Topical viscous lidocaine solution versus lidocaine spray for pharyngeal anesthesia in unsedated esophagogastroduodenoscopy

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Background and study aims: Pharyngeal anesthesia using topical lidocaine is generally used as pretreatment for unsedated esophagogastroduodenoscopy (UEGD). The aim of this study was to compare and evaluate the clinical efficacy of topical viscous lidocaine solution and lidocaine spray when each is used as a single agent for UEGD.

Patients and methods: Patients were randomized into the viscous lidocaine (V) group (n = 930) or the lidocaine spray (S) group (n = 934). The total dose of lidocaine was not higher than 5 mg/kg. The primary objective was to measure the successful completion rate of the endoscopy. The secondary objectives were to assess patient and endoscopist satisfaction, procedural pain, patient tolerance, ease of intubation, and adverse events.

Results: The procedure was successfully completed in 868 patients from group V (93.3 %) and 931 patients from group S (99.7 %; $P < 0.001$). Patients and endoscopists reported a higher degree of satisfaction in group S than group V ($P < 0.0001$). Procedural pain score in group S was significantly lower than in group V ($P < 0.0001$). The endoscopist rated patients in group S as having better tolerance and ease of intubation than those in group V ($P = 0.0004$ and $P = 0.002$, respectively). Adverse events occurred in 370 patients in group V and 316 patients in group S ($P = 0.002$). These were mainly transient changes in vital signs including hypertension, tachycardia, and bradycardia.

Conclusions: The use of lidocaine spray in UEGD was shown to result in a higher procedural completion rate, greater ease of intubation, and greater patient and endoscopist satisfaction. Topical lidocaine spray may be a better form of pharyngeal anesthesia than viscous lidocaine solution in UEGD.

Introduction

Unsedated esophagogastroduodenoscopy (UEGD) is generally safe and can be well tolerated [1]. The proportion of patients undergoing diagnostic UEGD has been increasing over the past decade, and previous studies suggest that many patients who receive adequate information about the procedure now choose not to have sedation [2,3]. In Thailand, most diagnostic and screening EGDs are performed without sedation. Topical pharyngeal anesthesia is often used as premedication for EGD. In a recent meta-analysis, topical pharyngeal anesthesia before EGD with sedation was shown to improve ease of endoscopy and patient tolerance [4]. Pharyngeal anesthesia is also often used in UEGD and is thought to improve patient tolerance [5,6]. One study compared the use of low- (30 mg) and high-dose (100 mg) topical pharyngeal lidocaine spray and found that the use of high-dose lidocaine spray reduced patient discomfort during UEGD [7]. Different forms of pharyngeal anesthesia exist including viscous solution and spray. To date, no studies have directly compared the different forms of topical pharyngeal anesthesia as pretreatment for UEGD. At the Siriraj Endoscopy Center, most EGD procedures are performed without intravenous sedation. Different practices exist regarding the two different forms of topical lidocaine. This study was therefore designed to compare the clinical efficacy of topical viscous lidocaine solution with that of lidocaine spray when each is used as a single agent for UEGD.

Patients and methods

Patients

This study was conducted from August 2006 to June 2008 at a large tertiary care referral center at Siriraj Hospital, Bangkok, Thailand. Patients

who were at least 15 years of age and who presented for diagnostic EGD were eligible for the study. Exclusion criteria included request for intravenous sedation, any clinical evidence of hepatic encephalopathy, American Society of Anesthesiologists (ASA) physical status of class IV or V, non-cooperation, and refusal to participate in the study. A total of 8901 EGD procedures were performed during the study period. A total of 1864 consecutive patients were eligible and were randomized for the study. The study was approved by the Institutional Review Board of the Faculty of Medicine Siriraj Hospital. All patients provided written informed consent for the study and the procedure.

Study design

The study was a double-blind, randomized-controlled study. Patients were randomized into either the viscous lidocaine solution group (V) or the lidocaine spray group (S) by using computer-generated randomization numbers placed in sealed envelopes. The endoscopists and the research assistant were blinded to the randomization procedure. Randomization took place in the pre-procedure room, separate from the procedure room and the recovery room. Pharyngeal anesthesia either with topical viscous lidocaine solution or lidocaine spray was performed in the pre-procedure room in the absence of the endoscopist or the research assistant. The blinded research assistant was present in the procedure room and/or recovery room to collect procedural data and other research or questionnaire data.

