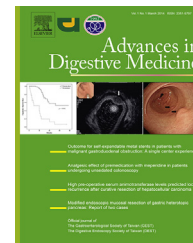


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ORIGINAL ARTICLE

Analgesic effect of premedication with meperidine in patients undergoing colonoscopy without sedation



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Summary *Background:* Colonoscopy is a standard and useful examination in the diagnosis of colorectal diseases; however, it usually causes pain to patients. Some patients receive narcotic drugs, e.g., meperidine, for pain relief if a colonoscopy is carried out without sedation. Whether the administration of such analgesic drugs to patients without sedation facilitates the performance of the colonoscopy or reduces pain remains to be elucidated. The aim of this study was to evaluate the analgesic effect of meperidine as premedication for patients undergoing a colonoscopy without sedation.

Patients and Methods: A total of 217 patients (109 men, 108 women) undergoing a diagnostic colonoscopy without sedation were analyzed prospectively. The procedures were carried out by three experienced endoscopists in a medical center. The patients could opt to receive analgesic drugs, with 25 mg of meperidine being given intramuscularly prior to the procedure if requested by either the doctor or patient. The colonoscopic examination was performed by one person using the short-axis method. Questionnaires to evaluate abdominal pain during or after colonoscopy without sedation were collected and analyzed for patients who used meperidine as premedication (Group A) and for those who did not receive meperidine (Group B). Abdominal pain was evaluated using a visual analog scale from 0 to 10. The cecal intubation rate, total insertion time, and the patient's willingness to receive another colonoscopy in the future if needed were also analyzed.

Results: In both groups, the cecal intubation rate was more than 99% with no significant difference between groups. The mean \pm standard deviation insertion time was 7.14 ± 5.45 minutes in Group A and 6.24 ± 4.24 minutes in Group B ($p = 0.309$). The visual analog pain score was

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3.54 ± 3.13 in Group A and 2.46 ± 2.75 in Group B ($p = 0.009$). After adjusting for age and sex, the pain score was 3.51 ± 3.21 in Group A ($p = 0.055$). Multivariate analysis showed that female sex and the individual endoscopist performing the colonoscopy were associated with abdominal pain during the examination.

Conclusion: In our study, premedication with meperidine or no premedication was not associated with a reduction in abdominal pain during colonoscopy without sedation. The insertion time and cecal intubation rate showed no difference between patients with or without additional analgesic drugs prior to the procedure. However, as self-selection bias could not be ruled out, further randomized, placebo-controlled trials are needed to confirm our findings.

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Introduction

Colonoscopy is a standard and useful examination in the diagnosis of colorectal diseases. It is generally indicated for screening and surveillance for colonic neoplasia, the evaluation of abnormalities on a barium enema, and the diagnosis of unexplained gastrointestinal bleeding, chronic diarrhea, or inflammatory bowel disease [1]. It is often uncomfortable and painful for patients and these unpleasant symptoms always make the procedure more difficult to perform without sedation. In the USA, the sedation of patients undergoing a colonoscopy is standard and is carried out routinely [2,3]. However, sedation is associated with enormous costs and a low risk of serious adverse events [4]. To reduce sedation-related side-effects, some facilities in the USA offer patients an option of colonoscopy without sedation [5–8]. In Taiwan and many Asian countries, sedation is not routinely available and several studies have reported the relative success of colonoscopy without sedation [9–12]. Most patients received different narcotic drugs, e.g., meperidine, for the relief of pain during a colonoscopy without sedation. Whether the administration of analgesic or narcotic drugs to patients facilitates the performance of a colonoscopy without sedation or reduces the painful sensations needs to be elucidated. We report here the results of an evaluation of the analgesic effects of meperidine as a premedication for patients undergoing a colonoscopy without sedation.

Methods

This prospective study was conducted from July 2009 to September 2009 in the Chung Shan Medical University Hospital (Taichung, Taiwan), a tertiary medical center. Three hundred and twenty-four consecutive outpatients who received a diagnostic colonoscopy without sedation were studied. Patients with the following conditions were excluded: age less than 18 years ($n = 1$), inadequate bowel preparation ($n = 25$), obstructive lesions of the colon ($n = 4$), contraindication to antispasmodic drugs or meperidine ($n = 0$), or unwilling to be evaluated for abdominal pain or to attend this study ($n = 77$). A total of 217 outpatients (109 men, 108 women) were enrolled.

