

# Identification of factors that influence tolerance of upper gastrointestinal endoscopy

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**Objective** Unsedated gastroscopy is unpleasant for some patients. The identification of factors related to tolerance would permit the selection of patients for sedation. The aim of the present study was to identify these factors.

**Methods** Five hundred and nine patients underwent diagnostic gastroscopy after the administration of topical pharyngeal anaesthesia, without sedation. Patients were grouped as to whether they had undergone prior examinations or not. Tolerance was assessed with a visual analogue scale and a questionnaire.

**Results** Two hundred and seventy-three (54%) patients underwent gastroscopy for the first time, and 236 (46%) patients had prior experience. Patient tolerance was poor in 84 of 273 (31%) patients undergoing gastroscopy for the first time, and in 61 of 236 (26%) patients with prior experience. Logistic regression analysis identified the following variables related to poor tolerance: (a) in patients undergoing gastroscopy for the first time: presence of gag reflex (odds ratio (OR) = 3.42, 95% confidence interval (CI) 1.90–6.17), apprehension (OR = 2.57, CI 1.33–4.95), young age (OR = 0.95, CI 0.93–0.98) and high level of anxiety (OR = 1.91, CI 0.96–3.89); (b) in patients with prior

experience: apprehension (OR = 4.21, CI 1.93–9.20), poor tolerance of prior examinations (OR = 4.92, CI 1.93–12.5) and female (OR = 2.23, CI 1.09–4.57).

**Conclusions** The above-mentioned factors are predictive of poor tolerance, and may enable the identification of those patients who might benefit more from sedation for gastroscopy. *Eur J Gastroenterol Hepatol* 11:201–204 © 1999 Lippincott Williams & Wilkins

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## Introduction

Upper gastrointestinal endoscopy (UGE) can be performed without sedation [1–3] but some patients find it very unpleasant. It has been reported that up to 5% of patients refuse and another 10% need to be persuaded to undergo an unsedated UGE when it is recommended [4]. After an unsedated UGE, some patients prefer sedation for further examinations or refuse a repeat [5,6]. Furthermore, discomfort during the procedure may lead to incomplete examinations [1,2,6–8].

Sedation improves patient tolerance, facilitates the procedure and makes it more likely that patients will accept further examinations [9]. This has led to its routine use in some countries [10]. However, this practice seems excessive as many patients tolerate an unsedated procedure extremely well, or prefer to endure a few minutes of discomfort in exchange for a

quick return to their normal activities [11]. In addition, sedation adds to inconvenience for both patients and endoscopy units [11] and is associated with some adverse effects [12,13].

It is not well established which patients might benefit most from sedation. A common trend is to allow the patients themselves to choose whether or not to be sedated, after providing them with comprehensive information about the advantages and disadvantages of sedation [5,6,11,14]. However, many patients undergoing UGE have little or no idea regarding the degree of discomfort involved in the examination, and some patients are unable to decide by themselves about premedication before UGE [15]. The identification of factors associated with UGE tolerance would provide additional information to help patients decide. The purpose of the present study was to identify factors influencing UGE tolerance.

## Materials and methods

Over a 6-month period, 543 consecutive patients were referred to our Digestive Endoscopy Unit for diagnostic UGE. Thirty-four patients were excluded from the study: two did not wish to participate, 29 had previously been included in the same study, and three were sedated on their request. Thus, 509 patients (287 men and 222 women; age  $47.6 \pm 13.9$  y (range 18–79)) were evaluated. The study was approved by the Ethics Committee of Clinical Research of the hospital.

The interviews and test administration were carried out by a gastroenterologist who was not involved in the endoscopic examinations. Before UGE patients were offered an information booklet explaining aspects of the examination and the advantages and disadvantages of sedation.

Four endoscopists participated in the study and the two least experienced have each performed more than 2000 examinations. Endoscopy was performed with the patient in the left lateral recumbent position and the endoscope (9.8 mm in diameter) introduced under direct vision. The examination was performed in a standardized way, reaching the second duodenal portion and carrying out gastric retroversion to explore the fundus.

Analysed variables and definitions for each patient are expressed in Table 1. In addition, patients were asked, before the examination, whether they would wish to undergo the procedure under sedation or not (although patients were aware that they would be undergoing UGE without sedation, as is usual in our country). After the examination patients were asked whether or not they would want to be sedated for a further UGE.

For the purpose of this analysis, tolerance as the outcome variable was defined based on two measurements made by patients before discharge: (1) discomfort, using a 100-mm visual analogue scale (VAS) (left-end point: 'easy'; right-end point: 'unbearable'); (2) tolerance, using a three-point nominal scale (0 = good, 1 = fair, and 2 = bad). Tolerance was defined as 'poor' (PT) if the patient stated that their tolerance had been 'bad', or if their tolerance had been 'fair' but scored greater than or equal to 50 mm on the VAS for discomfort.

