Propofol Sedation in Patients Undergoing Colonoscopy in Jamaica

MG Lee[1], CD McGaw[2], L Chin[1], MAC Frankson[3], CA Walters[3]

ABSTRACT

Background*: Propofol sedation is increasingly used for colonoscopy and may be associated with increased satisfaction and efficiency in diagnostic and therapeutic endoscopy. However, propofol has a relatively narrow therapeutic window as it frequently produces deep sedation, and can precipitate respiratory depression.*

Aim: *To determine the efficacy, safety and patient satisfaction with propofol sedation in patients undergoing colonoscopy at the University Hospital of the West Indies (UHWI).*

Methods: *Patients undergoing outpatient colonoscopy at the UHWI who were sedated with propofol were studied. Boluses of 10 − 20 mg of propofol at intervals of 2 − 5 minutes, as needed for adequate sedation, were administered after initial induction. Continuous monitoring of the pulse rate, and oxygen saturation were performed and the blood pressure checked every 2 − 5 minutes. All patients received supplemental oxygen (4 L/min).*

The following observations were recorded: the endoscopist recorded the ease of the procedure, the anaesthetist recorded the comfort of the patient throughout the procedure and at the time of discharge, and the patient stated the degree of satisfaction with the procedure. Any unusual events were recorded.

Results: *Sixty consecutive patients sedated with propofol were studied. There were 28 (46.7%) males, with a mean age of 58.3 years and 32 (53.3%) females, with mean age of 59.5 years. Most were normal healthy patients (56.6%). Comorbid illnesses were present in 43.4%, with hypertension being most common (23.3%). All patients were classified as ASA class 1 and 2. The average dose of propofol used was 180 mg (range 50 – 355 mg). The mean duration of colonoscopy was 19.5 minutes. The mean recovery period (able to stand) was 29.6 minutes. There were no documented cases of significant hypotension, bradycardia, or hypoxaemia during the procedure. Transient apnoeic episodes during the initial stages of sedation occurred in 12 (20%) patients. The majority of patients (91.7%) rated the experience as being extremely good or excellent. The majority could not recall the actual colonoscopy and there were minimal subjective reports of nausea or discomfort during the procedure.*

Conclusions: *Propofol sedation was associated with quick recovery and excellent satisfaction by patients and is a suitable alternative for sedation for colonoscopy in Jamaica.*

Keywords: Colonoscopy, propofol, sedation

La Sedación con Propofol en Pacientes Sometidos a Colonoscopía en Jamaica

MG Lee[1], CD McGaw[2], L Chin[1], MAC Frankson[3], CA Walters[3]

RESUMEN

Antecedentes: *La sedación con propofol se usa cada vez más en la colonoscopía, y puede asociarse con el aumento de la satisfacción y eficiencia en el diagnóstico y la endoscopía terapéutica. Sin embargo, el propofol frecuentemente tiene una ventana terapéutica relativamente estrecha, ya que con frecuencia produce sedación profunda, y puede precipitar la depresión respiratoria.*

Objetivo: *Determinar la eficacia, seguridad y satisfacción del paciente con la sedación del propofol en pacientes que se someten a colonoscopía en el Hospital Universitario de West Indies (UHWI).*

Métodos: *Se estudiaron pacientes sometidos a colonoscopía ambulatoria en el UHWI, que fueron sedados con propofol. Tras una inducción inicial, se administraron bolus de 10–20 mg de propofol a*

From: [1]Department of Medicine, The University of the West Indies, Kingston 7, Jamaica; [2]Department of Surgery, Radiology, Intensive Care and Anaesthesia, The University of the West Indies, Kingston 7, Jamaica and [3]Faculty of Medical Sciences, The University of the West Indies, Kingston 7, Jamaica.

