of Anesthesiology and Siriraj GI Endoscopy Center, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok 10700, Thailand

Katelamai Saivaew, Kittiya Vichitmala, Department of Anesthesiology, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok 10700, Thailand

Correspondence to: Amornyotin Somchai, Associate Professor of Department of Anesthesiology, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok 10700, Thailand.

Email: somchai.amo@mahidol.ac.th

Telephone: +66-2-4197990

Fax: +66-2-4113256

Received: April 22, 2015

Revised: July 14, 2015

Accepted: July 16, 2015

Published online: July 21, 2015

ABSTRACT

AIMS: To compare the pain score within twenty-four hours post-endoscopic ultrasonography (EUS) with or without fine needle aspiration (FNA) procedure in adult patients.

METHODS: We prospectively analyzed the patients who underwent EUS procedures from January, 2009 to December, 2009. Pain score was compared by using verbal rating scale (VRS, 0-100) and pain rescued medications at 2, 6, 12, 18, 24 hours post-procedure.

RESULTS: One hundred and twenty-four patients, 84 patients only with EUS procedure (group D) and 40 patients with EUS and FNA procedures (group F), were enrolled. All procedures were completed successfully. Sedative and analgesic agents in both groups were propofol, midazolam and fentanyl and were comparable the dose among the two groups. The mean procedural time in D and F was 39.8±19.1 and 60.6±26.0 minutes, respectively. Mean pain score at baseline and at 2, 6, 12, 18 and 24 hours post-EUS was not significantly different between the two groups. Additionally, total

dose of pethidine used for pain control after EUS procedure in both groups was not significantly different.

CONCLUSION: EUS-induced abdominal pain is mild and mainly occurs within six hours after the procedure. Pain score within twenty-four hours after EUS with or without fine needle aspiration procedure is comparable.

© 2015 ACT. All rights reserved.

Key words: Pain score; Endoscopic ultrasonography; Fine needle aspiration

Amornyotin S, Saivaew K, Vichitmala K. Pain Score within Twenty-Four Hours Post-Endoscopic Ultrasonography: A Comparison Between with or without Fine Needle Aspiration Procedure. *Journal of Gastroenterology and Hepatology Research* 2015; 4(7): 1694-1697 Available from: URL: <http://www.ghrnet.org/index.php/joghr/article/view/1270>

INTRODUCTION

Pain is a complex, private experience and attempts to make valid assessments of it have been fraught with difficulties. It is also influenced by numerous intrinsic and extrinsic factors, and the multiple aspects of pain have been assessed in many different ways. The assessment of perceived pain is necessary in the clinical setting for diagnosis and choice of treatment but also for the evaluation of treatment efficacy in a research context. However, pain intensity could be attributed to several patient and technique-related risk factors as well as the operator's skill.

The pain intensity, also assessed by using the pain score^[1-4], is relatively the most commonly assessed severity of pain. The reliable and valid measurements of pain are essential for conducting clinical trials of pain treatments^[5]. Fortunately, in most situations, that most

commonly used measures of pain intensity, including verbal rating scales (VRS) have been shown to have adequate sensitivity to change in pain associated with treatment across many populations and settings.

Endoscopic ultrasonography (EUS) procedure is an ultrasound examination of lining of the wall of the gastrointestinal tract and the structure adjacent to the gastrointestinal tract. The most common ultrasound examination is that of the lining and the walls of the esophagus, stomach, duodenum, and rectum. In addition, the internal organs such as pancreas, gallbladder, common bile duct and part of the liver are commonly seen during the examination^[6,7]. EUS is an invasive and prolonged gastrointestinal endoscopic (GIE) procedure^[8]. It creates pain and requires some forms of sedation and/or anesthesia during the procedure. The aim of this prospective study was to compare the pain score within twenty-four hours post-EUS procedure with or without fine needle aspiration (FNA) procedure in the adult patients.

MATERIALS AND METHODS

Patients

This study was a prospective observational study. All patients who underwent EUS procedures for the diagnosis of the wall of the gastrointestinal tract and the structure adjacent to the gastrointestinal tract in Siriraj GI Endoscopy Center, Faculty of Medicine Siriraj Hospital in one year were enrolled in the present study. We excluded the patients with confusion and/or cognitive impairment.

