European Journal of Molecular & Clinical Medicine
ISSN 2515-8260 Volume 09, Issue 04, 2022

Original research paper

Effects of different doses of dexmedetomidine on haemodynamic changes during fibre optics copy

[1]Dr. Dinesh M, [2]Dr. Mahalingappa, [3]Dr. Goolappa M Chikkanargund, [4]Dr. Deepak Dhummansure

[1]Resident, Narayana Hrudayalaya, Bangalore, Karnataka, India
[2]Resident, Rural Development Trust Hospital, Bathalapalli, Ananthapuramu, Andhra Pradesh
[3]Resident, Meenakshi Mission Hospital and Research Centre, Madurai, Tamil Nadu, India
[4]ESIC Medical College and Hospital, Kalaburagi, Karnataka, India

Corresponding Author:
Dr. Deepak Dhummansure

Abstract

Dexmedetomidine hydrochloride is indicated for sedation of initially intubated and mechanically ventilated patients during treatment in an intensive care setting. Dexmedetomidine hydrochloride should be administered by continuous infusion which should not exceed 24 hours. This is an observational prospective clinical study of haemodynamic, ease of intubation and patient comfort of awake fibreoptic intubation under dexmedetomidine sedation in patients posted for elective surgeries under general anaesthesia after obtaining the permission from the Institutional Ethical Committee. During fibreoptic scopy, mean SBP changed from 115.8 mm of hg to 115 mm of hg in group I & 119.4 mm of hg to 113.7 mm of hg in group II. During fibreoptic scopy mean DBP changed from 74.4 mm of hg to 75 mm of hg in group I & 74.5 mm of hg to 74 mm of hg in group II.

Keywords: Dexmedetomidine, haemodynamic changes, fibreopticscopy

Introduction

Dexmedetomidine hydrochloride is supplied as a clear, colourless, isotonic solution with a pH of 4.5 to 7.0. Each ml contains 118 μg of dexmedetomidine hydrochloride equivalent to 100 μg of dexmedetomidine and 9 mg of sodium chloride in water. The solution is preservative free and contains no additives or chemical stabilizers. The molecular weight of dexmedetomidine is 236.7 [1].

Dexmedetomidine undergoes almost complete biotransformation with very little unchanged dexmedetomidine excreted in urine and faeces. Biotransformation involves both direct glucuronidation as well as cytochrome P450 mediated metabolism [2].

Dexmedetomidine is a relatively selective alpha$_2$ adrenergic agonist. It is chemically related to clonidine, but has a much greater affinity for alpha$_2$-receptors over alpha1 receptors (1,620:1 compared to 200:1 for clonidine). Dexmedetomidine has activity at a variety of locations

throughout the central nervous system. The sedative and anxiolytic effects of dexmedetomidine result are primarily from its activity in the locus ceruleus of the brain stem. Stimulation of alpha$_2$-adrenergic receptors at this site reduces central sympathetic output, resulting in increased firing of inhibitory neurons. The presence of dexmedetomidine at alpha$_2$-adrenergic receptors in the dorsal horn of the spinal cord modulates release of substance P and produces its analgesic effects [3].

Dexmedetomidine hydrochloride is indicated for sedation of initially intubated and mechanically ventilated patients during treatment in an intensive care setting. Dexmedetomidine hydrochloride should be administered by continuous infusion which should not exceed 24 hours [4].

Dexmedetomidine hydrochloride has been continuously infused in mechanically ventilated patients prior to extubation, during extubation and post-extubation. It is not necessary to discontinue dexmedetomidine hydrochloride prior to extubation.

Methodology

This is an observational prospective clinical study of haemodynamic, ease of intubation and patient comfort of awake fibreoptic intubation under dexmedetomidine sedation in patients posted for elective surgeries under general anaesthesia after obtaining the permission from the Institutional Ethical Committee.

After obtaining written informed consent, 50 patients were randomly assigned to one of the two groups each containing 25. We recruited 50 consecutive adult patients of ASA physical status I, II and III scheduled to undergo elective surgery for treatment of head and neck cancer. Fibreoptic intubation using conscious sedation was planned for all patients because of difficult intubation arising from the cancer.

