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Case Report

Debate of Using Propofol Safely If Given by Non- Anesthesia Providers?

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Abstract

Statement of the Problem: Evidence is accumulating that Non-Anesthesiologist-Administered Propofol (NAAP) sedation has a safety and efficacy profile comparable or superior to that provided by benzodiazepines with or without opioids. The guidelines currently available emphasize the importance of appropriate patient selection, staff training, monitoring, and low-dose sedation protocols for use safety.

Methodology & Theoretical Orientation: Give Propofol with Initial Bolus: 1.5 2.5 mg/kg, patient will be apneic within 30 90 seconds the infusion at rate of 80-120 µg/kg/min.

Conclusion & Significance: It is unlikely that the use of Propofol by non-anesthesia professionals will cease. In many ways, Propofol may be as safe as medications that are more traditional. Monitoring must be standardized and adequate. Given their training, experience, and everyday environment, anesthesiologists should be at the forefront to determine protocols, initiate training, perform or oversee competency reviews, and set up quality assurance programs

Keywords: Conscious Sedation; Emergency Department; Emergency Service; Fentanyl; Infusions; Intravenous Anesthetic; Non-Anesthesiologist Administered Propofol (NAAP); Non-Barbiturate; Propofol (Diprivan); Sedation; Total Intravenous Anesthesia

Introduction

Propofol (Diprivan) was first prepared in early 1970s in the UK by Imperial Chemical Industries as ICI 35868 [1,2]. Clinical trials followed in 1977, first by Kay and Rolly, using a form solubilized in cremophor EL confirmed the potential of Propofol as an anesthetic to induce anesthesia. The emulsified formulation was re- launched in 1986 by ICI (now AstraZeneca) under the brand name Diprivan (abbreviated version of di-isopropyl IV anesthetic). Then used as sedative-hypnotic in U.S.A in 1989. Few can argue that Propofol is superior to conventional sedative regimens (combination of a benzodiazepine with an opiate) for sedation in endoscopy. The dispute is not whether to use Propofol, but who can administer it. Propofol (2,6 diisopropofol) is a sedative that combines the unique properties of rapid onset of action (30-45 seconds) and short duration of effect (4-8 minutes), making it an ideal agent for relatively short outpatient procedures such as upper endoscopy and colonoscopy [3,4]. It is Non-barbiturate short acting intravenous anesthetic agent, alkyl phenol (Figure 1) [4].

Organic Chemistry

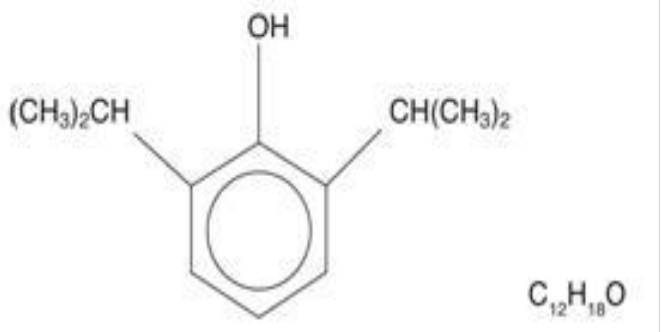

Figure 1: 2,6 Di-Isopropyl Phenol, The Color of Solution Is Milky White and is Available in 1% and 2% Concentration.

The formulation also contains soybean oil, Egg, Lecithin & glycerol. So, injection is painful. The Propofol injectable emulsion is isotonic and has a pH of 4.5-6.4 It is preservative free so should be used within 6hrs after opening the vial because there have been death reports following the use of contaminated solution of Propofol (as egg lecithin is a good media for bacterial growth). Propofol should not be mixed with other therapeutic agents prior to administration. If lidocaine is to be administered to minimize

pain on injection of Propofol, it is recommended that it be administered prior to Propofol administration or added to Propofol immediately before administration and in quantities not exceeding 20 mg lidocaine/200 mg Propofol [4,5]. All formulations are stable at room temperature and are not light sensitive. Store below 250°C, do not freeze. The pharmacokinetics of propofol follows a three-compartment linear model, including the plasma, rapidly, and slowly equilibrating tissues. Initially, there is rapid equilibration of propofol levels between plasma and highly perfused tissue of the brain, accounting for the rapid onset of anesthesia. Subsequent redistribution from the brain into other slowly equilibrating tissues terminates the anesthetic effects of propofol. Propofol is mainly eliminated by hepatic conjugation to inactive glucuronide metabolites, which are excreted by the kidney (Figure 2) [6,7].