Successful completion of the endoscopic procedure was the primary outcome measured. Successful endoscopic procedure was defined as completion of the procedure as intended without additional pharyngeal anesthesia with topical lidocaine once the procedure had started, and completion of the procedure without intravenous sedation. The decision to administer additional topical lidocaine (as long as the lidocaine dose had not exceeded the specified limit) or to initiate intravenous sedation rested on the endoscopist performing the procedure. The additional topical lidocaine given, if needed, was in the form of lidocaine spray. The secondary objective was to assess patient and endoscopist satisfaction, patient tolerance to the procedure, endoscopist perception of patient tolerance to the procedure, ease of intubation of the endoscope, and adverse events both during and immediately after the procedure. These secondary outcome variables were analyzed only in those who successfully completed the unsedated procedure.

The procedure was performed either by a gastroenterology fellow supervised by a staff or attending physician or by the staff physician. The Olympus video esophagogastroduodenoscope (GIF-Q 180, Olympus Corporation, Tokyo, Japan) was used for all EGD procedures. Each patient was monitored in the standard manner for blood pressure, heart rate, heart rhythm with single-lead electrocardiogram, and oxygen saturation with pulse oximetry. No other premedications were administered before the procedure.

Pharyngeal anesthesia technique

All pharyngeal anesthesia was administered by the nurse anesthesist or anesthesiology resident supervised by the staff anesthesiologist in the pre-procedural room. In group V, the patient was asked to gargle 5 mL of 2% viscous lidocaine solution (20 mg/mL) (Xylocaine 2%, Astra Zeneca, London, UK). Swallowing was not allowed for at least 5 minutes. Subsequently, the patient was permitted to swallow the lidocaine solution. At approximately 5 minutes before the start of the procedure, pharyngeal anesthesia was tested by assessing the gag reflex. If the gag reflex was present and strong, additional gargling of the viscous lidocaine solution was carried out.

In group S, five puffs of 10% lidocaine spray (Xylocaine 10% Spray, Astra Zeneca) (1 puff = 10 mg of lidocaine) was given to the patient by using either a laryngoscope or a tongue blade. Similarly, at approximately 5 minutes before the start of the procedure, pharyngeal anesthesia was tested by assessing the gag reflex. If the gag reflex was present and strong, additional lidocaine spray puffs were given.

In both groups, the maximum dose of lidocaine used was not to be higher than 5 mg/kg. Once adequate pharyngeal anesthesia (as deemed by the staff anesthesiologist) was achieved, the patient was moved into the procedure room for the start of the procedure.

Procedural and postprocedural assessment

The endoscopist doing the procedure was blinded to the type of pharyngeal anesthesia. After the start of the procedure, the research assistant would rate the ease of intubation of the endoscope as follow: 1 = effortless; 2 = easy; 3 = fair; and 4 = difficult. The research member would also note whether additional lidocaine was given or intravenous sedation started. Immediately after the procedure, the endoscopist was asked to complete a questionnaire to rate patient tolerance of the procedure and rank his/her satisfaction of the topical anesthesia used for the procedure. The endoscopist rated patient tolerance to the procedure as follow: 1 = exceptional; 2 = well; 3 = fair; 4 = poor. The endoscopist's satisfaction with the topical pharyngeal anesthesia for the procedure was ranked as follows: 1 = very satisfied; 2 = satisfied; 3 = neutral; and 4 = dissatisfied. Procedural vital signs were monitored and recorded by the blinded nurse, anesthesiologist or anesthesiology resident.

Patient assessment

After the procedure, the patient was discharged to the recovery room, where all vital signs continued to be monitored for the next 30 minutes. The blinded research assistant interviewed the patient using the questionnaire to evaluate the patient's satisfaction with the procedure and procedural pain. Patient satisfaction was divided into four responses: 1 = very satisfied; 2 = satisfied; 3 = neutral; and 4 = dissatisfied. The procedural pain was evaluated using a visual analog scale (VAS, 0 – 10) with 0 being none and 10 being unbearable. The complications during and immediately after the procedure were recorded. Any of the following alterations in vital signs were considered to be a complication: hypertension or hypotension (increase or decrease in blood pressure by 20% from baseline and above or below normal for age), tachycardia or bradycardia (increase or decrease in heart rate by 20% from baseline and above or below normal for age), and oxygen desaturation (SpO_2 < 90%). In addition, other symptoms such as sore throat, nausea, or vomiting were also recorded as complications.