Thorough pre-anaesthetic evaluation was carried out and patients were informed about the study and a written informed consent obtained. Investigations included Complete blood count, Renal function test, Liver function test, Blood grouping and Rh typing, Random blood sugar, ECG, ECHO, Coagulation profile and Urine routine.

Group 'I': Received IV. Dexmedetomidine (1μg/kg). **Group 'II':** Received IV. Dexmedetomidine (0.5μg/kg).

Exclusion criteria-patients with Uncontrolled Hypertension, Heart block greater than grade I, Cardiac dysfunction, Severe hepatic and Renal disease.

- Night prior to surgery all patients received Tab. Pantoprazole 40 mg orally. All patients were advised to be nil by mouth after 10:00pm.
- On the day of surgery at 6:00am all patients received Tab. Pantoprazole 40 mg orally 1 hour prior to surgery with sips of water under the supervision of a nursing staff.
- On arrival in the operating room, patient's parameters-heart rate, arterial blood pressure and oxygen saturation using pulse oximetry were recorded at baseline and then every 3 min thereafter. All patients were given oxygen via face mask at 5 litre/min.
- Intravenous access was established and an IV infusion started. Sterile fibreoptic scope with light source and appropriate sized endotracheal tubes were kept ready. 2 drops of nasal mucosal vasoconstrictor (Xylometazoline) were instilled into each nostril as decongestants.
- Patients in the dexmedetomidine group I received a loading dose of dexmedetomidine (1.0μg/kg) infused over 10 min.
- Patient in the dexmedetomidine group II received a loading dose of dexmedetomidine (0.5μg/kg) infused over 10 min.

- The infusion was prepared by an independent nurse who added 100µg (1 ml) of dexmedetomidine to 49 ml of 0.9% saline solution in a 50-ml syringe.
- While waiting for the desired level of sedation to be achieved, topical anaesthesia was applied to the airway. The tongue and hypopharynx were sprayed with lidocaine 10% (60 mg).
- Transtracheal block with 3ml of 2% lidocaine administered.
- Fibreoptic intubation was commenced once the dexmedetomidine infusion was given for ten min. Fibreoptic intubations were done by two qualified and experienced anaesthesiologists.
- After passing through the vocal cords, the fibrescope is advanced until the tracheal rings come into view. The carina is identified and the endotracheal tube is passed into the trachea using fibrescope as a guide. The scope is removed by holding endotracheal tube in place. Vecuronium 0.1mg/kg is given for neuromuscular block. The endotracheal tube is connected to the anaesthesia machine and assisted ventilation done. The endotracheal tube is secured after confirming placement by 5 point auscultation and capnography. Pt is maintained with isoflurane, oxygen and nitrous oxide to maintain 1 MAC.

Results

Table 1: Changes in Heart Rate during fibreopticscopy

HR at	Group I		Group II		'p'
	Mean	SD	Mean	SD	
0 minute	79.6	10.3	76.3	18.8	0.5399
1 minute	81.8	9.0	79.9	13.5	0.5335
2 minutes	82.2	7.8	79.5	13.4	0.2718
3 minutes	79.6	13.2	81.9	15.9	0.6812
4 minutes	82.0	4.2	78.3	8.3	0.999
5 minutes	-	-	75	-	--

*After 5 minutes there were no cases

Inference: No significant changes in Heart Rate between the groups.

Table 2: Changes in Systolic Blood Pressure during fibreopticscopy

SBP at	Group I		Group II		'p'
	Mean	SD	Mean	SD	
0 minutes	115.8	14.7	119.4	20.8	0.9922
1 minute	118.6	14.9	122.6	17.1	0.4837
2 minutes	117.4	10.7	117.7	11.7	0.8381
3 minutes	111.6	12.0	115.9	11.1	0.3378
4 minutes	115.0	7.1	113.7	9.3	0.7659
5 minutes	-	-	112	-	-

*After 5 minutes there were no cases

Inference: No significant changes in Systolic Blood Pressure between the groups.

