Introduction

The regimens of benzodiazepines alone or in combination with opioids have been mainly adopted to improve acceptability and tolerability of colonoscopy. Although these substances are relatively highly safe and easy to use, a slow induction of sedation and a relatively long half-life causing a delayed return to the routine have been complained. In particular, a significant proportion of patients are dissatisfied by the suboptimal degree of sedation by these regimens.

To overcome these drawbacks of the conventional sedation regimens, propofol has been used due to its rapid onset and offset of action. And today, nonanesthesiologist administration of propofol (NAAP) for sedation is hot issue in the field of gastroenterology.

The efficacy of balanced propofol sedation

NAAP remains controversial due to the possibility of deep sedation or general anesthesia related adverse events. As a single agent, propofol can be commonly titrated to deep sedation. Whereas balanced propofol sedation (BPS), which combines propofol with small doses of a benzodiazepine and/or an opioid, can be successfully titrated to moderate sedation.\(^1\)

In case of midazolam, the onset of sedative action has been reported to be 1-2.5 minutes and the peak effect occurs 8-12 minutes. And propofol cause unconsciousness within 30 seconds, recovering within 10-20 min after discontinuation. Considering that a diagnostic colonoscopy usually lasts 15-20 minutes, that synergy between propofol and midazolam may increase the depth of sedation through the initial phases of the procedure, diminishing propofol requirements. As a result, balanced propofol sedation can reduce the dosage of propofol, so can reduce the complication by propofol.

A recent meta-analysis showed that balanced propofol sedation didn’t seem to decrease the incidence of adverse events.\(^2\) However, it was not conclusive because of the significant heterogeneity among the enrolled studies.

Comparing with conventional sedation, BPS is able to cause the shorter time for sedation induction and recovery time. The average recovery time after colonoscopy was shorter in patients receiving propofol alone (15.6...
min) or propofol plus a narcotic (14.3 min) than for patients receiving a combination of benzodiazepine and a narcotic (54.9 min). Patient satisfaction with NAAP is equivalent or slightly superior to that with conventional sedation.\(^3\)

**Preparation for balanced propofol sedation**

Because propofol can induce a deep sedation, all endoscopists and endoscopy nurses who handle the drug for sedation should receive appropriate education and practical training. The training includes life support techniques such as BLS (basic life supports) or ACLS, as well as management of the adverse effects of propofol and other sedatives. And pharmacology of the drugs, appropriate selection of sedative drugs for use in endoscopic procedures or according to the patient’s clinical situation, monitoring techniques, and measuring the level of consciousness should be educated.\(^4\)

It is no wonder that careful monitoring is recommended during the sedation. Continuous pulse oximetry and automated noninvasive blood pressure measurement, and continuous electrocardiography (especially in patient with history of cardiac and/or pulmonary disease) from baseline to the recovery period is needed for all patients.

**How to perform balanced propofol sedation**

Before using propofol, it is necessary to know that the drug does not have a pharmacologic antagonist, and it is also contraindicated in patients with a known allergy to soy protein as well as patients contraindicated for sedation itself.

BPS is done as follows: After a single dose of midazolam (0.05 mg/kg; 1 mg if age > 70 or ASA class III-IV) plus meperidine 25 mg (12.5 mg if age > 70 or ASA class III-IV), a starter bolus of 0.5 mg/kg of propofol is administered intravenously. Repeated boluses of 10 to 20 mg of propofol are then administered on-demand with a 30-60 s interval for the entire duration of the procedure. The target level of sedation was moderate sedation based on the ASA levels. Propofol bolus frequency and dose are titrated to the patient response including vital signs and discomfort. The allowed maximum dose is 200 mg.\(^1,5\)

Throughout the procedure, oxygen 2 L/min by nasal cannula is supplied if needed, and the patient is closely monitored at 5-min intervals. Level of sedation should be evaluated according to the Scale for assessing Alertness/Sedation (MOAA/S).

Serious adverse events should be promptly and adequately managed: hypoxia (a reduction in oxygen saturation < 90% for more than 20 s) requiring positive pressure ventilation or laryngeal mask use, hypotension (< 90 mmHg) or bradycardia (< 60 beats/min) requiring medical treatment (i.e., infusion of liquid) other than propofol titration, and the administration of a benzodiazepine antagonist (flumazenil) if needed.

After the procedure, the patient is moved to the recovery room where blood pressure, SpO2 and heart rate should be measured continuously until discharge. Discharge can be possible when blood pressure is within 20% of the initial value, SpO2 > 90%, and the patient is able to drink and walk autonomously.\(^6\)
Conclusions

Endoscopist-directed BPS is safe and effective for colonoscopy under the premise of appropriate patient selection, education and training of endoscopists and nurses, use of an established protocol for drug administration, and careful assessment of a patient’s physiologic and clinical parameters throughout the procedure.

References