Original Research Article

Effectiveness of Dexmedetomidine as an Adjunct Agent to Propofol During ERCP

Mohsin Wazir[1], Faizani Asrar Nazki[2*],Shashidhar Matam[3]

[1]Senior Resident, Department of Anaesthesiology and critical care SKIMS Soura, J & K,India

[2]Department of Biochemistry Government Medical College Srinagar, J and K,India

[3]Consultant , Yashoda Hospital Malakpet, Hyderabad, Telangana,India

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Abstract

Objectives: To evaluate dexmedetomidine as an adjunct drug to propofol during ERCP, and its effects on hemodynamics.**Methods:** 80 patients ASA (I-II) scheduled for ERCP procedure were randomly classified to either dexmedetomidine/propofol group or propofol group. In Dexmedetomidine /Propofol group, induction was done using dexmedetomidine (0.5 µg/kg), propofol (50 mg), fentanyl 1µg/kg plus atracurium 0.5mg/kg followed by endotracial intubation. Maintainence of anaesthesia was done using infusion of dexmedetomidine(0.4 µg/kg/h) and propofol (0.5-1 mg/kg/h). In Propofol group, induction was done using propofol (50 mg), fentanyl 1 µg/kg followed by atracurium 0.5mg/kg followed by endotracial intubation. Maintaince of anesthesia was done using propofol infusion (0.5-1 mg/kg/h). HR, SBP, DBP, RR, SPO2 and ETCO2 were continuously monitored and recorded at the time points (T0 to T8).**Results:** Comparing dexmedetomidine/propofol group versus propofol group; PI values showed significant increase at T2 to T7 ($p<0.001$), HR values showed significant decrease at T1 to T8 (p 0.013 at T1 and 0.001 at T2 to T8). In dexmedetomidine/propofol group, the propofol dosage was significantly lower (p value 0.001) and the recovery time was significantly higher (p value 0.001) than that of propofol group, while the procedure time was comparable between both groups. Dexmedetomidine/propofol group showed higher incidence of bradycardia than propofol group (p value 0.035) while propofol group showed more cases with tachycardia (p value 0.016) and more cases with airway obstruction (p value 0.026). **Conclusion:**Dexmedetomidine is a useful adjunct drug during ERCP procedure.

Keywords: Dexmedetomidine; Sedation; Perfusion index; ERCP

Introduction

Endoscopic retrograde cholangiopancreatography (ERCP) is a procedure that combines endoscopy and fluoroscopy to identify and treat biliary and pancreatic ductal system disorders. Gallstones, inflammatory strictures (scars), leaks (after trauma and surgery), and cancer are among the problems that ERCP is used to diagnose and treat in the bile ducts and major pancreatic duct[1].Because anxiety and discomfort have been documented to be among the causes causing post-ERCP problems, ERCP is a difficult and painful treatment that requires proper sedation and analgesics. The elderly are the most common patients scheduled for ERCP operations, as biliary problems are more common in this age range, and they may also be suffering from comorbid conditions, adding to the procedure's hazards[1,2].So cautious choice of a sedative agent, as well as monitoring of its hemodynamic effects are required. During ERCP operations, propofol is the most usually utilised sedative. It's a strong hypnotic with a quick onset of effect and recovery. It has a dose-dependent cardiac impact, which, together with respiratory depression and inadequate analgesia, are the most common side effects[3]. As a result, adding an adjunct medication may result in a lower propofol dose and, as a result, fewer adverse effects while boosting analgesia.

Dexmedetomidine is a sedative and analgesic agonist with a high selectivity for the -2 adrenergic receptor. It promotes sympatholysis and maintains hemodynamic balance. It doesn't have any respiratory depression. As a result, it is regarded as a safe alternative sedative as well as a valuable adjunct drug in a variety of clinical settings[4]. Dexmedetomidine was tested as a single agent during ERCP operations in a recent study. Dexmedetomidine was shown to be less effective than propofol for sedation during ERCP5. As a result, we designed this trial to see if it may be used as an alternative to propofol for sedation during ERCP operations. Its effects on peripheral perfusion, as well as other hemodynamic, respiratory, and deleterious consequences, were explored.