Correspondence: Professor MG Lee, [1]Department of Medicine, The University of the West Indies, Kingston 7, Jamaica. E-mail: michael.lee@uwimona.edu.jm

intervalos de 2–5 minutos, según se necesitara para una sedación adecuada. Se realizó un monitoreo continuo del pulso, y la saturación de oxígeno, chequeándose por otra parte la presión sanguínea cada 2-5 minutos. Todos los pacientes recibieron oxígeno suplementario (4 L/min). Se registraron las observaciones siguientes: el endoscopista registró la facilidad del procedimiento, el anestesista registró el confort del paciente a lo largo del procedimiento y en el momento del alta, y el paciente expresó el grado de satisfacción con el procedimiento. Cualquier incidente que resultara inusual, fue registrado.
Resultados: *Se estudiaron sesenta pacientes consecutivos sedados con propofol. Hubo 28 (46.7%) varones, con una edad promedio de 58.3 años y 32 (53.3%) hembras, con una edad promedio de 59.5 años. En la mayor parte de los casos, se trataba de pacientes saludables normales (56.6%). En el 43.4% de los casos, se presentaron enfermedades comórbidas, siendo la hipertensión la más común (23.3%). Todos los pacientes fueron clasificados como clase ASA 1 y 2. La dosis promedio de propofol usada fue 180 mg (rango 50–355 mg). La duración promedio de la colonoscopía fue 19.5 minutos. El periodo de recuperación promedio (poder estar de pie) fue 29.6 minutos. Durante el procedimiento, no hubo ningún caso documentado de hipotensión, bradicardia, o hipoxemia de importancia. Episodios apneicos transitorios durante las fases iniciales de sedación, ocurrieron en 12 (20%) pacientes. La mayoría de los pacientes (91.7%) calificó la experiencia como sumamente buena o excelente. La mayoría no podía recordar la colonoscopía misma, y hubo reportes subjetivos mínimos de náusea o malestar durante el procedimiento.*
Conclusiones: *La sedación con propofol estuvo asociada con la recuperación rápida y excelente satisfacción de los pacientes, y constituye una alternativa conveniente para la sedación en los procedimientos de colonoscopía en Jamaica.*

Palabras claves: Colonoscopía, propofol, sedación

West Indian Med J 2011; 60 (3): 285

INTRODUCTION

Colonoscopy has been accepted and utilized widely for diagnosis of disorders of the large intestine for many years in Jamaica (1). Colonoscopic therapeutic procedures have also increased over the past several decades (2). Recently, there has been an increase in requests for screening and surveillance colonoscopy by physicians and patients, driven by an increased awareness of prevention and detection of early colorectal cancer and an increasing incidence of this malignancy (3). Colorectal cancer is now the second most common cause of cancer mortality in most developed countries and is the third most common cancer in Jamaica in both men and women (4, 5).

Sedation is routinely administered for colonoscopy as the procedure is uncomfortable and painful to most patients. Sedation allows for a comfortable and acceptable experience for both the patient and physician. The most widely used sedation is a combination of a benzodiazepine (midazolam) with an opiate analgesic, usually pethidine.

Midazolam is now the preferred benzodiazepine because of its rapid onset of action and relatively short elimination half life compared to diazepam. It also has amnestic, anxiolytic and sedative properties. The addition of an opiate provides analgesia, synergistic sedation and improved patient satisfaction (6, 7).

Although the combination of midazolam and pethidine is acceptable and adequate for most patients undergoing colonoscopy, there are several disadvantages with their use. These include: *a*) delayed onset of action, *b*) relatively prolonged sedative effects, which may delay discharge from the endoscopy suite and resumption of normal activity, and *c*) the attendant cost, personnel and space needed to monitor patients after the procedure (8). Because of these disadvantages, other sedative regimens have been undergoing clinical trials.

Propofol is an ultra-short acting sedative and hypnotic that provides amnesia. It has a rapid onset of action and a short-half life with consequent short recovery time (9). Because of its rapid recovery profile, propofol is increasingly used for gastrointestinal endoscopy and may represent an advance in sedation and in increasing patient satisfaction and efficiency in diagnostic and therapeutic endoscopy (9). In fact, its use is gaining acceptance with endoscopists and several studies have shown that it is safe even in high risk patients, is associated with shorter recovery times and improved patient satisfaction. In addition, its use allows quicker turnover of patients in the endoscopy suite, with a shorter stay and more rapid resumption of normal activity by the patient (7 − 11).