Endoscopy procedure

All EUS procedures were done using an Olympus video endoscope compatible with the type of endoscopy (GF-UE160-AL5 or GF-UC140P-AL5 Olympus Corporation, Tokyo, Japan). After completion of the EUS procedure, admission into the inpatient hospital service was arranged to rule out post-EUS complications and to evaluate the pain score. The EUS procedure was performed by three senior endoscopists with more than 10 years' experience.

Anesthesia-related procedure

The patients were monitored with non-invasive blood pressure, heart rate, pulse oximetry and electrocardiogram. All patients were utilized by using deep sedation technique. The sedative and analgesic drugs used during the procedure are propofol, midazolam and fentanyl. After the EUS procedure, pethidine was only used for pain rescued medication. Anesthesia was given by anesthetic personnel including residents in the anesthesiology residency program and anesthetic nurses supervised by a staff anesthesiologist.

Measurement of pain

The verbal rating scale (VRS) was used for pain measurement. All patients were instructed to make a single number on an oriented, ungraduated 100 scales labeled "0 = no pain" and "100 = most pain possible". As a measure of reliability, the patients were asked to score their pain before the procedure and this was then repeated at the end (2, 6, 12, 18 and 24 hours later). A VRS score was assessed by the ward nurses. According to this pain assessment, if the patients were asleep, the pain score should not assess. After EUS procedure, intramuscular pethidine was used for pain rescued medication and was given to the patients when their VRS scores > 30. The total amount of pethidine used during 24 hours post-procedure was noted.

Statistical analysis

Results were expressed as mean±SD or percentage (%), when

appropriate. Comparisons between EUS with and without FNA procedure were compared by using with Chi-square tests (for categorical variables), Chi-square tests for trend (for ordinal variables), and two-sample independent *t*-test (for continuous variables). The statistical software package SPSS for Window Version 11 (SPSS Inc., Chicago, IL) was used to analyze the data. All statistical comparisons were made at the two-sided 5% level of significance.

RESULTS

One hundred and twenty-four EUS procedures were performed between January 2009 and December 2009. Of these, 84 patients were performed only with EUS procedure (group D) and 40 patients were performed with EUS and FNA procedures (group F). Table 1 showed the characteristics of patients, duration and indication of procedure. There were no statistically significant differences in age, gender, weight and ASA physical status between the two groups. However, the duration of procedure in the EUS with FNA group was significantly longer than the EUS without FNA group (60.6 and 39.8 minutes, $p=0.002$). Pancreatic mass and gastric pathology were the most two common indications of the procedure in both groups.

Measurement of pain

There were not statistically significantly different in mean baseline pain score measured before EUS procedure and mean VRS score at 2, 6, 12, 18, and 24 hours post-EUS procedure between the D and F groups. However, mean VRS score at 2 and 6 hours after EUS procedure in group F was relatively greater than in group D. In addition, there was the highest pain score at 2 hours post-EUS procedure in both groups (Table 2).

Table 3 demonstrated the mean VRS score ≥ 30 after EUS procedure. During 24 hours post-procedure in the EUS with and without FNA groups, there was a high number of patient experienced VRS score ≥ 30 at 2 and 6 hours after EUS procedure. Consequently, pain score in these two groups reduced after the time. However, mean VRS score ≥ 30 at all periods of time was not significantly different between the two groups.

Sedative and analgesic drugs used during the procedure were propofol, midazolam and fentanyl. Mean dose of propofol, midazolam and fentanyl was not significantly different between the two groups. After the EUS procedure, 30 patients (20.3%) in the EUS with FNA procedure and five patients (17.2%) in the EUS without FNA procedure received pethidine for pain rescued medication ($p=0.436$). The total number of pain rescued medication in group F was relatively greater than group D. The mean total dose of pethidine was 0.9 ± 0.2 mg/kg in group F and 0.8 ± 0.2 mg/kg in group D (Table 4).

DISCUSSION

EUS is a technique increasingly used and essential for the diagnosis and treatment of the gastrointestinal tract and the structure adjacent to the gastrointestinal tract. However, it is an invasive GIE procedure and produces moderate to severe pain. As a consequence, the application of pain medications during and after the procedure would be necessary. In Siriraj GI Endoscopy Center, deep sedation and general anesthesia techniques are commonly used for EUS procedure^[9,10]. The combination of propofol, opioid and midazolam is usually utilized in this procedure^[10,11]. Up to date, limited information regarding pain assessment after EUS procedure is available. Our report is the first study that assesses the pain score after early post-EUS procedure in the adult patients.

