

Sedation for total colonoscopy with propofol administered by non-anesthesiologists

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Received: 08/10/18
Accepted: 23/07/19

Abstract

Introduction: Colonoscopy is a very precise procedure for diagnosis and treatment of diseases of the colon. It allows visualization of the mucosa of the entire colon and the terminal ileum if the examination is adequate. Classically, anxiolysis or conscious sedation has been used through the administration of benzodiazepines, or benzodiazepines plus opiates. However, the use of propofol as a sedative in digestive endoscopy has been gradually spreading in recent years. **Objective:** This study evaluates the evolution of sedation procedures with propofol administered by non-anesthesiologists for total colonoscopies. **Material and Method:** Patients who underwent total colonoscopy who were sedated with propofol administered by appropriately trained non-anesthesiologists were evaluated. Hemodynamic and respiratory behavior were measured. Patients were excluded if they were over II on the American Society of Anesthesiologists Physical Status Classification System. **Results:** Three hundred ninety patients were evaluated, 269 (69%) were women, and 121 (31%) were men. Their average age was 53.1 years. The average dose of propofol used was 2.3 mg/kg. Bradycardia developed in 4.9% of the patients according to the definition used. The average dose of propofol in patients with bradycardia was 1.76 mg/kg. **Conclusion:** The use of propofol by non-anesthesiologists can be considered safe as long as the protocols established for this purpose are followed.

Keywords

Colonoscopy, propofol, endoscopy, conscious sedation.

INTRODUCTION

Colonoscopy is very precision for diagnosis and treatment of diseases of the colon. It allows visualization of the entire mucosa of the colon and the terminal ileum if the examination is done well. (1) Classically, anxiolysis (minimal sedation) through administration of benzodiazepines or a combination of these drugs with opiates has been used. However, the use of propofol as a sedative has been gradually increasing in digestive endoscopy in recent years. (2) The administration of propofol is directed by an anesthesiologist in most cases, but 82,620 procedures that have used propofol without presence of an anesthesiologist have

been reported by endoscopists. The morbidity rate has been 0.19% while the mortality is zero. (3)

The objective of this project is to evaluate the behavior of patients during total colonoscopy with the administration of propofol sedation by non-anesthesiologists.

MATERIAL AND METHODS

This work was carried out in the diagnostic endoscopy section of the Union of Surgeons in Manizales, Colombia. Patients scheduled for total colonoscopy were evaluated according to protocol and met the inclusion criteria. They were sedated with propofol administered by appropria-

tely trained non-anesthesiologists. Blood oxygen saturation, hemodynamic behavior and respiratory behavior during sedation were all monitored. Patients under 18 years of age and those with ASA (American Society of Anesthesiologists) Physical Status Classifications over II were excluded in accordance with general recommendations for this type of procedure. Intravenous boluses of propofol were administered starting with a 10-30 mg dose and continuing with titrated propofol as needed according to the patient's response. All patients received at least 3 L/min of oxygen by nasal cannula. A heart rate of less than 50 beats per minute was defined as bradycardia for these procedures. This study was approved by the Institutional Bioethics Committee of the Faculty of Health Sciences of the University of Caldas in Resolution CBCS-023-16 of March 31, 2016.

RESULTS

Of the 390 patients evaluated, 269 (69%) were women and 121 (31%) were men. Their average age was 53.1 years, and their average weight was 64.4 kg (Table 1). 70.8% of the patients were ASA I and 29.2% were ASA II. 26.7% of the patients suffered from arterial hypertension, 6.2% had diabetes mellitus, 38.2% had histories of abdominal surgery, 8.2% of the women had had abdominal hysterectomies, 9.5% of the patients were smokers, 8.5% consumed alcohol regularly, and 0.3% consumed other substances (Table 2). The average arterial blood pressure before the procedure was 92 mm Hg, it was 84 mm Hg in the cecum or site of greatest advance, and it was 79 mm Hg after the procedure. The average arterial saturation in the cecum or site of greatest progress was 97% (Table 3). The average dose of propofol used was 2.3 mg/kg (Table 4). Bradycardia (according to the definition used) developed in 4.9% of the patients, and reversal required the use of hyoscine butylbromide although there was no need for atropine or other medications. No relationship was found between bradycardia and ASA I or ASA II classification. The average dose of propofol in patients who presented bradycardia was 1.76 mg/kg, while in those who did not present it was 2.3 mg/kg. The difference was significant ($p = 0.012$ with statistical power of 99%).

Table 1. Sociodemographic variables

N	Female	Male	Average age	Average weight
390	269 (69%)	121 (31%)	53.1 years	64.4 kg

Table 2. Background

ASA 1	ASA 2	AH	DM	ABD S	Cigarettes	Alcohol	Substances	HYST
70.8%	29.2%	26.7%	6.2%	38.2%	9.5%	8.5%	0.3%	8.2%

ASA: American Society of Anesthesiologists; ABD S: abdominal surgery; DM: diabetes mellitus; HYST: hysterectomy; AH: arterial hypertension.