Despite its beneficial properties, propofol has a relatively narrow therapeutic window (12). It frequently produces deep sedation, can precipitate respiratory depression and may inhibit the gag and cough reflexes (13). Therefore, it is recommended that it be administered by trained medical personnel, who will monitor the patient carefully and be able to treat apnoea should it occur (14).

There has not been any study published from Jamaica or the Caribbean using propofol sedation for gastrointestinal procedures. Because of its increasing use in many areas of the world, it is important to study the safety and efficacy of propofol sedation in patients undergoing colonoscopy in Jamaica.

SUBJECTS AND METHODS

All patients requiring colonoscopy were eligible for inclusion in the study. Those patients requiring colonoscopy and who requested moderate to deep sedation were eligible for the study. Patients referred for colonoscopy were seen by the gastroenterologist (MGL) who reviewed the clinical history and performed physical examination.

The procedure was explained to the patient including the preparation, possible complications of the procedure and the need for sedation. Patients who requested deep sedation were advised of the study and informed consent obtained.

All procedures were performed at the University Hospital of the West Indies (UHWI). On the morning of the procedure, before colonoscopy was performed, written consent for the procedure was obtained, after full explanation. In addition, a written consent was obtained for the study protocol. The anaesthetist (CDM) reviewed the patient, discussed the sedation technique and answered all questions that the patient had regarding the sedation.

Induction of sedation was commenced with an initial bolus of proprofol 40 mg (if less than 60 kg body weight) or 50 mg (if greater than 60 kg) and followed by titration in subsequent boluses of 10 − 20 mg at intervals of 2 − 5 minutes as needed for adequate sedation. The procedure commenced at loss of the patient's eyelash reflex. The response of the patient to the insertion of the colonoscope, the initial manoeuvres of the instrument and the subsequent insertions were monitored and further increments of drug administered as indicated. The target level of sedation was that level of depressed consciousness which effectively blocked the patients' response to the insertion and passage of the colonoscope by withdrawal or vocal sounds of discomfort, but without respiratory depression. The depth of sedation was titrated to achieve a state in which the patient was comfortable and tolerant to the procedure, and to guide the process and assessment of sedation, the University of Michigan Sedation Scale (UMSS) was used (15). The UMSS consists of the following four scales: 0, awake and alert; 1, minimally sedated: tired/sleepy, appropriate response to verbal conversation and/or sound; 2, moderately sedated: somnolent/sleeping, easily aroused with light tactile stimulation or a simple verbal command; 3, deeply sedated: deep sleep, arousable only with significant physical stimulation; and 4, unarousable.

All patients had continuous monitoring of the pulse rate and oxygen saturation. The blood pressure was checked automatically every 2 − 5 minutes. All patients received supplemental oxygen (4 L/min). The anaesthetist monitored respiration by observation of respiratory effort by chest movement and breathing.

Mental state assessment was performed at intervals of 5 − 10 minutes after completion of the procedure and recorded. In addition, the time at insertion of the instrument, withdrawal (completion) and discharge were recorded. The most proximal area reached, and biopsies and/or therapeutic procedures performed were recorded.

The following observations were recorded as excellent, good, satisfactory, poor, very poor, the endoscopist recorded the ease of the procedure, the anaesthetist recorded the comfort of the patient throughout the procedure and at the time of discharge, and the patient stated the degree of satisfaction for the procedure. Any unusual events were recorded.

The following patients were excluded from the study: *a*) under age 18 years or over age 75 years, *b*) allergy to any of the sedative drugs as well as allergy to eggs or soy products (as recommended by the package insert of Propofol as Diprivan (Astra Zeneca, Wilmington, Delaware, USA), *c*) moderate to severe cardiopulmonary disease, *d*) severe bleeding with haemodynamic instability, *e*) pregnancy, *f*) sleep apnoea, *g*) enlarged tongue, abnormality of head and neck or gross airway abnormality.