For statistical analysis, quantitative variables were described by means and standard deviation, or medians and interquartile range. Student's *t*-test and the non-parametric Mann-Whitney *U*-test were used to compare quantitative variables in both groups. Student's *t*-test, the Mann-Whitney *U*-test and the Kruskal-Wallis test were used to assess associations between quantitative and categorical variables. Qualitative variables were

Table 1 Analysed variables and definitions

Sociodemographic and other patient variables	
Age	
Sex	
Educational level (low: none or primary education; medium: secondary education; high: university graduate)	
Noxious habits (active daily smoker, or alcohol intake $\geq 40$ g/day)	
Body mass index	
Physical status (ASA) [16]	
Symptoms of gastro-oesophageal reflux (present at least once weekly)	
Prior experience of UGE (number of examinations and tolerance)	
Anxiety, fear, apprehension and neuroticism	
Anxiety related to UGE (0 = none; 1 = some; 2 = fair; 3 = much; 4 = unbearable)	
Degree of fear of the resulting diagnosis (same scale as anxiety)	
Apprehension about the procedure (same scale as anxiety)	
State trait anxiety inventory (state questionnaire, score range: min, 0; max, 60) [17]	
Eysenck personality inventory (neuroticism subscale; score range: min, 0; max, 25) [18]	
Gag reflex (retching during finger palpation of the pharynx, the base of the tongue and the soft palate after topical pharyngeal anaesthesia with 60 mg of lignocaine spray)	
Endoscopic variables	
Length of the examination	
Examinations in which biopsies were performed	
Endoscopist's subjective assessment of examination difficulty (VAS)	

compared by means of the chi-square test, and Fisher's exact test when required. Five-point nominal scales were arbitrarily combined into categories based on clinical criteria (0,1/2/3,4 or 0,1,2/3,4). Logistic regression was carried out to assess the association between tolerance and the explanatory variables significantly associated with the outcome variable in the univariate analysis. Validation was performed assessing calibration and discrimination of the model. Calibration was assessed using the Hosmer-Lemeshow test. The area under the curve ROC (receiver operating characteristic) was used to measure discrimination. All computations were performed using the SPSS/PC+ statistical package [19].

## Results

No patients included in this study had been sedated on prior UGEs. Three patients did not tolerate the introduction of the endoscope. Two hundred and seventy-three (54%) patients underwent UGE for the first time, and 236 (46%) patients had prior experience. When compared with patients undergoing UGE for the first time, those with prior experience were males in a higher proportion (67% vs 48%,  $P < 0.001$ ), older ( $50.8 \pm 12.4$  y vs  $44.7 \pm 14.4$  y,  $P < 0.001$ ), and less anxious (STAI score:  $20.2 \pm 9.4$  vs  $22.8 \pm 10.0$ ,  $P = 0.004$ ).

Concerning tolerance of UGE, 303 (59.6%) patients stated their tolerance as 'good' (mean VAS for discomfort  $32 \pm 16$ , range 0–75), 137 (26.9%) patients 'fair' ( $50 \pm 17$ , range 4–86), and 69 (13.5%) patients 'bad' ( $72 \pm 17$ , range 26–100). Sixty-one of the patients that

described their tolerance of the examination as 'fair' scored less than 50 mm on VAS for discomfort, and 76 patients greater than or equal to 50 mm. Thus, 364 (71.5%) patients were considered to have had good tolerance (GT), and 145 (28.5%) patients poor tolerance (PT).

When compared with those in the GT group (results of groups of patients undergoing UGE for the first time and those with prior experience are combined), a higher percentage of patients in the PT group would prefer sedation for a further examination (group PT, 49%; group GT, 7%,  $P < 0.001$ ).

Statistically significant variables related to poor tolerance of the examination in the univariate analysis are shown in Table 2. There were no significant differences with respect to alcohol intake, educational level, prior experience of UGE, fear of diagnosis, neuroticism score or body mass index. Logistic regression analysis identified the following variables related to poor tolerance: (a) in patients undergoing gastroscopy for the first time: presence of gag reflex (odds ratio (OR) = 3.42,

95% confidence interval (CI) 1.90–6.17), apprehension (OR = 2.57, CI 1.33–4.95), young age (OR = 0.95, CI 0.93–0.98) and high level of anxiety (OR = 1.91, CI 0.96–3.89); (b) in patients with prior experience: apprehension (OR = 4.21, CI 1.93–9.20), tolerance of prior examinations (fair, OR = 2.36, CI 1.01–5.52; poor, OR = 4.92, CI 1.93–12.5, reference group, good tolerance) and female (OR = 2.23, CI 1.09–4.57). The Hosmer–Lemeshow test was not significant, and the area under the curve ROC (77% and 83% for models for patients undergoing UGE for the first time and patients with prior experience, respectively) indicated good calibration and discrimination of the model.