All patients followed a colon-cleaning method with 24-hour dietary restriction and the ingestion of either 90 mL

of sodium phosphate (C.B. Fleet, Lynchburg, VA, USA) or 2 L of polyethylene glycol electrolyte lavage solution. Hyoscine butylbromide (20 mg intramuscularly) was used as an antispasmodic drug. Prior to colonoscopy, 25 mg meperidine was offered as an option for premedication pain relief and its use was decided by either the doctor or by patient demand. Group A includes patients who received meperidine as premedication and Group B includes those who did not receive meperidine.

All the colonoscopic examinations were performed by one of three experienced endoscopists (C.C.L., T.H.C., or M.C.T.; each endoscopist had a minimum experience of 2000 colonoscopies) with one person and the short-axis method. Colonoscopies were carried out using an Olympus CF-260AZI colonoscope (Olympus Optical, Tokyo, Japan). Carbon dioxide was routinely used as the insufflating gas. The procedure was conducted without sedation and the doctor could explain the real-time findings and perform therapeutic procedures (including biopsy and polypectomy) if needed. Successful cecal intubation was defined as reaching the cecum and taking the pictures of the appendiceal orifice and the ileocecal valve. The cecal intubation time was recorded as the time interval from the initial insertion into the anal channel to cecum intubation.

A trained research assistant who was blinded to the premedication status administered the questionnaire and evaluated the abdominal discomfort of the patients during the procedure. Abdominal pain was graded by an 11-point visual analog scale (VAS) from 0 to 10 (0 = no pain, 10 = worst imaginable pain). We evaluated abdominal pain during and immediately after the procedure. The patients were also contacted by telephone 24 hours after the colonoscopy and abdominal pain was again recorded by the VAS. The questionnaire also included the acceptance of the procedure and the willingness to repeat a colonoscopy without sedation depending on the patient's condition and doctor's advice.

Quantitative data were summarized and are presented as mean ± standard deviation values. Continuous variables were compared using the Student t test for normal data and the Mann–Whitney U test for non-normal data. Categorical variables were compared using Fisher's exact test for different patient groups. We used logistic regression analyses to evaluate the importance of various factors to severe abdominal pain (VAS ≥ 4) during colonoscopy and these

are presented with the odd ratios (OR) and 95% confidence interval (CI); $p < 0.05$ indicates statistical significance. All analyses were performed with SPSS version 17.0 for Windows (SPSS Inc., Chicago, IL, USA).

Results

A total of 217 patients underwent a diagnostic colonoscopy without sedation from July 2009 to September 2009. Group A included 77 patients (31 men and 46 women, mean age 51.6 years) who received 50 mg meperidine intramuscularly prior to the colonoscopy. Group B included 140 patients (78 men and 62 women, mean age 50.7 years) who received no analgesic drug (Table 1). The total cecal intubation rate was more than 99% in both groups without a statistically significant difference. The insertion time was 7.14 ± 5.45 minutes in Group A and 6.24 ± 4.24 minutes in Group B ($p = 0.309$). There was no difference in withdrawal time between the two groups (Table 1). No major adverse event, such as hypotension or respiratory distress, occurred in this study.

Abdominal pain was evaluated using VAS (0–10). The pain score during the procedure was 3.54 ± 3.13 in Group A and 2.46 ± 2.75 in Group B ($p = 0.009$). Group A patients also had a higher pain score minutes after the procedure. There was no difference in pain score between the two groups 1 day after colonoscopy without sedation (Table 1). After adjusting for age and sex, the pain score was 3.51 ± 3.21 in Group A compared with Group B ($p = 0.055$). Table 2 shows the acceptance of the procedure and the willingness to repeat the colonoscopy if necessary. No significant difference was seen between the two groups in acceptance for the procedure. The willingness to repeat this procedure also had no significant difference between the two groups [76/77 (98.7%) in Group A vs. 135/140 (96.4%) in Group B; Table 2].