Statistical analysis

The study was designed to test the null hypothesis that pharyngeal anesthesia with lidocaine viscous would offer no better anesthesia than lidocaine spray. In the reported literature, the success rates of UEGD range from 88% to 94% [1,7,8]. To detect a 3% – 4% difference in the success rate between each group, the estimated sample size was calculated to range from 600 to 1067 patients per arm. The power of the test was 0.8. Additionally, α was set to 0.05 for all comparisons. Results were expressed as mean

Table 1 Characteristics of patients and indications for procedures.

	Group V (n = 930)	Group S (n = 934)	*P*-value
Mean (± SD) age, years	54.4 ± 14.6	56.5 ± 15.9	0.29
Sex, n (%)			
Male	437 (47.0)	475 (50.9)	0.10
Female	493 (53.0)	459 (49.1)	0.10
Mean (± SD) weight, kg	58.0 ± 11.1	58.5 ± 12.6	0.44
Mean (± SD) height, cm	159.4 ± 7.9	159.0 ± 7.8	0.23
ASA physical status, n (%)			
I	292 (31.4)	210 (22.5)	< 0.001*
II	452 (48.6)	435 (46.6)	
III	186 (20.0)	289 (30.9)	
Prior unsedated endoscopy, n (%)	352 (37.8)	338 (36.2)	0.46
Indication, n (%)			
Dyspepsia	267 (28.7)	183 (19.6)	0.13
Upper gastrointestinal hemorrhage	145 (15.6)	252 (27.0)	< 0.001*
Variceal screening	184 (19.8)	174 (18.6)	0.53
Gastroesophageal reflux disease	78 (8.4)	60 (6.4)	0.11
Anemia	49 (5.3)	43 (4.6)	0.51
Gastritis	39 (4.2)	36 (3.9)	0.71
CA stomach	31 (3.3)	21 (2.2)	0.16
Peptic ulcer	29 (3.1)	48 (5.1)	0.06
Others	108 (11.6)	117 (12.5)	0.55

Group V: Lidocaine viscous; Group S: Lidocaine spray.
*Statistically significant

±SD or percentage, when appropriate. The statistical software package SPSS for Windows Version 16 (SPSS Inc., Chicago, Illinois, USA) was used to analyze the data. All statistical comparisons were made at the two-sided 5% level of significance.

Results

Of the total 1864 patients randomized, 930 patients were randomized to group V and 934 patients to group S. **Table 1** summarizes the clinical characteristics of the two groups.

The mean ages in both groups were similar: 54.4 ± 14.6 years (range 15 – 93 years) years in group V and 56.5 ± 15.9 years (range 16 – 93 years) years in group S ($P = 0.29$). There were slightly more women in group V than in group S (P = 0.10). There were differences in both groups with respect to ASA physical status: there were more patients with ASA I and fewer patients with ASA III in group V than in group S ($P < 0.001$).

Indication for EGD is also shown in **Table 1**. More patients underwent EGD for evaluation of upper gastrointestinal hemorrhage in group S than in group V ($P < 0.001$). Patients who had undergone prior UEGD were comparable (V, 37.8%; S, 36.2%) between the two groups ($P = 0.46$). Topical pharyngeal anesthesia used in prior UEGD was topical viscous lidocaine solution, spray or a combination of the two.

In group V, 868 patients (93.3%) successfully completed the procedure as intended compared with 931 patients (99.7%) in group S ($P < 0.001$). The duration of the procedure in each group was similar: 12.1 ± 6.8 minutes in group V and 12.7 ± 7.6 minutes in group S ($P = 0.70$). Of the successful procedures, mean and range of total lidocaine dose was 3.8 ± 0.7 mg/kg (range 1.5 – 5.0 mg/kg) in group V and 1.7 ± 0.6 mg/kg (range 0.5 – 4.2 mg/kg) in group S ($P < 0.001$).

Responses to satisfaction and pain questionnaires in patients who successfully completed UEGD are shown in **Table 2**.