Data from this study were managed using primarily Microsoft Office Application software and analysed with suitable recognized statistical software, including Statistical Packages of the Social Sciences (SPSS) version 12.0 and Stata Version 10.1. Univariate descriptive statistics as appropriate for the types of variables collected were generated after ensuring data entry integrity. Pearson's correlation coefficient was also used to assess the strength of the linear relationship, if one existed between propofol dose and recovery time (time to stand). Other bivariate statistical methods such as the chi-square tests of homogeneity and Student's t-tests were employed as necessary to accomplish secondary analyses on the data collected in this study.

The study was approved by the Faculty of Medical Sciences, The University of the West Indies/University Hospital of the West Indies Ethics committee.

RESULTS

A total of 60 consecutive patients who underwent colonoscopy were sedated using propofol. There were 28 (46.7%) males with a mean age of 58.3 years and 32 (53.3%) females, with a mean age of 59.5 years. Most patients were in the older age range as 70% of males and 65% of females were over 55 years. Most were normal healthy patients (56.6%). Of those with comorbid illnesses (43.4%), hypertension was the most common disorder (23.3%), other co-morbidities included diabetes mellitus (5%), asthma, bipolar disorder, hyperthyroidism, seizure, multiple sclerosis and sarcoidosis. The majority were non-smokers (89.7%). Of the males, 50% were classified as ASA class 1 and 50% class 2. Among the females, 53% were class 1 and 47% class 2. All patients were

sedated with propofol for the first time. Prior colonoscopy had been performed in 40% of the study participants and 30% had previous sedation usually with midazolam combined with or without an opiate. The indications for colonoscopy were diverse and included bowel symptoms, family history of colorectal cancer, routine screening, anaemia, polyp, rectal bleeding and diverticular disease. All subjects underwent colonoscopy as outpatients.

The average dose of propofol used was 180 mg (range 50 – 355 mg) with the majority of patients requiring between 200 – 249 mg (28.3%) for adequate sedation. There was no difference in mean dosage between males and females. The mean duration of colonoscopy was 19.5 minutes. The mean recovery period (able to stand) was 29.6 minutes. Of note, there was an overall inverse relationship between propofol dose and time to stand (not statistically significant) and suggestive of a non-linear relationship (r = -0.097, p = 0.462). This weak inverse relationship was observed among females (r = -0.349, p = 0.051) and patients below 55 years of age (r = -0.264, p = 0.323) but not among males (r = 0.187, p = 0.341) and persons aged 55 years and older (r = 0.010, p = 0.954). There were no documented cases of significant hypotension, bradycardia or hypoxaemia during the procedure (Table 1). Transient apnoeic episodes during the initial stages of sedation occurred in 12 (20%) patients. There was no significant association between experiencing an apnoeic episode and gender (p = 0.698) although a slightly higher percentage of females (21.9% *versus* 17.9%) experienced these episodes. A slightly higher proportion of patients in the under 55-year age group experienced an apnoeic episode (25.0%) compared to persons in the 55 years and over age group [20.6%] (p = 0.725). There was a greater proportion of persons having an apnoeic episode among persons with prior colonoscopy (33.3%) compared to those who did not have a prior colonoscopy [11.1%] (p = 0.035).

Table 1: Data during colonoscopy

Duration of procedure	19.45 mins ± 9.72
Time to stand	29.7 mins ±12.5
Systolic blood pressure	125 mmHg ± 20
Diastolic blood pressure	65 mmHg ± 10
Pulse rate	70 bpm ±10
Oxygen saturation	95% ± 4
Apnoeic episodes	20% (n = 12)

Mean ± Standard deviation values shown

Most patients achieved UMSS sedation scale 3 early in the procedure and sedation 2 at the end of the procedure. The majority of patients (91.7%) rated the experience as being extremely good or excellent. The majority could not recall the actual colonoscopy but there were minimal subjective reports of nausea or discomfort during the procedure (Table 2).

