Endoscopist-administered propofol: A retrospective safety study

John WI Morse MD FRCPC1,2, Sharyle A Fowler MD3, Amy L Morse MD3

ORIGINAL ARTICLE

Propofol administré par l’endoscopiste : Étude rétrospective d’innocuité

HISTORIQUE : Le propofol est un anesthésique couramment utilisé pour la sédation consciente. Il a des avantages à titre de sédatif lors d’interventions endoscopiques, notamment un début d’action rapide, une demi-vie brève et un temps de récupération rapide. Par contre, les risques associés à la dépression respiratoire et à l’hypotension, le risque de perforation associé à la sédation profonde et la nécessité d’une surveillance anesthésique peuvent poser problème. Le propofol est utilisé sous la supervision de l’endoscopiste au Stanton Territorial Hospital de Yellowknife, dans les Territoires du Nord-Ouest, depuis 1996 (environ 7 000 cas).


RÉSULTATS : La tension artérielle systolique (TAS) de départ moyenne (± É.-T.) était de 122,8 ± 17,0 mm Hg. La TAS moyenne la plus basse était de 101,7 ± 14,5 mm Hg. La baisse moyenne absolue de la TAS a été de 21,1 ± 16,7 mm Hg avec une baisse moyenne en pourcentage de 16,3 % ± 11,7 %. Quatre-vingt-huit patients (12,9 %) ont présenté une hypotension transitoire (TAS inférieure à 90 mm Hg). Chez tous les patients, la tension artérielle est spontanément revenue à la normale lorsqu’elle a été revérifiée. Aucun patient n’a eu besoin de réanimation liquidienne. La saturation moyenne en oxygène était de 96,4 % ± 2,1 %. Un patient (0,1 %) a présenté une désaturation transitoire (O2 saturation 89 %), mais a été réanimate après un ressaut. Aucune intervention n’a dû être interrompue pour la sécurité du patient. On n’a noté aucune complication majeure, ni perforation ni décès. Une seule lacération muqueuse est survenue lors d’une colonoscopie (0,1 %).

CONCLUSION : Le propofol peut être administré de manière sécuritaire dans les hôpitaux régionaux sous la supervision de l’endoscopiste, sans autre soutien ou surveillance.


BACKGROUND: Propofol is an anesthetic agent that is commonly used for conscious sedation. Propofol has advantages as a sedative agent for endoscopic procedures including rapid onset, short half-life and rapid recovery time. However, concerns exist regarding the potential for respiratory depression, hypotension, perforation due to deep sedation and the need for monitoring by an anesthetist. Propofol has been used under endoscopist supervision at the Stanton Territorial Hospital in Yellowknife, Northwest Territories since 1996 (approximately 7000 cases).

METHODS: A retrospective chart review of endoscopic procedures conducted at the Stanton Territorial Hospital between January 1996 and May 2007 was performed. A random sample of 680 procedures was reviewed from a total of 6396 procedures.

RESULTS: The mean (± SD) baseline systolic blood pressure (SBP) was 122.8±17.0 mmHg. The mean lowest SBP was 101.7±14.5 mmHg. The mean absolute drop in SBP was 21.1±16.7 mmHg, with a mean per cent drop of 16.3%±11.7%. Eighty-eight patients (12.9%) developed transient hypotension (SBP lower than 90 mmHg). All patients regained normal blood pressure spontaneously on repeated measurement. No patients required intravenous fluid resuscitation. The mean O2 saturation was 96.4%±2.1%. One patient (0.1%) transiently desaturated (O2 saturation 89%), but recovered spontaneously on repeat measurement with no intervention. No procedures were aborted for patient safety. There were no major complications, including perforation or death. There was one mucosal tear during nontherapeutic colonoscopy (0.1%).

CONCLUSIONS: Propofol can be safely administered in a community hospital setting under endoscopist supervision, with no additional support or monitoring.