Pain rating scales have an essential tool in clinical practice. Several

data recommend that patients are capable to use these scales to communicate their pain experience and their response to management. However, pain is probable to vary over time and with different activities^[12]. The VRS score is usually used in the measurement of pain since it is easy to use. The alterations of pain score measured in two different patients or at two different times are referenced to categorical responses contrasting the two health conditions in order to verify clinically meaningful differences. A previous study has been recommended that the minimum clinically significant change in patient pain severity measured with a 100-mm visual analog scale was 13 mm^[13].

Generally, it is essential to detect a minimal clinically significant difference in pain that can be used to evaluate the differences between these two endoscopic groups. In our study, we used mean VRS score ≥ 30 mm to compare pain intensity between the two groups because this score signified moderate to severe pain severity for each patient. This difference was considered to be clinically significant. However, the range of the score was very wide, for example no pain (0 mm), mild pain (0-30 mm), moderate pain (30-65 mm), severe pain (65-100 mm)^[14]. Our present study reveals clinically non-significant changes in pain intensity between the EUS with and without FNA procedure by using VRS score in 24 hours after the procedure. The total number of pain rescued medication in the EUS with FNA group is relatively greater than in the EUS without FNA group but not statistically significantly different. In addition, mean VRS score ≥ 30 mm in both groups were mainly occurred at 2 and 6 hours after procedure. This study also explained that mild and moderate pain frequently occurred earlier on the first 6 hours after EUS with or without FNA procedures.

Both conventional and interventional EUS procedures were established to be acceptably safe techniques^[15]. The overall complication rate of these procedures was relatively low with mild degree and no severe or fatal events. Acute pancreatitis related with EUS-FNA procedure ranges from 0% to 2%. Importantly, this pancreatitis as a result of EUS-FNA procedure arises in patients undergoing FNA of pancreatic cysts, masses, or pancreatic duct^[16]. In the present study, the patient-related factors, baseline clinical presentation and severity of disease were similar in both groups. Moreover, there were no signs and symptoms of post-EUS pancreatitis in these two groups.

From our previous experiences, we assumed that the therapeutic GIE procedures produced higher pain intensity than the diagnostic GIE procedures^[17]. We hypothesized that the therapeutic procedure initiated more tissue injuries, was the causing factor. In our present report, pain intensity in the EUS with FNA group did not support this hypothesis. This might be due to three factors. First, all EUS procedures were performed by experienced endoscopists. Second, an exact deep sedation target may offer a better pain control. Third, the FNA procedure may create less tissue injuries than other therapeutic procedures. An indirect evidence to support the latter explanation is that pain rescued medication is not significantly different between EUS with and without FNA groups.

There are several limitations of this study that should be noted. First, we only use VRS score for pain assessment. The large variability around the mean and the discordance of this scale may reflect a problem with the reproducibility or reliability. We are unable to find any published studies of the reproducibility in measurement of acute pain in the EUS patients. In addition, small changes in pain can be challenging, when using the VRS to compare the effectiveness of differences in mean VRS score. Second, pain score assessed in this study is limited to pain intensity and pain rescued medication. There seems to be a considerable individual variability in post-EUS

Table 1 Characteristics of patients, duration and indication of procedure (mean, SD and percentage).

	Without FNA (n=84)	With FNA (n=40)	P value
Age (yr; mean, SD)	54.8 (15.4)	59.4 (14.8)	0.220
Gender (n, %):			0.383
Male	35 (41.7)	20 (50.0)	
Female	49 (58.3)	56.4 (13.0)	
Weight (kg; mean, SD)	59.6 (12.5)		0.539
ASA physical status (n, %)			0.050
I	30 (35.7)	32 (80.0)	
II	49 (58.3)	2 (5.0)	
III	5 (6.0)	60.6 (26.0)	
Duration of procedure (min; mean, SD)	39.8 (19.1)		0.002 [†]
Indications (n, %)		21 (52.5)	< 0.001 [†]
Pancreatic mass	15 (17.9)	8 (20.0)	
Gastric pathology	12 (14.3)	0	
Cholelithiasis	12 (14.3)	1 (2.5)	
Chronic pancreatitis	9 (10.7)	0	
Chronic dyspepsia	8 (9.5)	1 (2.5)	
Pancreatic cyst	6 (7.1)	0	
Chronic abdominal pain	4 (4.8)	9 (22.5)	
Others	18 (21.4)		

[†] considered to be of statistical significance

Table 2 Pain score at baseline and during 24 hours post-EUS.