After the examination, nearly half (54 out of 117) of patients preferring sedation prior to UGE stated that they would prefer to forgo sedation in further examinations.

There was a strong association between examination difficulty assessed by the endoscopist on VAS and patient tolerance ( $12.7 \pm 12.2$  mm in the GT group;  $28.8 \pm 19.7$  mm in the PT group,  $P < 0.001$ ). Moreover,

**Table 2** Patients' characteristics related to poor tolerance of upper gastrointestinal endoscopy (UGE). Univariate analysis

Categorical variables	Patients undergoing UGE for the first time ( <i>n</i> = 273)			Patients with prior experience of UGE ( <i>n</i> = 236)		
	<i>n</i> (%)	Poor tolerance (%)	<i>P</i>	<i>n</i> (%)	Poor tolerance (%)	<i>P</i>
Sex						
Male	130 (48)	32	NS	157 (67)	22	0.08
Female	–	29		–	33	
Active smoking						
Yes	90 (33)	40	0.02	74 (30)	39	0.002
No	–	26		–	20	
ASA category						
I	202 (74)	35	0.01	153 (65)	28	NS
II, III	–	20		–	22	
GER symptoms						
Yes	122 (45)	34	NS	84 (36)	33	0.05
No	–	28		–	22	
Prior UGE tolerance						
Good				118 (50)	12	< 0.001
Fair				66 (28)	24	
Poor				52 (22)	60	
Apprehension						
Low	208 (76)	25	0.001	155 (66)	12	< 0.001
High	–	48		–	52	
Anxiety						
Low	229 (84)	27	0.007	218 (92)	24	0.06
High	–	52		–	44	
Gag reflex						
Present	123 (45)	46	< 0.001	111 (47)	38	< 0.001
Absent	–	19		–	15	
Continuous variables	Good tolerance	Poor tolerance	<i>P</i>	Good tolerance	Poor tolerance	<i>P</i>
Age (y), mean (SD)	46.8 (14.7)	40.1 (12.7)	< 0.001	51.5 (12.5)	48.8 (12.1)	NS
Anxiety <sup>a</sup> , median (IQ)	20 (10.5)	24.5 (14.7)	0.001	18 (10)	24 (15.5)	< 0.001

GER, gastro-oesophageal reflux; SD, standard deviation; IQ, interquartile range.

<sup>a</sup>Anxiety measured by the STAI.

the association between anxiety as measured by the categorical scale and the STAI score was very strong (medians of STAI score for the five categories of anxiety were: none 16, some 22, fair 27, much 33, unbearable 39;  $P < 0.001$ ). There were no differences between the two groups as regards to the length of the procedure (GT group 3 min, 24 s  $\pm$  1 min, 37 s; PT group 3 min, 28 s  $\pm$  2 min, NS), or the percentage of examinations with biopsies (GT group 46%, PT group 43%, NS).

## Discussion

Sedation is now considered the best premedication for UGE, and it should be offered to all patients. A common trend is to sedate those patients that want it. Nevertheless, if the sole criterion for sedation were the patients' wish, many of those undergoing UGE with sedation could have forgone it [1,5]. In our study, 9% (35 out of 392) of patients not wanting sedation prior to UGE would prefer it for a further UGE. But of greater interest is the fact that a surprising 46% (54 out of 117) of patients wanting sedation prior to UGE would prefer a further UGE without it. This suggests that patient decision is not sufficiently accurate, and some form of guidance or recommendation could be introduced. In the present study we have identified factors associated with poor tolerance of UGE. The risk of poor tolerance can be quickly assessed before the procedure, and an indication of the probability of poor tolerance can be easily given to the patients to aid them in their choice.

Of the factors identified, presence of gag reflex (usually encountered in 50% of patients) [20,21] decreased tolerance three-fold. Other studies have also found similar results [21,22]. Anxiety was also an important factor related to poor tolerance [1,5,22–24], and it can be easily measured by a simple categorical scale just before the procedure. This method showed a similar predictive value in the logistic regression analysis to the STAI, a standard measurement widely employed in similar hospital settings [25,26].

We have confirmed previous studies that young patients [3,7,11,21,23] and females [6,7,11,23] have a poorer tolerance of UGE. In contrast to other studies [5,11], previous experience of endoscopy did not improve tolerance in the present study. However, patients with prior unsedated examinations know what to expect and are therefore more capable of deciding for themselves whether or not to be sedated.

In summary, factors associated with tolerance of UGE have been identified in the present study. Their use should help patient decision-making and should permit the selection of those patients who might benefit more from sedation. Selective sedation in this setting could be more cost-effective and rational. A prospective study

is now being conducted to evaluate the feasibility of this approach.