More patients in group S were very satisfied with the procedure compared with those in group V, 48.8% vs. 37.0% ($P < 0.001$). More patients in group V were either neutral or dissatisfied with the endoscopic procedure compared with those in group S, 14.2% vs. 9.6% ($P = 0.002$) and 3.1% vs. 0.8% ($P < 0.001$), respectively. Procedural pain was minimal in both groups. However, procedural pain score in group V was statistically significantly greater than in group S, 2.02 vs. 1.39 ($P < 0.001$).

The endoscopist's assessment of patient tolerance to the procedure and their own satisfaction towards pharyngeal anesthesia in patients who successfully completed UEGD are shown in **Table 3**.

The endoscopist perceived that more patients in groups S had exceptional tolerance to the procedure compared with those in group V, 26.2% vs. 21.2% ($P = 0.013$). The endoscopist was very satisfied with pharyngeal anesthesia in more patients from group S compared with group V (58.7% vs. 42.5%; $P < 0.001$). Data on ease of intubation are also shown in **Table 3**. Intubation was effortless in more patients from group S compared with those from group V (35.7% vs. 29.0%; $P = 0.003$).

In **Table 4** those who completed the UEGD, adverse events occurred in 370 patients (42.6%) in group V and 316 patients (33.9%) in group S ($P = 0.002$). Most of the complications were hemodynamic alterations including tachycardia (23.2% in group V vs. 18.7% in group S); hypertension (18.3% vs. 14.5%); and bradycardia, (0.3% vs. none). These alterations were transient and did not require any specific intervention. Sore throat occurred in three patients in group V and four patients in group S ($P = 0.78$). Nausea and vomiting occurred in four patients in group V and three patients in group S ($P = 0.64$). There were no procedure-related complications.

Discussion

UEGD is considered to be a safe, feasible, quick, and well-tolerated procedure. In addition, the unsedated procedure is well accepted, as demonstrated by patient willingness to repeat the procedure under similar conditions [1, 3, 4, 9]. There are a number of

	Group V (n = 868)	Group S (n = 931)	*P*-value
Mean (± SD) procedural pain (range)†	2.02 ± 1.77 (0 – 9)	1.39 ± 1.40 (0 – 8)	< 0.001*
Patient satisfaction, n (%)			
Very satisfied	321 (37.0)	454 (48.8)	< 0.001*
Satisfied	397 (45.7)	380 (40.8)	
Neutral	123 (14.2)	89 (9.6)	
Dissatisfied	27 (3.1)	8 (0.8)	

Group V: Lidocaine viscous; Group S: Lidocaine spray
*Statistically significant.
†Measured by the visual analog scale 0 – 10 (0 = none and 10 = unbearable)

Table 2 Comparison of procedure pain score and patient satisfaction.

	Group V (n = 868)	Group S (n = 931)	*P*-value
Patient tolerance, n (%)			< 0.001*
Exceptional	184 (21.2)	244 (26.2)	
Well	498 (57.4)	534 (57.4)	
Fair	173 (19.9)	151 (16.2)	
Poor	13 (1.5)	2 (0.2)	
Ease of intubation, n (%)			0.002*
Effortless	252 (29.0)	332 (35.7)	
Easy	524 (60.4)	519 (55.7)	
Fair	88 (10.1)	80 (8.6)	
Difficult	4 (0.5)	0	
Endoscopist satisfaction, n (%)			< 0.001*
Very satisfied	369 (42.5)	546 (58.7)	
Satisfied	337 (38.8)	297 (31.9)	
Neutral	148 (17.1)	84 (9.0)	
Dissatisfied	14 (1.6)	4 (0.4)	

Group V: Lidocaine viscous; Group S: Lidocaine spray.
*Statistically significant.

Table 3 Comparison of the endoscopist's assessment of patient tolerance, ease of intubation, and endoscopist satisfaction.

advantages associated with performing EGD without sedation. These include a decreased incidence of hypoxemia and cardiopulmonary complications, a shorter examination time, decreased hospital costs, and the ability to work and drive immediately following the procedure [1,6,10]. The lack of anterograde amnesia is also beneficial as it allows postexamination consultation with the endoscopist [1,2,10].

