

Severe cardiorespiratory complications derived from propofol sedation monitored by an endoscopist

Sergio Maestro-Antolín, Bruno Moreira-Da-Silva, Fernando Santos-Santamarta, Arancha Germade, Laura Pérez-Citores, Ana Santamaría, Rosa Eva Madrigal, Esther Saracibar, Javier Barcenilla-Laguna, Francisco Igea-Arisqueta and Antonio Germán Pérez-Millán

Department of Digestive Diseases. CAUPA. Hospital Río Carrión. Palencia, Spain

Received: 06/10/2017 · **Accepted:** 12/03/2018

Correspondence: Sergio Maestro-Antolín. Department of Digestive Diseases. CAUPA. Hospital Río Carrión. Av. Donantes de Sangre, s/n. 34005 Palencia, Spain. **e-mail:** sergipalen@hotmail.com

ABSTRACT

Introduction: deep sedation with propofol monitored by an endoscopist in different endoscopy units is a controversial subject and the source of conflicts of interest between the various scientific societies of Anesthesiology and Gastroenterology. Many studies have already demonstrated the efficacy, efficiency and low incidence of complications associated with sedation when under the control of a trained endoscopist vs an anesthesiologist.

Material and methods: the rate of severe cardiorespiratory complications during various endoscopic examinations (gastroscopy, colonoscopy, endoscopic retrograde cholangiopancreatography [ERCP] and endoscopic ultrasound [EUS]) where sedation was controlled by an endoscopist within our unit, from 2011 to 2016, was reviewed.

Results: during the study period, 33,195 examinations were analyzed. The rate of cardiorespiratory complications was 0.13% and the majority were severe desaturations. Most cases responded to an opening in the airway associated with the interruption of drug infusion and an ambu bag was required in a few cases. There were no statistically significant differences between the different groups, except for mean age, risk by type of examination and ASA risk, where the difference between ERCP and the rest of examinations was statistically significant.

Conclusion: there is a high level of evidence in the scientific literature suggesting that sedation controlled by a trained endoscopist is safe, effective and efficient. However, further prospective studies are required in order to confirm this conclusion due to the fact that the majority of studies to date are retrospective.

Key words: Propofol. Endoscopy. Complication. Safety.

INTRODUCTION

Deep sedation with propofol monitored by an endoscopist in different endoscopy units is a controversial subject and

the source of conflicts of interest between the various scientific societies of Anesthesiology and Gastroenterology. Safety has been evaluated and confirmed in many previously published scientific studies. A 2013 meta-analysis (1) concluded that endoscopy sedation with propofol by the endoscopist is safe and there was no difference with regard to cardiorespiratory complications compared with sedation by anesthesiologists. In 2016, a registry study from the United States concluded that endoscopy sedation by an endoscopist is safer, with a lower number of adverse effects than that by anesthesiologists (2). Complex endoscopic examinations may be more conflictive, such as the case of endoscopic ultrasound (EUS) or endoscopic retrograde cholangiopancreatography (ERCP). However, many recent Spanish studies support the use of propofol by an endoscopist due to its safety and low rate of adverse effects compared with traditional sedation (3-5).

METHODS

Sources of information

The objective of the study was to assess the rate of cardiorespiratory complications during different endoscopic techniques with propofol sedation monitored by an endoscopist, between 2011 and 2016. A retrospective study was performed using data obtained from our computerized database. All endoscopies are recorded and coded by diagnosis. Once the examination is complete, the endoscopist enters into the database identifying the propofol dose required in order to obtain deep sedation of the patient. Deep sedation was achieved in all examinations except for

Maestro-Antolín S, Moreira-Da-Silva B, Santos-Santamarta F, Germade A, Pérez-Citores L, Santamaría A, Madrigal RE, Saracibar E, Barcenilla-Laguna J, Igea-Arisqueta F, Pérez-Millán AG. Severe cardiorespiratory complications derived from propofol sedation monitored by an endoscopist. *Rev Esp Enferm Dig* 2018;110(4):237-239.

DOI: 10.17235/reed.2018.5282/2017

endoscopy procedures, both diagnostic and therapeutic, where the patient did not wish to be sedated. Propofol infusion was performed via an intravenous bolus (20 mg every 30 seconds) for diagnostic gastroscopies, whereas sedation was performed via a pump-controlled perfusion for therapeutic gastroscopies, colonoscopies, EUS and ERCP. The Alaris® perfusion pumps by CareFusion were used in the study. The mean dose of propofol used in gastroscopies was 95 ± 15 mg, 195 ± 45 mg for colonoscopies, 257 ± 32 mg for EUS and 355 ± 50 mg for CRPE. Finally, the endoscopist and the nurse verified all sedation-derived complications in the database. Prior to the examination, the nursing staff interviewed the patient in order to determine their ASA risk and to define any cardiorespiratory comorbidities before the test.

