Do we use too much propofol for sedation in colonoscopy?

An observational study with SEDLine monitor

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Colonoscopy is a diagnostic and therapeutic endoscopic procedure that causes discomfort and pain. Maintenance of amnesia with sedation is advised during the procedure in order to minimize these complaints, as well as patient anxiety, especially in cancer patients who require multiple procedures. Sedoanalgesia is also performed in order to increase tolerance on the part of the patients who require close attention and careful monitoring in order to avoid the risk of complications. Sedative agents may affect patient satisfaction, safety and ease of procedure, and thus also surgeon satisfaction. Propofol is a well-known sedative drug frequently used during induction and maintenance of anesthesia in adult and pediatric patients and with no analgesic properties. It is preferred during colonoscopy for the maintenance of conscious sedation. Studies have evaluated the effects and efficacy of many drugs, including propofol. Extensive use of propofol sedation has played a key role in enhancing patient acceptance. Patient compliance is also better, thus making extensive screening possible. Additionally, the efficiency of endoscopy units has improved due to rapid and clear-headed recovery, facilitating early discharge. While similar studies have investigated depth of sedation using other monitors, few have objectively measured depth of sedation in patients undergoing colonoscopy using a SEDLine monitor (SedlineInc., San Diego, CA, USA). This study was designed to objectively measure depth of sedation using an EEG-based SEDLine monitor. This monitor is new to Turkey, and this is the first study to date concerning SEDline monitoring in Turkey.

This non-randomized prospective study was performed in the colonoscopy unit in our hospital. Patients undergoing colonoscopy with either propofol-fentanyl based sedation (Group P) or midazolam-fentanyl sedation (Group M) were enrolled. The patient recruitment period was approximately 6 months (2014–2015), during which 108 adults (58 males, 50 females) were studied. An approved signed informed consent form was received from all patients prior to the start of the operation. Patients aged 18-80 years, American Society of Anesthesiologists (ASA) scale I to III, and undergoing colonoscopy for various reasons and receiving sedation during the operation were included. No acute intoxication or chronic alcoholism was present in any patient, and all patients were referred from outpatient clinics. Depth of sedation was monitored using a SEDLine electroencephalograph (Masimo Corp., Irvine, CA, USA)-based monitor that measures and displays patient state index (PSI). PSI is a recognized and validated measure of depth of sedation. PSI scores of 0–25, 25–50, 50–100 are associated with deep general anesthesia, general anesthesia/deep sedation, and mild to moderate sedation, respectively [7, 8]. Patient allocation to groups P or M was not randomized. We prefer to use midazolam-based sedation for comorbid patients, and propofol for others in our routine clinical approach. The use of sedatives is based on various factors, including age (propofol-based sedation is recommended for younger patients) and comorbidity. In this study the anesthesiologist added fentanyl to sedatives for analgesia, and sedative drugs were administered by an experienced specialist. The level of sedation was examined using the Richmond Agitation-Sedation Scale. All the patients were tried to keep at the same level. No other sedatives or analgesic medications were administered. All patients received supplemental oxygen via nasal cannulae. One hundred eight patients were enrolled in this study, 49 receiving propofol-fentanyl (Group P) and 59 patients receiving midazolam-fentanyl (Group M). Mean baseline and recovery PSI values were also similar (60.8±9.9 and 77±10.2) (p<0.0001). Distribution of ASA status was compared using the Mann–Whitney U test, and a statistically significant difference was observed. ASA scores of Group P patients were lower than those of Group M patients (p = 0.02). PSI scores at scope insertion (5th min) were significantly lower in Group P in comparison to Group M (53.9±9.7 vs 69.5±9.8 respectively) [p <0.0001]. Similarly, PSI scores at the end of the procedure, when patients became responsive to verbal commands, were significantly lower in Group P in comparison to Group M (60.8±9.9 vs 77±10.2 respectively) [p<0.0001].

Comparison of depth of sedation using SEDline monitoring between the groups in terms of sedation protocols			
	Group P (n=49)	Group M (n=59)	p value
5th min PSI n (%)			<0.0001*
0-25	2 (4.1%)	0 (0%)	
25-50	16 (32.7%)	3 (5.1%)	
50-75	29 (59.2%)	26 (44.1%)	
75-100	2 (4.1%)	30 (50.8%)	
5th min PSI (mean±SD)	53.9±9.7	69.5±9.8	<0.0001*
Post recovery PSI (mean±SD)	60.8±9.9	77±10.2	<0.0001*
Group P, patients who received the propofol-fentanyl protocol; Group M, patients who received the midazolam-fentanyl protocol; *, statistically significant; SD, standard deviation; PSI, Patient state index			

Patients in Group P spent significantly longer at PSI values associated with general anesthesia/deep sedation (PSI scores of 0–50) in comparison to Group M [p<0.0001] (Table 2). Similarly, the Chi square test with Yates correction revealed a significant difference in the number of patients achieving PSI values below 25, an indicator of deep general anesthesia [2 in Group P vs 0 in Group M [p<0.0001] (Table 2). Patients in Group M, who had more comorbidity, had more stable PSI values. Their sedation levels were also closer to normal values. Patients were taken to the recovery room after achieving hemodynamic stability and verbal responsiveness. The use of clinical signs for sedation in this study showed that propofol was used considerably in excess of requirements. In the literature, midazolam has been associated with delayed discharge and decreased patient satisfaction. Propofol provides better patient satisfaction, although overdose is more common. It is possible that titration of propofol using a processed-EEG monitor, such as the SEDLine monitor, can improve sedation procedures by reducing the time spent in states of deep sedation/general anesthesia while maintaining the clinical advantages of propofol. EEG-based monitoring can result in more objective, uncomplicated and tolerable sedation. Lighter titrations of sedative drugs may also result in improved patient care, such as lowering the risks of aspiration and hypotension, reducing delayed discharge.