Pharmacodynamics

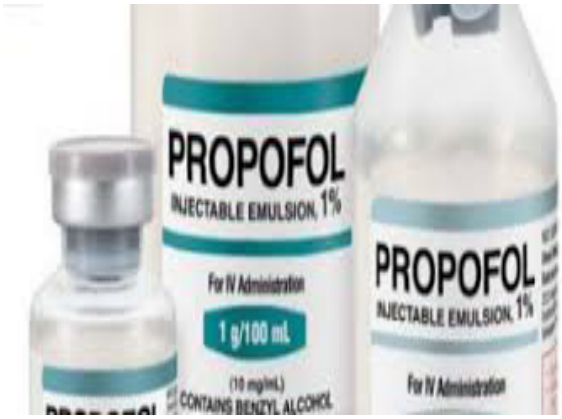

Figure 2: Exact mechanism of action of propofol is still not clear, but noted to have many pharmacological effects.

Propofol Directly Activates γ-Aminobutyric Acid (GABA) receptors, which specifically interact with the β subunits, resulting in endocytosis at the GABA receptor by decreasing association with adaptin complexes AP2 [8,9].

It is Ultra short-acting anesthetic; depress the Central Nervous System (CNS) to produce hypnosis and anesthesia without analgesia. Propofol increases dopamine concentration in the nucleus acumens (phenomenon associated with drug abuse and pleasure-seeking behavior) resulting in a sense of wellbeing in a patient. Onset of hypnosis starts within 90 to 100 seconds for 5 to 10 minutes [10].

Indications

Induction of Anesthesia

- It is the most commonly used IV induction agent
- Dose: 1- 2.5mg/kg IV dose reduced with increasing age

Maintenance of Anesthesia

- A bolus of 10- 40 mg repeated every few minutes or.
- Continuous infusion with rate of 50- 150 µg/kg/min IV combined with N_2O or opiate.
- Preferred anesthetic drug for TIVA (Total Intravenous Anesthesia) technique in conjugation with short acting opioids 6,15.

Sedation

- For short surgical procedure or ICU sedation/ conscious sedation.
- Dose of 25-75µg/kg/min IV.
- Preferred drug in Day care surgery sedation.

Anticonvulsant Activity

- It has anti-epileptic activity due to GABA mediated pre- and post- synaptic inhibition of chloride ion channels.
- Dose more than 1mg/kg body weight decreases seizure duration.

Adverse Effects

- Apnea is more profound and longer.
- Hypotension is more severe.
- Injection is painful.
- Solution is less stable (6 hours)
- Chances of sepsis with contaminated solution is high.
- Myoclonic activity.
- Expensive than thiopentone.
- Allergic reactions in individuals who are allergic to egg lecithin.
- Propofol infusion syndrome: It is very rare but is a lethal complication, usually seen if infusion is continued for more than 48 hours & more common in children.
- The first respiratory disturbance after a bolus dose of Propofol is a profound fall in tidal volume leading to apnea in many patients [7,8].

Discussion & Results

Evaluation of the data on Propofol use by non-anesthesia providers is complex because of several factors, the foremost of which is the lack of adequately powered studies that statistically support the conclusions made. In addition, a direct comparison among the different specialties cannot be made. Procedural needs, patient presentation, and defined endpoints are quite different for each specialty. Gastroenterology has evolved from simple procedures such as colonoscopy and diagnostic EGD that require only moderate sedation, to more invasive and stimulating ones such as ERCP and EUS (Figure 3) [8,9].