Key Words: Anesthesia; Colonoscopy; Endoscopy; Gastroscopy; Propofol; Sedation

Propofol is an anesthetic agent that is commonly used for conscious sedation. It has many characteristics that make it an attractive agent for use in endoscopy including rapid onset, short half-life and rapid recovery time after the procedure. However, a number of questions have been raised concerning potential side effects such as respiratory depression and hypotension, possible perforation due to deep sedation and the need for concomitant monitoring by an anesthetist (1). The US Food and Drug Administration product label states that “[propofol] should be administered only by persons trained in the administration of general anesthesia.” The American Gastroenterological Association Institute Review of Endoscopic Sedation (2) reports that worldwide, the experience with gastroenterologist-directed administration of propofol now

1Division of Internal Medicine, Stanton Territorial Hospital, Yellowknife, Northwest Territories; 2Department of Internal Medicine, University of Alberta, Edmonton, Alberta; 3Department of Internal Medicine, University of Saskatchewan, Saskatoon, Saskatchewan

Correspondence and reprints: Dr John WI Morse, Stanton Medical Centre, 419 Byrne Road, Yellowknife, Northwest Territories X1A 2N1.

Telephone 867-669-3100, fax 867-920-4271, e-mail john_morse@gov.nt.ca

Received for publication March 13, 2008. Accepted April 11, 2008
This experience, as well as our increased understanding of dosing by titrating to moderate sedation, has led many professional associations to support the use of propofol administration by health care professionals other than anesthesiologists. The American Gastroenterological Association, the American College of Gastroenterology and the American Society for Gastrointestinal Endoscopy all support gastroenterologist-directed propofol administration, stating that “with adequate training, physician-supervised nurse administration of propofol can be done safely and effectively” (8). The Canadian Association of Gastroenterology recently published a statement on the use of propofol for sedation that supports the recommendations of the joint American gastroenterology societies (9).

Propofol has been used at the Stanton Territorial Hospital (a community hospital in Yellowknife, Northwest Territories) in approximately 7000 cases between 1996 and 2007. In this setting, propofol was administered by the endoscopist or a trained endoscopy nurse under the supervision of the endoscopist. Propofol was given as an initial bolus of 1 mg/kg to 2 mg/kg. Repeated smaller boluses of 0.5 mg/kg to 1 mg/kg were given to maintain moderate sedation based on patient comfort. The usual interval between boluses was 4 min to 5 min. Two nurses were involved in the procedures— one to administer propofol and monitor the patient, and one to assist with the procedure. All patients received a baseline of 2 L of O2 by nasal prongs. O2 saturation (SpO2) and heart rate were monitored continuously using the Nellcor Puritan Bennett NPB-290 pulse oximeter (Nellcor Puritan Bennett LLC, USA), with a sound alarm set at 85%. Blood pressures were obtained by manual measurement before the procedure, after the procedure and at any time that was clinically indicated (ie, heavy sedation, or change in SpO2 or heart rate). If the patient was hypotensive, or if the clinician thought there was a significant drop in blood pressure from baseline, blood pressure measurements were repeated immediately. No further boluses of propofol were given if patients were hypotensive.

METHODS

A retrospective chart review of endoscopic procedures conducted at the Stanton Territorial Hospital between January 1996 and May 2007 was performed. A random sample of 680 procedures was reviewed, from a total of 6396 procedures. Charts were selected by health records personnel who were blinded to the intention of the study. Every 10th procedure was chosen from a chronological list of procedures performed in both inpatient and outpatient settings. Patients were considered eligible for the present study if they underwent gastroscopy and/or colonoscopy between January 1996 and May 2007, were 18 years of age or older and received only propofol for sedation. Patients were excluded from the study if they required cardiorespiratory support in the intensive care unit, or if an alternate sedation regimen was used (ie, propofol with narcotic and benzodiazepine, or narcotic and benzodiazepine alone).

Data on patient demographics, procedure demographics, propofol dose administered, and sedation and procedural complications were collected from the endoscopy records of each patient.

RESULTS

Patient demographics

Patient demographics are summarized in Table 1. The mean (± SD) age was 43.2±15.7 years. Three hundred fifty-nine patients (53%) were female and 321 (47%) were male. The population was relatively healthy, with low rates of comorbidities and home use of narcotics and benzodiazepines.

