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DEXMEDETOMIDINE PROVIDES OPTIMUM CONDITIONS DURING AWAKE FIBEROPTIC INTUBATION IN CERVICAL SPINE INJURY PATIENTS

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ABSTRACT **Background and Aims:** We undertook this study to assess dexmedetomidine (DEX) for conscious sedation during fiberoptic intubation (FOI) in cervical spine injury. The aim was to assess the efficacy of DEX on arousability and patient's comfort during FOI in CSI patients.

Material and Methods: In this observational study, 50 American Society of Anesthesiologists Grade I-II patients aged between 18 and 65 years scheduled for elective surgery under general anesthesia underwent FOI under conscious sedation with DEX. After locally anesthetizing the airway and applying a cervical collar, patients received DEX 1 µg/kg over 10 min followed by 0.7 µg/kg/h maintenance infusion in normal saline during FOI. Sedation (Ramsay sedation score [RSS]) during FOI was recorded.

Results: The total number of patients succesfuly fibro optically intubated with DEX were 42. In remaining 8 patients additional sedation agents like Midazolam or Propofol were used to perform fibroptic intubation. These 8 cases were excluded from this study. The mean sedation score was sedation (RSS ≥3) . Similarly, patient satisfaction score, heart rate, systolic, diastolic and mean arterial pressure and respiratory parameters were observed during the procedure.

Conclusions: Dexmedetomidine provides optimum sedation without compromising airway or hemodynamic instability and better patient tolerance and satisfaction in 84% for FOI. In 12% of patients additional sedation agents were required to perform FOI.

KEYWORDS : fiberoptic Intubation, Cervical Spine Injury, Dexmedetomidine.

Introduction

Meticulous airway management with maintenance of the cervical spine alignment and provision of continuous immobilization are an integral part of care of the cervical spine injury (CSI) patients. Concern about the possibility of cervical spinal cord injury when extending the head and flexing the neck for direct laryngoscopy and intubation leads many anesthesiologists to prefer fiberoptic intubation (FOI) in patients with CSI.

Fiberoptic intubation is either performed in a completely awake patient without sedation after anesthetizing the airway or under conscious sedation. There are advantages and disadvantages of both approaches. Intubation can provoke anxiety and can lead to discomfort to the patient. With the conscious sedation, the sedation needs to be carefully titrated as it can lead to hypoventilation, whereas inadequate sedation leads to discomfort, anxiety and excessive sympathetic discharge. Various pharmacological methods have been reported to achieve conscious sedation for FOI including fentanyl, midazolam (MDZ), ketamine, propofol, remifentanil, and dexmedetomidine (DEX).

Dexmedetomidine is a highly selective and specific alpha 2 adrenoreceptor agonist and has properties making it suitable for FOI. In addition to hemodynamic stability, anxiolytic and analgesic properties, it results in sedation while maintaining easy arousability. DEX demonstrates minimal respiratory depression even at higher doses and also decreases salivary secretions, which is desirable during FOI.

The aim of this study was to evaluate the safety and efficacy of DEX 1 µg/kg over 10 min followed by 0.7 µg/kg/h infusion in providing optimum conditions for FOI in CSI patients.

Material and Methods

After obtaining Institutional Research and Ethics Committee Approval, written informed consent for this observational trial was obtained from 50 healthy patients between the age groups 18-65 years. Patients belonging to American Society of Anesthesiologists Grade I or II, with Mallampati Grade I or II, scheduled for elective surgery requiring general anesthesia were included in the study conducted during the period from March 2016 to June 2017.

The criteria for exclusion were patients with a history of allergy to DEX, concomitant use of medications, which may exaggerate the heart rate (HR) response of DEX including digoxin or β-adrenergic antagonists, HR <50 beats/min, systolic blood pressure (SBP) <90 mm Hg, pregnancy, nursing women and morbid obesity. Patients on anticoagulants, nasal trauma, deformity or polyp were excluded.

Patients were premedicated with 0.5 mg oral alprazolam and 150 mg ranitidine the night before surgery .All patients received intravenous (IV) DEX (1 µg/kg) over 10 min followed by DEX infusion at the rate of 0.7 µg/kg/h.

In the preoperative area, patient's HR, blood pressure (BP) (SBP, diastolic blood pressure [DBP], mean arterial pressure [MAP]), SpO_2 were recorded, and 20G IV cannula was placed on the dorsum of a hand for drug and continuous fluid administration. Glycopyrrolate 0.2 mg was given intramuscularly 45 min before the surgery. Nasal patency was confirmed, and 2-3 drops of 0.1% xylometazoline were instilled in both the nostrils. Lignocaine up to a maximum dose of 5 mg/kg was used to topicalize the airway of each patient. Based on the total lignocaine dose calculated as per weight of the patient, all patients were nebulized with 4-5 ml of 4% lignocaine through ultrasonic nebulizer. On arrival in the operating room, the patient's baseline HR, BP and oxygen saturation (SpO_2) were recorded. Pledgets soaked in 2% lignocaine with adrenaline were placed in both the nostrils one by one for 10 min and 2-3 puffs of 10% lignocaine was sprayed on oropharynx and base of the tongue. Transtracheal block with 2-3 ml of 2% lignocaine, was given to the patient on the operating table, eliciting a cough without significant cervical motion. Then patient's neck was immobilized with semi rigid cervical collar .