Topical pharyngeal anesthesia then becomes important in facilitating patient tolerance to UEGD. The importance and efficacy of pharyngeal anesthesia have been reviewed in a meta-analysis study favoring topical anesthesia in patients undergoing sedated EGD [4]. However, the potential benefit from the use of topical anesthetic preparations before EGD remains controversial [2,7,11]. Two randomized studies concluded that topical lidocaine spray does not facilitate EGD [12,13]. However, in a randomized double-blind placebo-controlled study by Leitch et al. [14], it was shown that topical lidocaine produced better acceptability and tolerability for the procedure performed. Another randomized, double-blind, placebo-controlled study by Soma et al. [11], also demonstrated that topical pharyngeal anesthesia significantly reduced the risk of discomfort in EGD by 44% in all patients.

Furthermore, there are no studies comparing different forms of topical anesthesia in either sedated or unsedated EGD. The present study is the first double-blind, randomized-controlled study comparing the efficacy of viscous lidocaine solution with that of lidocaine spray as topical pharyngeal anesthesia in unsedated endoscopy.

The primary objective of this study was to measure the rate of completion of endoscopy in the two different groups without additional topical anesthesia after the start of the procedure and without initiation of intravenous sedation. Our results showed that both groups have good overall successful completion rates (96.5%). Our overall success rate in performing UEGD is better than rates that have been previously reported: a study involving the US Air Force community reported an 88% success rate in performing UEGD [15]; and a study from England reported a 92% success rate [16]. In our study, which compared two groups of UEGD, the success rate in the group that used lidocaine spray was significantly higher than that in the viscous lidocaine solution group (99.7% vs. 93.3%). The higher overall success rate may be attributable to methodological and attentive application of pharyngeal anesthesia. We allowed at least 5 minutes for the pharyngeal anesthesia to take effect. Before the start of endoscopy, the pharyngeal anesthesia was tested by assessing the gag reflex, with reapplication of anesthesia if the gag reflex was still present.

Factors associated with successful completion of UEGD have been reported. These include older age, lower level of pre-endoscopic apprehension, smaller endoscope diameter, male sex, and having undergone prior unsedated endoscopy [7,16]. In our study, slightly more women were randomized to group V (53%) compared with group S (49%), yet this was not statistically significant. Furthermore, both groups had similar numbers of patients who had undergone prior endoscopy. More sick patients, as noted by the higher ASA classification and higher number of endoscopy performed for upper gastrointestinal tract bleeding, were randomized to group S. This, theoretically, should have negatively impacted upon the success rate in group S. However, this was not observed, as group S had a higher completion rate than group V.

Table 4 Comparison of procedure-related adverse events between the two groups.

	Group V (n = 868)	Group S (n = 931)	*P*-value
Overall, n (%)	370 (42.6)	316 (33.9)	0.002*
Tachycardia, n (%)	201 (23.2)	174 (18.7)	0.04*
Hypertension, n (%)	159 (18.3)	135 (14.5)	0.09
Bradycardia, n (%)	3 (0.3)	0	0.07
Sore throat, n (%)	3 (0.3)	4 (0.4)	0.78
Nausea/vomiting, n (%)	4 (0.5)	3 (0.3)	0.64

Group V: Lidocaine viscous; Group S: Lidocaine spray.
*Statistically significant.

The higher success rate of completed procedures in the lidocaine spray group may be due to the methods used in application of the different forms of lidocaine. The method of applying the lidocaine spray likely facilitated accurate targeting of the posterior pharynx. The use of the tongue blade or the laryngoscope gives a wide exposure to the posterior pharynx. The lidocaine spray can then be readily targeted to the posterior pharynx.

By contrast, the viscous lidocaine solution is gargled in the mouth and the back of the throat for 5 minutes. This instruction to gargle may not have been followed properly. There is a potential that the solution is left retained in the mouth, rather than be in contact with the back of the throat; the solution is therefore easily diluted when mixed with salivary fluid. This may lead to significant oral anesthesia, but not pharyngeal anesthesia. The inadequate contact time with the posterior pharynx may predispose to less-effective pharyngeal anesthesia. In addition, the volume of solution used for gargling may be small making it difficult to gargle adequately. The strength of the viscous lidocaine used in the study was 2%. Thus a smaller volume was used while making sure that the total drug dosage did not exceed the set limit. If the solution was diluted to 1%, a larger volume could have been given and may have enabled better gargling. Indirect evidence to support the latter explanation is that a higher mean lidocaine dose was used in the viscous lidocaine group than in the lidocaine spray group (3.8 vs. 1.7 mg/kg). Regardless of the plausible explanation, lidocaine spray may offer a better topical pharyngeal anesthesia method leading to improved procedure success rate.