Table 3. Hemodynamic variables

AABP prior to procedure	AABP in the Cecum or highest point of advance	AABP after procedure	Arterial saturation in the Cecum or highest point of advance
92 mm Hg	84 mm Hg	70 mm Hg	97%

AABP: Average arterial blood pressure

Table 4. Propofol dosage

Average propofol dose	Dose bradycardia	Dose without bradycardia
2.3 mg/kg	1.76 mg/kg	2.3 mg/kg

DISCUSSION

This study evaluated the hemodynamic and oxygenation behavior of ASA I and ASA II patients during colonoscopies performed with sedation administered by non-anesthesiologists. Although most of the patient were classified as ASA I patients, we found no real differences in blood pressure levels during the procedure and at the different sites evaluated. Similarly, no differences were found in arterial oxygen saturation. When bradycardia developed, it was reversed with hyoscine butylbromide. Bradycardia may be more closely related to the tension on the mesocolon (vagal reflex) than to the dose of propofol used since patients who developed bradycardia had lower doses of propofol. This association was statistically significant.

To facilitate diagnostic and therapeutic procedures, sedation and/or analgesia is commonly used for medical, dental or surgical procedures by a wide range of health professionals with various qualifications and training. (4) The purpose of sedation and analgesia is to reduce anxiety, discomfort and pain and decrease memories of the event. The appropriate level of sedation ranges from minimal sedation to general anesthesia. (5) Patient comfort is an important measure of colonoscopy quality and outcome and has an

influence on patient satisfaction and acceptance of a new procedure. (6)

Sedation levels range from minimal to moderate sedation to deep sedation and anesthesia. A sedated patient may or may not be awake but maintains an open airway and breathes spontaneously. Similarly, conscious sedation allows communication and response to verbal orders. (7) In general, three types of sedation are used during colonoscopy:

- General anesthesia administered by an anesthesiologist
- Procedural sedation and analgesia (PSA) administered by an anesthesiologist or a gastroenterologist other than the one performing the colonoscopy
- PSA administered by a trained nurse. (8)

Sedation schemes that have been used for invasive procedures include these being midazolam with meperidine, midazolam with fentanyl, and midazolam alone. However, these medications have longer durations of action than does propofol. Their side effects include nausea after the procedure, respiratory depression and accumulation in cases of renal failure. (9) Propofol, developed for induction and maintenance of general anesthesia, has rapid onset of action, less nausea and vomiting, and a short recovery time among its greatest advantages. The latter allows rapid exit of a patient from the endoscopy room. (10)

Propofol is regularly used for sedation, induction, hypnosis, maintenance, anticonvulsant effect and decreasing the cerebral metabolic rate. It acts nonspecifically on lipid membranes and partially in the inhibitory transmitter system (Gamma aminobutyric acid - GABA). (11) It is classified as an ultra-short-acting hypnotic sedative agent that causes amnesia and minimal levels of analgesia. (12)

Injection site pain occurs in more than 30% of patients who receive propofol intravenously. Cardiovascular effects include decreased cardiac output, systemic vascular resistance and blood pressure. Respiratory depression and weakening of cardiac muscular contractions can also occur. (13)

Sedation with propofol for colonoscopy has been shown to be superior to other sedation methods because propofol is associated with a low incidence of cardiopulmonary complications and is superior to benzodiazepines with respect to the speed of sedation of induction and recovery. (14)

Propofol sedation by nurses under the direction and supervision of the endoscopist who is performing the endoscopic procedure remains controversial due to safety-related concerns about the use of an anesthetic for sedation. (15) Recently it has been shown that propofol can be an effective and safe agent when used by non-anesthesiologists to achieve an adequate level of sedation, and adequate evidence supports its use by non-anesthesiologists due to the rarity of life-threatening episodes. (16) In the absence of

another person dedicated solely to monitoring the patient and administering medication, administration of sedation by the endoscopist who performs the endoscopic procedure or the nurse who assists is safe and effective. (17) A disadvantage of propofol is its ability to produce rapid changes in neuropsychological function, from conscious sedation to deep sedation, or even narcosis with respiratory depression and apnea. Another disadvantage is that there is no antagonist. (18)

It has been shown that cardiorespiratory complications during colonoscopy may be associated with anesthesia, especially to excessive doses of a drug, inadequate patient monitoring, and/or rapid induction of sedation. (19) A multifaceted specialized training program is needed for individuals who administer propofol. It should include advanced cardiac support and courses designed for this purpose. (20-22) Propofol is one of the medications recommended for sedation grade I and grade II in Colombia. It is recommended by the Colombian Society of Anesthesiology and Resuscitation, the Colombian Association of Gastroenterology and the Colombian Association of Digestive Endoscopy. (23)

CONCLUSION

The use of propofol by non-anesthesiologists can be considered safe for ASA I and ASA II patients as long as the protocols established for this purpose are followed, the person administering the propofol has basic knowledge of the drug and possible complications, and the necessary resources for any untoward eventuality are on hand.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Funding Source

The authors received no financial support for this study.

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