Procedures demographics

Procedure demographics are summarized in Table 2. Procedures included 296 gastroscopies (44%), 296 colonoscopies (44%) and 88 combined procedures (12%). Thirty-four cases (5.0%) were included 296 gastroscopies (44%), 296 colonoscopies (44%) and 88 combined procedures (12%).
of an urgent nature. Interventions were performed in 432 patients (63.5%), including biopsy or polyp removal in 400 patients (58.8%), dilation in 27 patients (4.0%), injection or cautery in four patients (0.6%) and variceal banding in one patient (0.1%). The mean duration of each procedure (scope in to scope out) was: gastroscopy 5.2±3.0 min; colonoscopy 12.3±6.1 min; and combined gastroscopy and colonoscopy 14.6±6.2 min. Mean discharge time after the procedure (scope out to discharge from unit) was 44.3±15.5 min.

**Propofol dosing**

Dosing information is summarized in Table 3. The mean dose for each procedure was: gastroscopy 2.2±0.6 mg/kg, colonoscopy 3.0±0.9 mg/kg, and combined gastroscopy and colonoscopy 3.9±1.1 mg/kg.

**Safety data**

Safety data are summarized in Table 4. The mean baseline systolic blood pressure (SBP) was 122.8±17.0 mmHg. The lowest SBP recorded during the procedure was used for statistical analysis. The mean lowest SBP was 101.7±14.5 mmHg. The absolute drop in SBP was 21.1±16.7 mmHg, with a mean per cent drop of 16.3±11.7%. Eighty-eight patients (12.9%) developed transient hypotension (SBP lower than 90 mmHg). All patients regained normal blood pressure spontaneously on repeat measurement. No patients required intravenous fluid resuscitation. The mean SpO₂ was 96.4±2.1%. One patient (0.1%) transiently desaturated (SpO₂ 89%), but recovered spontaneously on repeat measurement. No patients required more than the baseline supplemental O₂ at 2 L/min. No procedures were aborted for patient safety. There were no major complications, including perforation or death. There was one mucosal tear during nontherapeutic colonoscopy (0.1%).

**DISCUSSION**

To our knowledge, the present study is the largest to describe the use of endoscopist-directed administration of propofol for sedation during endoscopy in Canada. The results of the present retrospective safety study indicate that adequately trained endoscopists and nurses who are familiar with the use of propofol can administer propofol safely in an outpatient setting, with no additional support or monitoring.

Concerns exist regarding the potential for respiratory depression and hypotension with the use of propofol. This was not observed in our study. One patient (0.1%) transiently desaturated (SpO₂ 89%) and 88 patients (12.9%) developed transient hypotension (SBP lower than 90 mmHg). All patients recovered spontaneously on repeat measurement, with no interventions. The present study's rate of sedation events is comparable with that quoted in the literature for both sedation with propofol and combination benzodiazepine and narcotic (10).
larger proportion of procedures would be done in an inpatient setting, and potentially in more emergent situations. In our setting, a direct comparison between propofol and a more standard sedation regimen used in Canada, such as a benzodiazepine and/or narcotic combination, was not possible because propofol alone has been used in the majority of endoscopies since 1996. A comparison between these regimens would be interesting to help address any differences in safety, and patient and physician satisfaction. A formal cost-benefit analysis of the use of endoscopist-directed administration of propofol in Canada should also be performed to determine whether the benefits of shorter induction time, more rapid recovery time and potentially faster discharge time outweighs the additional costs of closer monitoring, likely involving an additional nurse whose sole responsibilities are administration of propofol and patient monitoring.

CONCLUSIONS

Propofol can be safely administered in a community hospital setting under endoscopist supervision. Endoscopists and nurses using propofol should obtain additional education and training before using propofol. Additional work is needed to determine the nature and duration of training that is required to ensure that the widespread use of propofol proceeds safely. Based on our experience, we propose that the minimal standard for training should include advanced cardiac life support training and teaching by an endoscopist, anesthetist or intensivist familiar with the use of propofol.

ACKNOWLEDGEMENTS: The authors thank Dr H Ward at the University of Saskatchewan (Saskatoon, Saskatchewan) and the medical records staff at the Stanton Territorial Hospital.

REFERENCES