The absolute difference in the successful endoscopic completion rate between group V and group S was 6.4%. The number needed to treat was 17. We feel that this difference is not only statistically significant but also clinically relevant. Siriraj Hospital is a busy tertiary care hospital that receives referrals from all over the country of Thailand. Patients usually travel long distances to the hospital for endoscopy. Most patients have limited financial resources. For unsedated endoscopy, a technique that has a very high success rate, such as the use of lidocaine spray for pharyngeal anesthesia, is preferred in order to avoid rescheduling the procedure, to better manage limited resources of both the patient and the hospital, and to improve patient compliance, tolerability, and satisfaction.

Tolerance toward unsedated endoscopy is an important factor that determines patient acceptance, physician acceptance, and the adequacy and feasibility of the procedure. In our study, the tolerability to the procedure was excellent in both groups, as measured by patient perception of procedural pain and endoscopist rating of patient tolerance. Procedural pain was minimal in both groups. However, procedural pain in the viscous lidocaine group was significantly higher than in the spray group. Subsequently, patients who received topical lidocaine spray reported higher satisfaction with the procedure; having to gargle the viscous lidocaine solution may not be well favored given its taste, and may contribute negatively to patient satisfaction. In addition, even though the endoscopist's perception of patient tolerance was similar in both groups, endoscopist satisfaction was higher in the group that received topical lidocaine spray. Patient and endoscopist satisfaction may be related to ease of intubation, as more effortless intubation was observed in patients who received topical lidocaine spray. This observation is similar to a previous study [17], which showed that patient comfort during the endoscopic procedure was an important predictor of patient satisfaction.

UEGD can be performed safely without serious complications [1,5,8,18]. The observed hemodynamic alterations during the procedure in our study were transient and did not require any specific intervention. More of these alterations were observed in patients who received topical viscous lidocaine solution. These hemodynamic changes are likely to be a result of stress due to the procedure. The significance of such stress with corresponding vital sign changes needs further exploration, particularly in patients with cardiovascular co-morbid conditions. None of the complications in the present study could be directly related to the use of lidocaine, thus confirming the safety of both forms of topical lidocaine. One single study [19] suggested that up to 25% of patients receiving pharyngeal anesthesia demonstrated radiologic evidence of aspiration, a potentially serious adverse event. Although our study did not directly assess for aspiration, we did not observe any significant hypoxemia during or after the procedures.

There are several limitations in our study. First, this study did not assess pre-procedure anxiety, which has been shown to be a factor for successful completion of endoscopic procedures [16]. Second, the endoscopic procedures were performed by endoscopists with a range of experience, and this may have biased the results including the successful completion rate and ease of intubation. However, the effect of this may be small given the high successful completion of the procedures and equal amount of time used for the completion of the procedures in both groups. Third, the study employed ease of intubation and satisfaction scales that had not been previously validated. As these reported scales are secondary outcomes, the result of the primary objective remained unbiased by the use of these scales.

Despite the limitations discussed, we are confident that our findings can be generalized to the practice of UEGD that uses topical pharyngeal anesthesia. For the best result, we believe that several steps in utilizing lidocaine spray in unsedated endoscopy should be followed. First, the pharyngeal anesthesia should not be hurried; adequate contact time should be given for the lidocaine spray to take effect. Second, the pharyngeal anesthesia should be checked prior to the start of the endoscopy. Third, the lidocaine spray should be reapplied if there remains a significant gag reflex. Fourth, there should be good exposure of the posterior pharynx to allow direct targeting by the lidocaine spray. Assisted devices, such as a tongue blade or, if needed, a laryngoscope may be employed to help expose the posterior pharynx. A simple squirt of the lidocaine spray into the mouth moments before the start of endoscopy may not yield the best result in achieving successful endoscopic completion.