Table 2: Ratings by patient

Subjective ratings of procedure	
No discomfort during the procedure	78.3%
Little discomfort during the procedure	21.7%
No nausea during the procedure	90.0%
Recall of the procedure – none or little	90.0%
Overall rating of the experience	
Excellent	60%
Extremely good	31.7%
Very good	3.3%
Good	1.7%
Above average	1.7%
Below average	1.7%

DISCUSSION

Propofol is now considered one of the main alternatives for endoscopic sedation but most studies using propofol were done in the developed countries of the western world. Currently, limited data exist on the use of propofol in the developing countries. The combination of benzodiazepine and an opioid analgesic is still the most common method of sedation in 56% of countries, while 18% of countries surveyed used propofol for colonoscopy, none of which included a Caribbean country (16).

The results of the present study show that propofol is safe to use and well tolerated by the patients. The main complications associated with propofol use include severe respiratory depression, hypotension and bradycardia (17). Respiratory depression was the only adverse event that occurred in this study. The apnoeic episodes that occurred were transient and did not require intubation or reversal, which is in keeping with a Cochrane review which showed that only one patient required respiratory intervention (other than oxygen) in a meta-analysis of five studies involving 407 patients (18). In high risk patients, transient oxygen desaturation with propofol use occurred in 12% compared to midazolam plus pethidine [26%] (19). It is important to carefully and continuously assess the airway and ventilation in patients sedated with propofol because of the potential of respiratory depression. In this study, the administered propofol was given by an anaesthesiologist but other studies have demonstrated that it is equally safe if given by gastroenterologists or nurses supervised by endoscopists appropriately trained in its use (6, 10).

In a larger study utilizing propofol combined with small doses of a benzodiapezine and an opioid, the mean duration of colonoscopy was 17 minutes which compares favourably to 19.5 minutes in the present study (20). Also, the mean recovery time of 29.6 minutes in the present study is comparable to the 25 minutes in the previous report (20). In another study, using propofol alone, the mean duration of colonoscopy was 18.7 minutes which is similar to the present study but the recovery time was 14.4 minutes and 40.5

minutes to discharge (7). In a third study using propofol, the mean duration of colonoscopy was 8.7 minutes with a mean discharge time of 43.3 minutes (21).

The satisfaction expressed by the patients was excellent in the present study and the majority did not recall the procedure. This is in keeping with other studies in which patients who received propofol expressed greater overall mean satisfaction (9.3) on a 10-point visual analogue scale than patients receiving midazolam and an opioid (7, 18).

Propofol for sedation during colonoscopy for generally healthy individuals can lead to faster recovery and discharge times, increased patient satisfaction without an increase in side effects (5, 18). Therefore, propofol use is a suitable alternative for sedation during colonoscopy. This is particularly important in our setting as colon cancer is the third most common cancer in the Jamaican population and compliance with screening is vital (4). Further research is recommended to compare the efficacy and patient satisfaction of using propofol-only sedation to the current practice of using a benzodiazepine with or without opioid supplementation. Also the costs of implementing a change in sedation would have to be examined, especially in our resource limited setting. Potential costs include the cost of the drug, as well as the cost and availability of trained personnel to administer and monitor the patients. However, if the high per cent rate of satisfaction seen in the present study can be translated to the general population, screening for colon cancer specifically would be increased. With shorter recovery times during colonoscopy and increased detection of colon cancer in the earlier stages, the overall financial burden to the health sector would be greatly improved.

The main limitation in the present study was the relatively small number of patients studied. Also the majority of patients were healthy and thus the findings would be applicable to outpatient colonoscopy.