**Correspondence*

Dr.Faizani Asrar Nazki

Demonstrator, Department of Biochemistry Government Medical College Srinagar, J&k, India.

E-mail: Faizanan@gmail.com

Methods

From July to November 2017, the current study was carried out in the Department of Anaesthesiology and Critical Care at Yashoda Hospital, Hyderabad, Telangana. After receiving approval from the research and ethics committees, as well as the patients' informed consent. This prospective study comprised 80 ASA I-II patients who were scheduled for an ERCP treatment. Patients having an ASA class greater than II, as well as those with a compromised airway, hemodynamic instability, gastrointestinal reflux illness, or a history of an adverse reaction to scheduled drugs, were excluded. Pregnant ladies and emergency situations (such as Cholangitis or haemorrhage) were also excluded.Patients were randomly assigned to one of two groups: dexmedetomidine/propofol (DP) group (n=40) or propofol (P) group (n=40) using a computer-generated randomization code. Each patient in both groups had two IV lines, one for propofol and the other for Dex (in the propofol/Dex group) or Saline (placebo in the propofol group) to achieve blindness. In the propofol line, propofol boluses were administered. The patient and the data collector were both blinded in the trial, but the anaesthetist was not. Patients were placed in the prone position and monitored with ECG, NIBP, pulse oximetry, and ETCO2 with no pre-medications. All of

the patients were able to breathe on their own and were given supplemental oxygen (2 L/min) through a nasal catheter. Sedation was induced in the (DP) group with 0.7/kg dexmedetomidine (percedex; Hospira, Inc., Lake Forest, IL 60045 US) infused over 10 minutes and a 50 mg bolus dose of propofol (B. Braun Melsungen AG 34209 Melsungen, Germany) to achieve a Modified Observer's Assessment of Alertness and Sedation scale (MOAA/S)6 equal 1 or Sedation was induced in the (P) group with a 50 mg bolus dose of propofol to obtain a MOAA/S of 1 or 2, followed by a propofol infusion of 0.5-1 mg/kg/h. If any discomfort, agitation, or unexpected movement occurred in either group of patients, an incremental bolus of propofol (10-20mg) was given.

Statistical analysis

Continuous variables were represented by mean and standard deviation, whereas categorical variables were represented by number and/or percentage of total. The difference between the two groups was tested using the t-test. Gender, ASA Class, ERCP indications, and side effect incidence were examined using the chi-square test or Fisher's exact test, as appropriate. All analyses were performed using SPSS software version 20 and a p value of 0.05 was considered statistically significant.

Results

Table 1 shows that there were no significant changes in demographic data, ASA classification, or ERCP indications. With a p value of 0.001, the propofol dosage in the dexmedetomidine/propofol group was considerably lower than in the propofol group. In addition, the dexmedetomidine/propofol group had a significantly longer recovery time than the propofol group, with a p value of 0.001, though the procedure time was comparable in both groups (Table 2).

Table 1: Age, weight, gender, propofol dosage, ASA class and indications for ERCP

Parameters	Dexmedetomidine/ propofol(n=40)	Propofol (n=40)	P value
Age (years) mean ± SD	52.12 ± 9.49	56.20 ± 10.75	0.33
Weight (kg) mean ± SD	81.76 ± 8.23	79.51 ± 8.90	0.063
Gender (M/F)	22/18	23/17	0.61
Propofol dosage (mg/kg/h) mean ± SD	6.87 ± 1.51	9.23 ± 1.35	0.001
ASA Class (%) I II III	 17(42.5) 16(40) 7(17.5)	 18(45) 16(40) 6(15)	0.91
Indications for ERCP Calcular Malignant biliary stricture Benign biliary stricture Pancreatic Others	 14(35) 13(32.5) 5(12.5) 4(10) 4(10)	 16(40) 12(30) 4(10) 4(10) 4(10)	0.99