Statistical analysis

The SPSS software was used to perform the statistical analysis and $p < 0.01$ was set as statistical significance.

RESULTS

During the study period, 33,195 examinations in 29,524 patients (16,584 colonoscopies, 12,964 gastroscopies, 2,194 endoscopic ultrasounds and 1,453 ERCPs) were analyzed. The demographic characteristics are summarized in table 1.

Forty-three cardiorespiratory complications (0.13%) were observed and the majority were severe desaturations, which amounted to 39 complications (0.12%). Severe desaturation is defined as the presence of oxygen saturation in the arterial blood at $< 88\%$. Of these complications, 25 (64%) responded to a combined maneuver of opening the airway and interrupting the drug infusion, and an ambu bag was required on 12 occasions (30%).

This included five colonoscopies (0.04%), five gastroscopies (0.1%) and five ERCP procedures (0.4%). Orotracheal intubation by the Intensive Medicine Department was only required in two cases (6%), one ASA IV case with amyotrophic lateral sclerosis who underwent a gastroscopy for hematemesis and another case who suffered bronchoaspiration during a colonoscopy performed due to rectal bleeding.

In the sub-analysis by type of examination, there were three complications during colonoscopy (0.08% and 0 deaths), six complications during gastroscopy (0.15% and one death of a 92-year-old patient in the endoscopy room due to bronchoaspiration secondary to hematemesis caused by esophageal varices), 12 complications during EUS (0.23% and no deaths), and 22 complications during ERCP (0.41% and no deaths). Statistically significant differences ($p < 0.01$) were only found in the ERCP group. The associated diseases according to the type of examination are summarized as a percentage in table 2.

DISCUSSION

Due to the aforementioned reasons and currently available data, we believe that the ability of an endoscopist to be in charge of deep sedation during endoscopy is unquestionable. This is due to the low risk of cardiorespiratory complications derived from the procedure. An adequate training of health professionals in the deep sedation area is required. However, prospective studies should be conducted in order to confirm these claims as our study had a limitation due to the retrospective nature.

Even though the economic impact was not the objective of our study, we should not dismiss this aspect. Many studies have demonstrated the increase in healthcare costs due to the presence of an anesthetist in the endoscopy room, even

Table 1. Demographic characteristics

Type of examination	Age (years)	Gender % (M/F)	ASA III-IV
Gastroscopy	61.91 ± 17.65 (n.s. p)	48.5/51.5% (n.s. p)	4.9% (n.s. p)
Colonoscopy	63.95 ± 15.50 (n.s. p)	55.1/44.9% (n.s. p)	5.4% (n.s. p)
EUS	65.48 ± 14.44 (n.s. p)	54.3/45.7% (n.s. p)	6.3% (n.s. p)
ERCP	75.39 ± 14.74 ($p < 0.01$)	43.8/56.2% (n.s. p)	12% ($p < 0.01$)

EUS: endoscopic ultrasound; ERCP: endoscopic retrograde cholangiopancreatography; n.s.: non-significant.

Table 2. Associated diseases according to the type of examination

Type of examination	COPD (%)	OSAS (%)	Cardiopathy (%)
Gastroscopies	25.5	18.3	27.1
Colonoscopies	24.4	18.2	26.7
EUS	22.9	24.3	29.8
ERCP	28.6	26.6	32.4
p value	n.s.	n.s.	n.s.

COPD: chronic obstructive pulmonary disease; OSAS: obstructive sleep apnea syndrome; EUS: endoscopic ultrasound; ERCP: endoscopic retrograde cholangiopancreatography; n.s.: non-significant.

though this does not result in a clear benefit in terms of safety or efficacy (6-8). This is important due to the current economic crisis within the health sector.

However, we should take one step further. Even though, as we have shown in complex and/or prolonged endoscopies such as ERCP, the number of complications may be higher than that observed in other endoscopic techniques, the rate of overall complications associated with sedation monitored by endoscopists is similar or lower compared with the previously published studies of conventional sedation (9). The high rate of complications associated with this procedure may be explained by the more advanced age of this population.

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