	Without FNA		With FNA		P value
	VRS (mean, SD)	VRS (range)	VRS (mean, SD)	VRS (range)	
Baseline	4.9 (9.0)	0-40	4.3 (8.4)	0-40	0.772
Post-EUS					
2 hour	16.9 (17.9)	0-60	17.8 (16.6)	0-50	0.522
6 hour	13.1 (13.8)	0-50	15.0 (15.5)	0-50	0.949
12 hour	6.7 (10.2)	0-50	6.8 (10.0)	0-40	0.869
18 hour	3.7 (7.2)	0-30	3.3 (5.7)	0-20	0.719
24 hour	1.2 (3.9)	0-20	1.8 (3.8)	0-20	0.141

VRS: Verbal rating scales (0-100).

Table 3 VRS score ≥ 30 after EUS procedure.

Post-EUS	Without FNA		With FNA		P value
	n (%)	mean (SD), range	n (%)	mean (SD), range	
2 hour	21 (25.0)	38.6 (9.1) 30-60	13 (32.5)	38.5 (5.5) 30-50	0.381
6 hour	16 (19.0)	35.0 (7.3) 30-50	9 (22.5)	37.8 (8.3) 30-100	0.654
12 hour	3 (3.6)	40.0 (10.0) 30-50	1 (2.5)	40.0	0.752
18 hour	1 (1.2)	20.0	0		0.488
24 hour	0		0		1.000

VRS: Verbal rating scales (0-100).

Table 4 Sedative and analgesic drugs used during procedure (mean, SD; mg/kg) and pain rescued medication during 24 hours post-EUS (n, % and mean, SD; mg/kg).

	Without FNA	With FNA	P value
Anesthetic agents			
Propofol	4.2 (2.2)	6.3 (3.4)	0.279
Midazolam	0.02 (0.01)	0.02 (0.01)	0.478
Fentanyl	0.001 (0.000)	0.001 (0.000)	0.154
Pain rescued medication			
Pethidine	4 (4.8), 0.8 (0.2)	6 (15.0), 0.9 (0.2)	0.050

pain perception even following standardized procedure^[18]. Third, in our practice, we do not routinely measure serum amylase and lipase levels after the procedure. Abdominal pain from post-EUS pancreatitis can influence the pain score. However, the patients who develop abdominal pain and fever during post-procedural period will investigate for acute pancreatitis. Additionally, no patients have been suspected. Fourth, we do not evaluate the pain score in the sleep

patients. We assume that the patients have no pain while they are sleeping. Finally, this study is limited to early (24 hours) post-EUS procedure. Exploration of these findings to other time periods will be undertaken for new discoveries.

Despite these limitations, the findings have important implications for the assessment of treatment outcome in early post-EUS pain analgesia clinical trials. Overall pain severity after this procedure is of mild intensity. However, the pain score at 2 and 6 hours after the procedure in both groups is relatively higher than the pain score at other periods of time. We are confident that the physicians need to be careful evaluation and closed observation their patients' pain intensity especially in the first six-hour after the EUS procedure. Furthermore, the future research is needed to reproduce and compare these findings of the present study with those in other magnitudes of pain.

SUMMARY

Pain intensity after early EUS with or without fine needle aspiration procedure is mild. Most of pain scores in both groups arise at 2 and 6 hours after the procedure. Additionally, mean pain scores and a total amount of pain rescued medication after EUS procedure are not significantly different between the two groups.

CONFLICT OF INTERESTS

There are no conflicts of interest with regard to the present study.