Infusion of DEX (1 µg/kg) over 10 min (loading dose) followed by a continuous infusion (maintenance dose) of DEX (0.7 µg/kg/h. Infusion was prepared by an anesthesia resident .

Ramsay sedation score, was assessed after the loading dose of DEX or normal saline and thereafter every 2 min from the beginning of the maintenance dose till the completion of the fiberoptic intubation procedure. Any patient having RSS <3 was given MDZ as the rescue drug, in the dose of 0.5 mg or Inj.Propofol 10mg intravenously in titrated doses. Those cases which required additional intravenous

sedation were excluded from the study. After confirming suppressed gag reflex and RSS ≥2, fiberoptic bronchoscopy (using Karl Storz, 5 mm adult fiberoptic bronchoscope) was done by an anesthesiologist experienced in bronchoscopy. After visualization of carina, prewarmed loaded endotracheal tube (size 7.5 in females and 8.0 in males) was slid over the bronchoscope. Placement of endotracheal tube was confirmed by recording end tidal carbon dioxide and chest auscultation. Subsequently, general anesthesia was administered as per routine protocol, and scheduled surgery was completed. All the patients were given oxygen through nasal cannula at the rate of 4 L/min throughout the FOI procedure.

Vital signs were recorded at baseline and every 3 min from the start of study drug infusion until completion of FOI. Baseline values of SBP, DBP, SpO_2, HR, respiratory rate (RR) were used to define adverse events requiring study discontinuation and/or therapeutic intervention. Hypotension was defined as SBP <80 mmHg, DBP <50 mmHg, or SBP <30% below baseline. Hypertension was defined as SBP >180 mmHg, DBP >100 mmHg, or a SBP increase to >30% mmHg above baseline. Bradycardia was defined as HR <50 beats/min or a decrease to <30% below baseline. Tachycardia was defined as HR >120 beats/min or increase to >30% above baseline. Respiratory depression was defined as RR <8 breaths/min or a decrease to <25% below baseline. Hypoxia was defined as SpO_2 <90% or a decrease to <10% below baseline saturation.

Hypotension was treated with fluid infusion followed by mephenteramine if there was no response to fluid infusion. Bradycardia was treated with atropine. In case the patient did not tolerate the procedure the cervical collar was removed, study procedure was abandoned and anesthesia was induced as per routine protocol and scheduled surgery was completed. That particular patient was excluded from the study.

Any adverse events or complications during intraoperative period were mentioned separately. Sedation was assessed using RSS.

Results

8 patients from the placebo group were excluded as they required additional midazolam or propofol for targeted sedation (RSS ≥3). In 42 patients(84%) dexmeditomidine in prescribed dose was adequate to perform fibo optic intubation successfully. In 16% of patients additional IV sedation was required.

Discussion

Our study indicates that DEX in the dose of 1 μg/kg over 10 min followed by 0.7 μg/kg/h provides hemodynamic stability, no respiratory depression, arousability and good patient satisfaction for FOI in CSI patients.

Dexmedetomidine, has several unique properties, including sedation, anxiolysis, analgesia, amnesia, hemodynamic stability, antisialagogue effects, a unique respiratory-sparing effect and arousability that make it ideally suited for the management of difficult and critical airways like CSI patients requiring postintubation neurological examination.

Dose of 1 μg/kg bolus over 10 min followed by 0.7 μg/kg/h has been used for procedural sedation including FOI in various studies.

Dexmedetomidine causes a decrease in HR and BP by an inhibition of central sympathetic outflow that overrides the direct effects of DEX on the vasculature. Our hemodynamic results were comparable to those of Bergese *et al*. Bradycardia from DEX may have been mitigated in our study by the use of glycopyrrolate. We did not see a biphasic response of BP with DEX in our patients, which is similar to the findings of Jorden *et al* and Ramsay and Luterman.

Dexmedetomidine causes minimal respiratory impairment and does not decrease arterial oxygen saturation <90 even when given in large doses. Ramsay and Luterman also reported use of high doses of DEX (1-5 μg/kg/h) in three patients and showed that the airway was maintained along with adequate respiratory drive.

Abdelmalak *et al*., have reported a series of successful awake fiberoptic intubations in 5 patients with critical (unstable, difficult) airways using DEX. All of the patients were comfortable during the procedure. Bergese *et al*.concluded that the DEX-MDZ patients had less pain and discomfort and were more satisfied than MDZ only patients.

Finally, a thoroughly anesthetized airway is essential for successful FOI. Although the protocol standardized the topicalization process with lignocaine, there was variability among patients in the quality of local anesthetic block, which might have led to variation in results.

We conclude that DEX in the dose of 1 μg/kg over 10 min followed by 0.7 μg/kg/h, provides optimum conditions with stable hemodynamics for conscious sedation during FOI in 84% of CSI patients .

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Conflicts of interest
There are no conflicts of interest.

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