Univariate analyses showed that female sex, meperidine use, and endoscopist were associated with a higher risk of severe abdominal pain (VAS ≥ 4) during colonoscopy without sedation. After adjusting for other confounding factors,

multivariate analyses showed that female sex had a significantly higher risk of severe pain (VAS ≥ 4) during colonoscopy (OR 2.313; 95% CI, 1.301–4.113; $p = 0.004$). Different endoscopists also correlated with severe pain when compared with each other (Table 3).

Discussion

Our study showed that female sex and endoscopist were associated with abdominal pain during colonoscopy without sedation, but not an absence of premedication with meperidine. Premedication with meperidine was not associated with a difference in cecal intubation rate and total insertion time during colonoscopy without sedation. Previous studies have shown that female sex, lower body mass index, younger age, intubation time, bowel preparation status, previous hysterectomy, use of antispasmodic drugs, and the experience of the endoscopist were predictors of a more painful experience for patients during colonoscopy without sedation [13,14]. The subgroup and multivariate analysis in our study confirmed that women experienced more abdominal pain during colonoscopy without sedation than men. All three endoscopists in this study had performed more than 2000 colonoscopies each, but the pain score still showed a significant inter-endoscopist difference. These results imply that even experienced endoscopists need continued training or an improvement of skills in colonoscopy without sedation.

In this study, patients who received meperidine as a pre-procedure analgesia experienced a greater severity of abdominal pain. Although the proportion of women is higher (59.7% vs. 40.3%) in the group using meperidine, multivariate analysis did not show a significant correlation between abdominal pain and meperidine. Contrary to experience from usual practice and common belief, the routine administration of meperidine prior to colonoscopy does not reduce abdominal pain during this procedure. These results suggest that colonoscopy without sedation is well accepted and feasible whether premedication with meperidine is used or not.

Table 1 Basic characteristics of study participants undergoing colonoscopy without sedation with or without meperidine as a premedication.

	With meperidine (Group A; $n = 77$)	Without meperidine (Group B; $n = 140$)	p
Male sex, %	40.3	55.7	0.034
Age (y)	51.6	50.7	0.410
Biopsy or polypectomy, n (%)	25 (32.5)	60 (42.6)	0.134
Abdominal pain			
In process of examination	3.54 ± 3.13	2.46 ± 2.75	0.009*
Male	2.81 ± 3.04	1.85 ± 2.42	0.086
Female	4.20 ± 3.20	3.45 ± 3.01	0.225
At end of examination	0.70 ± 1.75	0.10 ± 0.46	0.000*
24 hours after examination	0.08 ± 0.49	0.14 ± 0.78	0.495
Cecal insertion time (min)	7.14 ± 5.45	6.24 ± 4.24	0.309
Withdrawal time (min)	6.82 ± 5.00	7.69 ± 5.33	0.330
Total cecum intubation rate (%)	100	99	

Data are presented as mean \pm SD.

* $p < 0.05$.

Table 2 Acceptance of colonoscopy without sedation and willingness to undergo examination again.

	With meperidine (Group A)	Without meperidine (Group B)	<i>p</i>
Acceptance, <i>n</i> (%)			
Excellent	55 (71.4)	103 (73.9)	0.079
Good	18 (23.1)	29 (21.6)	
Fair	4 (5.2)	1 (0.7)	
Poor	0 (0)	1 (0.7)	
NA ^a	0 (0)	6 (4.1)	
Patient willing to undergo colonoscopy without sedation again (%)	98.7	96.4	0.426

^a In Group B, acceptance was not recorded in six patients. The remaining 134 patients were analyzed and compared with Group B.

In the USA, the sedation of patients for colonoscopy is routine and may relieve patient anxiety and discomfort, improve the outcome of the examination, and diminish the patient's memory of the event [15]. The most common choice of sedative is benzodiazepine alone or in combination with an opiate. Meperidine is a common opioid drug used for analgesia and partial sedation. Combinations of benzodiazepine and opioid drugs are often used, but may increase the risk of oxygen desaturation and cardiorespiratory complications [15]. One previous study showed no difference in abdominal pain during colonoscopy in patients receiving a combination of midazolam and meperidine, or either drug given alone [16]. However, another study showed that a combination of these two drugs provided better patient tolerance to the procedure and less pain during the colonoscopy than midazolam alone [17].