REFERENCES

1. Lee MG, Martin A, Terry SI. Colonoscopy in Jamaica – a 12-year experience. West Indian Medical Journal 1989; **38:** 213 – 6.
2. Lee MG, Hanchard B. Management of colon polyps by colonoscopic polypectomy in Jamaica. West Indian Medical Journal 1991; **40:** 81 – 5.
3. Faulx AL, Vela S, Das A, Cooper G, Sivak MV, Isenberg G et al. The changing landscape of practice patterns regarding unsedated endoscopy and propofol use: A national web survey. Gastrointest. Endosc 2005; **62:** 9 – 15.
4. Walsh JME, Terdiman JP. Colorectal cancer screening. Scientific review. JAMA 2003; **289:** 1288 – 96.
5. Hanchard B, Blake G, Wolff C, Samuels E, Waugh N, Simpson D et al. Age specific incidence of cancer in Kingston and St. Andrew, Jamaica, 1993 – 1997. West Indian Med J 2001; **50:** 123 – 9.
6. Lee MG, Hanna W, Harding H. Sedation for upper gastrointestinal endoscopy. A comparative study of midazolam, diazepam and controls. Gastrointest Endosc 1989; **35:** 82 – 4.
7. Sipe BW, Rex DK, Latinovich D, Overley C, Kinser K, Bratcher L et al. Proprofol versus midazolam/meperidine for outpatient colonoscopy: Administered by nurses supervised by endoscopists. Gastrointest Endosc 2002; **55:** 815 – 25.
8. Vargo JJ, Zuccaro G, Dumot JA, Shermock KM, Morrow JB, Conwell DL et al. Gastroenterologist administered propofol versus meperidine and midazolam for advanced upper endoscopy: A randomized trial. Gastroenterol 2002; **123:** 8 – 16.
9. Tobias H, Kefalides P. The medical need for anaesthesiologist administered propofol. AGA Perspectives 2005; **1:** 5, 13.
10. Heuss LT, Schnieper P, Drewe J, Pflimlin E, Beglinger C. Safety of propofol for conscious sedation during endoscopic procedures in high risk patients – a prospective, controlled study. Amer J Gastroenterol 2003; **98:** 1751 – 7.
11. Rex DK, Overley C, Kinser K, Coates M, Lee A, Goodwine BW et al. Safety of propofol administered by registered nurses with gastroenterologist supervision in 2000 endoscopic cases. Amer J Gastroenterol 2002; **97:** 1159 – 63.
12. Walker JA, McIntyre RD, Schleinitz PF, Jacobson KN, Haulk AA, Adesman P et al. Nurse administered propofol sedation without anaesthesia specialists in 9152 endoscopic cases in an ambulatory surgery center. Amer J Gastroenterol 2003; **98:** 1744 – 50.
13. Byrne MF, Baillie J. Propofol for conscious sedation. Gastroenterol 2002; **123:** 373 – 5.
14. Wilcox CM. Conscious deep sedation with propofol for endoscopic procedures. AGA Perspectives 2005; **1:** 4, 5, 12, 13.
15. Malviya S, Voepel-Lewis T, Tait AR, Merkel S, Tremper K, Naughton N. Depth of sedation in children undergoing computed tomography: Validity and reliability of the University of Michigan Sedation Scale (UMSS). Br J Anaesth 2002; **88:** 241 – 5.
16. Benson AA, Cohen LB, Waye JD, Akhavan A, Aisenberg J. Endoscopic sedation in developing and developed countries. Gut Liver 2008; **2:** 105−12.
17. Graber RG. Propofol in the endoscopy suite: An anesthesiologist's perspective. Gastrointest Endosc 1999; **49:** 803 – 6.
18. Singh H, Poluha W, Cheung M, Choptain N, Baron KI, Taback SP. Propofol for sedation during colonoscopy. Cochrane Database of Systematic Reviews 2008, Issue 4. Art. No.: CD006268. DOI: 10.1002/14651858.CD006268.pub2.
19. Riphaus A, Stergiou N, Wehrmann T. Sedation with propofol for routine ERCP in high-risk octogenarians: A randomized, controlled study. Amer J Gasroenterol 2005; **100:** 1957 – 63.
20. Cohen LB, Dubovsky AN, Aisenberg J, Miller KM. Propofol for endoscopic sedation: A protocol for safe and effective administration by the gastroenterologist. Gastrointestinal Endoscopy 2003; **58:** 1 – 10.
21. Ng JM, Kong CF, Nyam D. Patient-controlled sedation with propofol for colonoscopy. Gasrointest Endosc 2001; **54:** 8 – 13.