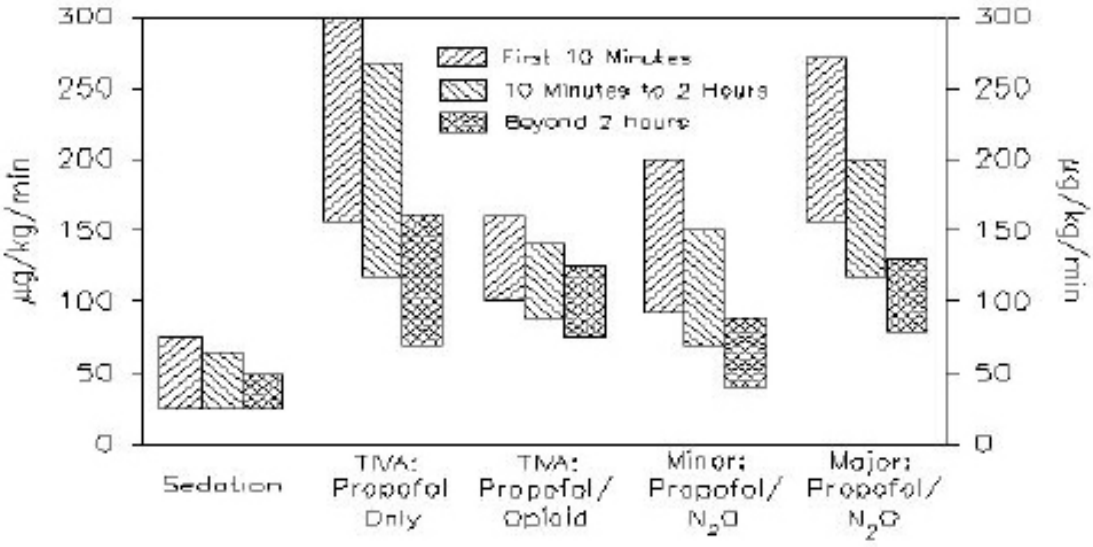

Figure 3: Research study is a prospective, randomized clinical trial** case study.

The traditional approach has been to combine a benzodiazepine with or without an opioid, and this is the combination against which Propofol-based sedation protocols with or without adjuvants are compared. Similarly, physicians in the specialty of emergency medicine are often faced with the need for deep sedation and analgesia to perform short, painful procedures such as the reduction of a dislocated joint or closed fracture. The specialty of radiology has supported the development of Pediatric Sedation Units (PSUs) primarily for radiologic procedures. The sedation teams are supervised at times at a distance by pediatric intensivists or emergency department physicians [10,11].

Because these cases can require hours of sedation, Propofol is one of several options used. Finally, dentistry has long been associated with painful procedures. Although local infiltration or nerve blocks remain the techniques of choice, patients may receive supplemental sedation to accompany the procedure, especially at the time of the nerve block or local infiltration. Current studies report sedation being maintained throughout the entire procedure at a more responsive level [12].

Although Propofol is undoubtedly an attractive sedative for endoscopic procedures, there continues to be debate regarding its safe use by non- anesthesiologists. It is clear that when Propofol is administered by an experienced professional, the rate of sedation-related adverse events is low. Newer technologies such as computer-assisted personalized sedation are likely to standardize the use of Propofol by non-anesthesiologists in endoscopy [13-15]. Propofol use by non-anesthesiologists is likely to become more common because of increased demand by both patients and physicians and the increased number of procedures being performed outside the operating theater. [15,16]. Propofol is increasingly being used for sedation purposes during Endoscopic Retrograde Cholangiopancreatography (ERCP). This study aimed to evaluate the safety of Non-Anesthesiologist Administration of Propofol (NAAP) during therapeutic ERCP [16,17].

Conclusion

The use of Propofol by non-anesthesia professionals may not stop. Generally, Propofol may be as safe as or safer than other traditional medications. However, education of non-anesthesia professionals who are responsible for the patient, is needed to improve patient safety. Considering risks for non-fasted patients and providing the training to avoid and rescue from deep levels of sedation are essential. Monitoring must be standard and adequate. All specialties using sedation should agree on a consistent set of definitions of sedation depth. The sedation related adverse events in patients administered propofol by non-anesthesiologists are extremely low. We cannot compare such outcomes with anesthesia providers, as similar studies are not available. Anesthesia professionals need to be prepared to address the use of such potent drugs by non-anesthesia professionals in a more proactive manner [14]. The American Society of Anesthesiologists (ASA) has started to establish the necessary documentation to address future events.

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