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## References

- Mosca S, Balzano A, Amitrano N, et al. Is routine sedation and/or local anaesthesia necessary for diagnostic oesophagoduodenoscopy? *Endoscopy* 1988; **20**:51.
- Beavis AK, La Brooy S, Misiewicz JJ. Evaluation of one-visit endoscopic clinic for patients with dyspepsia. *BMJ* 1979; **1**:1387–1389.
- Campo R, Brullet E, Montserrat A, et al. Topical pharyngeal anesthesia improves tolerance of upper gastrointestinal endoscopy: a randomized double-blind study. *Endoscopy* 1995; **27**:659–664.
- Panades A. Endoscopia digestiva alta. Aceptación y demora diagnóstica. *Gastroenterol Hepatol* 1992; **15**:62–63.
- Pereira SP, Hussaini SH, Hanson PJV, et al. Endoscopy: throat spray or sedation? *J R Coll Physicians Lond* 1994; **28**:411–414.
- Tan CC, Freeman JG. Throat spray for upper gastrointestinal endoscopy is quite acceptable to patients. *Endoscopy* 1996; **28**:277–282.
- Hoare AM, Hawkins CF. Upper gastrointestinal endoscopy with and without sedation: patients' opinions. *BMJ* 1976; **3**:20.
- Thompson DG, Evans SJ, Murray RS, et al. Patients appreciate premedication for endoscopy. *Lancet* 1980; **2**:469–470.
- McCloy R, Nagengast F, Fried M, et al. Conscious sedation for endoscopy. *Eur J Gastroenterol Hepatol* 1996; **8**:1233–1240.
- Daneshmend TK, Bell GD, Logan RFA. Sedation for upper gastrointestinal endoscopy: results of a nationwide survey. *Gut* 1991; **32**:12–15.
- Hedenbro JL, Lindblom A. Patient attitudes to sedation for diagnostic upper endoscopy. *Scand J Gastroenterol* 1991; **26**:1115–1120.
- Arrowsmith JB, Gerstman BB, Fleischer DE, et al. Results from the American Society for Gastrointestinal Endoscopy/U.S. Food and Drug Administration collaborative study on complication rates and drug use during gastrointestinal endoscopy. *Gastrointest Endosc* 1991; **37**:421–427.
- Froehlich F, Gonvers JJ, Fried M. Conscious sedation, clinically relevant complications and monitoring of endoscopy: results of a nationwide survey in Switzerland. *Endoscopy* 1994; **26**:231–234.
- Probert CSJ, Jayanthi V, Quinn J, et al. Information requirements and sedation preferences of patients undergoing endoscopy of upper gastrointestinal tract. *Endoscopy* 1991; **23**:218–219.
- Landefeld K, Rohde H, Müller J, et al. Acceptance, reactivity and side effects in 519 gastroscopy and 506 colonoscopy patients with and without Midazolam-premedication. *Med Klin* 1993; **88**:691–698.
- Owens WD, Felts JA, Spitznagel EL. ASA physical status classification. A study of consistency of ratings. *Anesthesiology* 1978; **49**:239–243.
- Spielberger CD, Gorsuch RE, Luchene RE. *Manual for the State-Trait Anxiety Inventory*. Palo-Alto, California: Consulting Psychologists Press, 1970.
- Eysenck T, Eysenck SBG. *Manual of the Eysenck Personality Inventory*. London: Hodder and Stoughton, 1963.
- Nousis MJ/SPSS. SPSS/PC+ version 4.0 for the IBM PC/XT/AT and PS/2. Chicago: SPSS, 1990.
- Davies AE, Kidd D, Stone SP, et al. Pharyngeal sensation and gag reflex in healthy subjects. *Lancet* 1995; **345**:487–488.
- Pound DC, O'Connor KW, Brown ED, et al. Oral medications for upper gastrointestinal endoscopy using a small diameter endoscope. *Gastrointest Endosc* 1988; **34**:327–331.
- Ladas SD, Raptis SA. Selection of patients for upper gastrointestinal endoscopy without sedation. The finger-throat test. *Ital J Gastroenterol* 1986; **18**:162–165.
- Froehlich F, Schwizer W, Thorens J, et al. Conscious sedation for gastroscopy: patient tolerance and cardiorespiratory parameters. *Gastroenterology* 1995; **108**:697–704.
- Webberley MJ, Cuschieri A. Response of patients to upper gastrointestinal endoscopy: effect of inherent personality traits and premedication with diazepam. *BMJ* 1982; **285**:251–252.
- Moix J. Emoción y cirugía. *Anales de Psicología* 1994; **10**:167–175.
- Levy N, Landmann L, Stermer E, et al. Does a detailed explanation prior to gastroscopy reduce the patient's anxiety? *Endoscopy* 1989; **21**:263–265.