In contrast with the USA, colonoscopy is commonly performed without sedation in Taiwan and many Asian countries. The advantages of colonoscopy without sedation include the prevention of sedation-related complications, reduction in recovery time after the procedure, and a lower cost. A recent study also showed primary screening with colonoscopy without sedation is feasible, as with sigmoidoscopy [13]. Meperidine is usually used for analgesia prior to colonoscopy without sedation in our daily practice. It is

administered within 30 minutes prior to the examination via the intramuscular route in our outpatient department; however, some adverse effects such as dizziness, nausea, vomiting, or hypotension may occur. In our findings, the performance of the procedure and the patient's abdominal pain were not related to the use of meperidine during colonoscopy without sedation. Meperidine may not be necessary as a premedication for colonoscopy without sedation.

Although sedation for colonoscopy is standard in the USA, some facilities do offer the option of colonoscopy without sedation. One recent study conducted in the USA noted that 28% of patients changed their choice from colonoscopy with sedation to colonoscopy without sedation after being informed of the advantages and disadvantages of these two options. More than 90% of patients would accept further colonoscopy with no sedation and 75% had a good or excellent experience [7]. Our results also showed a high acceptance for colonoscopy without sedation (good or excellent in more than 90% patients) and our patients were willing to repeat the procedure without sedation. These studies suggest that colonoscopy without sedation is well accepted in the majority of patients. By promoting an informed choice of colonoscopy without sedation and an explanation of the advantages and disadvantages, we could reduce the

Table 3 Association between risk factors and abdominal pain (visual analog scale ≥ 4 points) using univariate and multivariate analyses.

Risk factor	Univariate analysis			Multivariate analysis		
	Odds ratio	95% Confidence interval	<i>p</i>	Odds ratio	95% CI	<i>p</i>
Sex (female vs. male)	2.468	1.398–4.358	0.002	2.313	1.301–4.113	0.004*
Age (>60 y vs. ≤ 60 y)	1.455	0.812–2.608	0.208			
Meperidine (Group A vs. Group B)	1.916	1.081–3.396	0.026*	1.723	0.958–3.099	0.069
Endoscopy procedure (biopsy/polypectomy vs. no biopsy/polypectomy)	0.694	0.391–1.232	0.212			
Previous abdominal surgery (with previous abdominal surgery vs. without previous abdominal surgery)	1.464	0.772–2.776	0.243			
Endoscopist ^a						
A (M.C.T.)	2.018	0.942–4.323	0.071	1.861	0.857–4.041	0.116
B (T.H.C.)	2.972	1.385–6.378	0.005*	2.557	1.171–5.582	0.018*

* $p < 0.05$.

^a Endoscopist C.C.L. was used as reference.

unnecessary number of colonoscopies with sedation and the enormous cost and risk of cardiovascular complications.

In addition to abdominal pain, we evaluated several quality indicators for colonoscopy (cecum reach rate, insertion time, and withdrawal time) [18]. The three endoscopists had good performances in colonoscopy without sedation. Both groups had a high cecum reach rate (more than 99%) and adequate insertion and withdrawal times, as in other studies. The administration or non-administration of meperidine did not influence the performance of the colonoscopy without sedation.

Our study had several limitations. Firstly, it was not a randomized study. The patients could choose to receive or not receive meperidine prior to the colonoscopy and the demographic data in this study showed a higher proportion of women asking for meperidine. Secondly, the patients who asked for analgesia may also have had underlying anxiety or a fear of painful sensations. To overcome these limitations, we need further randomized controlled trials and to add to the questionnaire to evaluate the psychiatric status of patients.

In conclusion, premedication with meperidine was not associated with a reduction in abdominal pain during colonoscopy without sedation. The insertion time and cecum intubation rate showed no difference between patients with or without meperidine. Premedication with meperidine is not mandatory prior to colonoscopy without sedation if the procedures are performed skillfully.

Conflicts of interest

All contributing authors declare no conflicts of interest.

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