Table 2: The times of procedure and recovery

Parameters	Dexmedetomidine/ propofol (n=40)	Propofol (n=40)	P value
Procedure time (min)	36.75 ± 8.09	39.73 ± 8.19	0.054
Recovery time (min)	20.28 ± 4.12	12.12 ± 5.11	0.001

Table 3: Adverse effects between dexmedetomidine/propofol group and propofol group

Parameters	Dexmedetomidine/ propofol (n=40)	Propofol (n=40)	P value
Hypotension	4(10)	6(15)	0.326
Hypertension	4(10)	6(15)	0.503
Bradycardia	4(10)	0	0.035
Tachycardia	2(5)	8(20)	0.016
Arrhythmia	0	1(2.5)	0.327
Oxygen desaturation	1(2.5)	4(10)	0.184
Airway Obstruction	0	6(15)	0.026
Laryngospasm	0	1(2.5)	0.327
Nausea/Vomiting	2(5)	3(7.5)	0.688

Table 3 compares the negative impacts of both groups and shows that there was a significant difference between them. In the occurrence of bradycardia, 4 cases (10%) were reported in the dexmedetomidine/ propofol group, one of which required IV atropine 0.5 mg, compared to no cases in the propofol group (p = 0.035). Also, with a p value of 0.016, tachycardia was reported in 8 cases (20%) in the propofol group against 2 cases (5%) in the dexmedetomidine/propofol group. With a p value of 0.026, there were 6 cases (15%) of airway blockage in the propofol group versus no cases in the dexmedetomidine/propofol group. The airway blockage was minor, and just chin lii or jaw thrust were required. During the maintenance phase, it primarily happened with propofolboluses. There was no discernible difference in the other negative consequences. Hypotension occurred during the procedure in moderate, temporary occurrences that did not necessitate the use of vasoconstrictors.

Discussion

Dexmedetomidine as a solitary agent for conscious sedation during ERCP provided less adequate sedation than propofol, with most patients requiring additional sedatives to attain a tolerable level of sedation. This could be due to the use of dexmedetomidine as a solitary agent at a low dose, similar to what is used in intensive care for sedation and in anaesthesia as an adjunct agent. Despite this, dexmedetomidine patients required less fentanyl and had a longer recovery time during which they were more drowsy than propofol patients[7].In some past research, the use of dexmedetomidine versus propofol for sedation in various circumstances was examined. Another study tested dexmedetomidine and propofol during an

electrophysiological research and found that both drugs produced similar levels of drowsiness. The dexmedetomidine group had significantly higher mean arterial blood pressure values at 5, 15 minutes. The RR values in the dexmedetomidine group were considerably lower than those in the propofol group[8].This could help us understand why different studies had different hemodynamic results. Dexmedetomidine was utilised as a solo agent or as an adjuvant medication because varied doses were used. The propofol group had a faster recovery time[9].In a study of a few healthy volunteers, Hager et al. discovered that the PI could indicate painful stimuli under sevofluraneanaesthesia, as painful stimulation decreased PI significantly, while there was a weak correlation between end tidal sevoflurane concentration and PI, as well as between end tidal sevoflurane concentration and the decrease in PI values during painful stimulation[10]. The addition of dexmedetomidine to propofol for sedation during ERCP operations resulted in lower propofol doses, according to our findings. The findings are in line with the majority of past research. Hemodynamics were less impacted by stressful moments during the surgery when dexmedetomidine was used. This is thought to be especially advantageous for older individuals undergoing ERCP who may be hypertensive or ischemic.When dexmedetomidine was given to propofol, the respiratory problems were reduced. This is a significant benefit during ERCP. Due to either heavy sedation or even light sedation in the presence of secretions and endoscopic manipulations, the treatment may be associated with increased respiratory problems, particularly during endoscopic insertion and during the treatment.

Conclusion

We conclude that utilizing dexmedetomidine as an adjuvant medication to propofol for sedation during ERCP operations resulted in improved sedation, more efficient analgesia, and respiratory safety, all of which are important in this operation.

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