REFERENCES

- 1 Ferreira-Valente MA, Pais-Ribeiro JL, Jensen MP. Validity of four pain intensity rating scales. *Pain* 2011; **152**: 2399-2404
- 2 Williamson A, Hoggart B. Pain: a review of three commonly used pain rating scales. *J Clin Nurs* 2006; **14**: 798-804
- 3 Hjermstad MJ, Fayers PM, Haugen DF, Caraceni A, Hanks GW, Loge JH, Fainsinger R, Aass N, Kaasa S, on behalf of the European Palliative Care Research Collaborative (EPCRC). Studies comparing numerical rating scales, verbal rating scales, and visual analogue scales for assessment of pain intensity in adults: a systematic literature review. *J Pain Symp Manage* 2011; **41**: 1073-1093
- 4 Cork R, Isaac I, Elsharydah A, Saleemi S, Zavisca F, Alexander L. A comparison of the verbal rating scale and the visual analog scale for pain assessment. *Intern J Anesthesiol* 2003; **8**: Number 1
- 5 Breivik H, Borchgrevink PC, Allen SM, Rosseland LA, Romundstad L, Hals EKB, Kvarstein G, Stubhaug A. Assessment of pain. *Br J Anesth* 2008; **101**: 17-24
- 6 Godfrey EM, Rushbrook SM, Carroll NR. Endoscopic ultrasound: a review of current diagnostic and therapeutic applications. *Postgrad Med J* 2010; **86**: 346-353
- 7 Keter D, Melzer E. Endoscopic ultrasound in clinical practice. *Acta Gastroenterol Latinoam* 2008; **38**: 146-151
- 8 Amornyotin S. Sedation and monitoring for gastrointestinal endoscopy. *World J Gastrointest Endosc* 2013; **5**: 47-55
- 9 Amornyotin S, Prakanrattana U, Chalayonnavin W, Kongphlay S. Intravenous sedation for endoscopic ultrasonography in Siriraj Hospital. *Thai J Anesthesiol* 2009; **35**: 181-190
- 10 Amornyotin S, Pranootnarabhal T, Chalayonnavin W, Kongphlay S. Anesthesia for gastrointestinal endoscopy from 2005-2006 in Siriraj Hospital: a prospective study. *Thai J Anesthesiol* 2007; **33**: 93-101
- 11 Amornyotin S, Leelakusolvong S, Chalayonnavin W, Kongphlay S. Age-dependent safety analysis of propofol-based deep sedation for ERCP and EUS procedures at an Endoscopy Training Center in a developing country. *Clin Exp Gastroenterol* 2012; **5**: 123-128
- 12 Turk DC, Okifuji A. Assessment of patients' reporting of pain: an integrated perspective. *Lancet* 1999; **353**: 1784-1788
- 13 Todd KH, Funk KG, Funk JP, Bonacci R. Clinical significance of reported changes in pain severity. *Ann Emerg Med* 1996; **4**: 485-489
- 14 Briggs M, Closs JS. A descriptive study of the use of visual analog scales and verbal rating scales for the assessment of postoperative pain in orthopedic patients. *J Pain Symptom Manage* 1999; **18**: 438-446
- 15 Buscarini E, De Angelis C, Arcidiacono PG, Rocca R, Lupinacci G, Manta R, Carucci P, Repici A, Carrara S, Vallisa D, Buscarini L, Cosentino F, Pera A, Rizzetto M, Testoni PA, Zambelli A. Multicenter retrospective study on endoscopic ultrasound complications. *Dig Liver Dis* 2006; **38**: 762-767
- 16 Early DS, Acosta RD, Chandrasekhara V, Chathadi KV, Decker GA, Evans JA, Fanelli RD, Fisher DA, Fonkalsrud L, Hwang JH, Jue TL, Khashab MA, Lightdale JR, Muthusamy VR, Pasha SF, Saltzman JR, Sharaf RN, Shergill AK, Cash BD. Adverse events associated with EUS and EUS with FNA. *Gastrointest Endosc* 2013; **77**: 839-843
- 17 Amornyotin S, Phasurin T, Wongnuch P. Pain score within twenty-four hours post-endoscopic retrograde cholangiopancreatography: a comparison between diagnostic and therapeutic procedures. *Gastroenterol Insights* 2009; **1(e7)**: 20-23
- 18 Nielsen PR, Rudin A, Werner MU. Prediction of postoperative pain: Focus on acute pain. *Curr Anesth Crit Care* 2007; **18**: 157-165

Peer reviewer: Hidekazu Suzuki, Division of Gastroenterology and Hepatology, Department of Internal Medicine, Keio University School of Medicine, 35 Shinanomachi, Shinjuku-ku, Tokyo 160-8582, Japan.