In conclusion, the efficacy of topical lidocaine spray as a single agent for pharyngeal anesthesia showed a distinct advantage

over viscous lidocaine solution in UEGD. Additionally, our study suggests that the use of topical lidocaine in either form is safe with rare serious adverse events related to the use of topical lidocaine. The ease of application of topical pharyngeal spray to the target area is likely to contribute to better pharyngeal anesthesia, resulting in higher procedural completion rate, greater ease of intubation, and greater patient and endoscopist satisfaction. Topical lidocaine spray may be better than viscous lidocaine solution for topical anesthesia in UEGD.

Competing interests: None

References

1 *Al-Atrakchi HA.* Upper gastrointestinal endoscopy without sedation: a prospective study of 2000 examinations. Gastrointest Endosc 1989; 35: 79 – 81
2 *Periera SP, Hussaini SH, Hanson PJV et al.* Endoscopy: throat spray or sedation. J R Coll Physicians London 1994; 28: 411 – 414
3 *Hedenbro JL, Lindblom A.* Patient attitudes to sedation for diagnostic upper endoscopy. Scand J Gastroenterol 1991; 26: 1115 – 1120
4 *Evans LT, Saberi S, Kim HM et al.* Pharyngeal anesthesia during sedated EGDs: is "the spray" beneficial? A meta-analysis and systematic review. Gastrointest Endosc 2006; 63: 761 – 766
5 *Fisher NC, Bailey S, Gibson JA.* A prospective randomized controlled trial of sedation vs. no sedation in outpatient diagnostic endoscopy. Endoscopy 1998; 30: 21 – 24
6 *Jameson JS, Kapada SA, Polson RJ et al.* Is oropharyngeal anesthesia with topical lignocaine useful in upper gastrointestinal endoscopy? Aliment Pharmacol Ther 1992; 6: 739 – 744
7 *Mulcahy HE, Greaves RR, Ballinger A et al.* A double-blind randomized trial of low-dose versus high-dose topical anesthesia in unsedated upper gastrointestinal endoscopy. Aliment Pharmacol Ther 1996; 10: 975 – 979
8 *Sorbi D, Gostout CJ, Henry J et al.* Unsedated small-caliber esophagogastroduodenoscopy (EGD) versus conventional EGD: a comparative study. Gastroenterology 1999; 117: 1301 – 1307
9 *Mulcahy HE, Hennessy E, Connor P et al.* Changing patterns of sedation use for routine out-patient diagnostic gastroscopy between 1989 and 1998. Aliment Pharmacol Ther 2001; 15: 217 – 220
10 *Sorbi D, Chak A.* Unsedated EGD. Gastrointest Endosc 2003; 58: 102 – 110
11 *Soma Y, Saito H, Kishibe T et al.* Evaluation of topical pharyngeal anesthesia for upper endoscopy including factors associated with patient tolerance. Gastrointest Endosc 2001; 53: 14 – 18
12 *Davis DE, Jones MP, Kubik CM.* Topical pharyngeal anesthesia does not improve upper gastrointestinal endoscopy in conscious sedated patients. Am J Gastroenterol 1999; 94: 1853 – 1856
13 *Dhir V, Swaroop VS, Vazifdar KF et al.* Topical pharyngeal anesthesia without intravenous sedation during upper gastrointestinal endoscopy. Indian J Gastroenterol 1997; 16: 10 – 11
14 *Leitch DG, Wicks J, El Beshir OA et al.* Topical anesthesia with 50 mg of lidocaine spray facilitates upper gastrointestinal endoscopy. Gastrointest Endosc 1993; 39: 384 – 387
15 *Wilkins T, Brewster A, Lammers J.* Comparison of thin versus standard esophagogastroduodenoscopy. J Fam Pract 2002; 51: 625 – 629
16 *Mulcahy HE, Kelly P, Banks MR et al.* Factors associated with tolerance to, and discomfort with, unsedated diagnostic gastroscopy. Scand J Gastroenterol 2001; 12: 1352 – 1357
17 *Yacavone RF, Locke GR III, Gostout CJ et al.* Factors influencing patient satisfaction with GI endoscopy. Gastrointest Endosc 2001; 53: 703 – 710
18 *Craig A, Hanlon J, Dent J et al.* A comparison of transnasal and transoral endoscopy with small-diameter endoscopes in unsedated patients. Gastrointest Endosc 1999; 49: 292 – 296
19 *Prout BJ, Metreweli C.* Pulmonary aspiration after fibre-endoscopy of the upper gastrointestinal tract. Br Med J 1972; 4: 269 – 271