Table 3: Changes in Diastolic Blood Pressure during fibreopticscopy

DBP at	Group I		Group II		'p'
	Mean	SD	Mean	SD	
0 minute	74.4	14.9	74.5	13.7	0.8687
1 minute	76.5	15.2	78.5	10.8	0.3311
2 minutes	76.6	12.9	77.6	11.6	0.7262
3 minutes	74.5	10.7	75.0	10.1	0.4302
4 minutes	75	9.9	74.6	7.1	0.5549
5 minutes	-	-	74	-	-

*After 5 minutes there were no cases

Inference: No significant changes in Diastolic Blood Pressure between the groups.

Table 4: Changes in Mean Arterial Pressure during fibreopticscopy

MAP at	Group I		Group II		'p'
	Mean	SD	Mean	SD	
0 minute	85.8	13.8	86.5	16.4	0.8607
1 minute	89.4	14.9	89.2	12.8	0.7263
2 minutes	89.6	12.6	88.3	8.9	0.861
3 minutes	88.1	10.2	86.7	9.5	0.970
4 minutes	90	8.5	87.9	7.3	0.763
5 minutes	-	-	85	-	-

*After 5 minutes there were no cases

Inference: No significant changes in Mean Arterial Pressure between the groups.

Table 5: Changes in Saturation during fibreopticscopy

SPO_2 at	Group I		Group II		'p'
	Mean	SD	Mean	SD	
0 minute	99.9	0.3	99.9	0.3	0.6407
1 minute	99.6	0.6	99.9	0.3	0.1394
2 minutes	99.8	0.4	99.8	0.4	0.4839
3 minutes	99.6	0.5	99.4	0.5	0.3865
4 minutes	99.5	0.7	98.4	0.5	0.0777
5 minutes	-	-	99	-	-

*After 5 minutes there were no cases

Inference: No significant changes in Saturation between the groups.

Discussion

In this study, the base line HR was comparable between two groups. There was a gradual decrease in heart rate in both groups during infusion. There was no significant increase in HR after introduction of fibreoptic scope and intubation.

Heart rate-the baseline values mean rates were comparable in both groups group I had 81.5 beats/min & group 2 had 76 beats/min. Mean heart rate during infusion decreased from 79.2

beats/min to 75.5 beats/min in group I while in group II it decreased from 82.8 beats/min to 77.5 beats/min. During fibreoptic scopy the mean rate changed from 79.6 beats/min to 82 beats/min in group I & 76.3 beats/min to 78.3 beats/min in group II. Patients in group II were less comfortable and required propofol, but heart rate in this group was stable when compared to group I.

In this study, mean SBP, DBP and MAP were comparable with respect to the base line, during study drug infusion and fibreoptic scopy.

Systolic blood pressure-the baseline values were comparable in both groups. SBP during infusion decreased from a mean of 122.2 mm of hg to 110.8 mm of hg in group I while in group II it decreased from 125.6 mm of hg to 114.6 mm of hg. During fibreoptic scopy, mean SBP changed from 115.8 mm of hg to 115 mm of hg in group I & 119.4 mm of hg to 113.7 mm of hg in group II. The decrease in SBP in group II could be due to the higher requirement of propofol.

Diastolic blood pressure-the baseline values were comparable in both groups. DBP during infusion decreased from a mean of 75.5 mm of hg to 69.6 mm of hg in group I while in group II it decreased from 81.8 mm of hg to 71.3 mm of hg. During fibreoptic scopy mean DBP changed from 74.4 mm of hg to 75 mm of hg in group I & 74.5 mm of hg to 74 mm of hg in group II.

Mean arterial pressure-the baseline values were comparable in both groups. MAP during infusion changed from a mean of 90.7 mm of hg to 82.1 mm of hg in group I while in group II it changed from 93.6 mm of hg to 84.0 mm of hg. During fibreoptic scopy MAP changed from 85.8 mm of hg to 90 mm of hg in group I & 86.5 mm of hg to 85 mm of hg in group II. In this study, all patients of both groups-maintained oxygen saturation (SPO_2) throughout the procedure ($p > 0.05$).

Andranik Ovassapian, Sharon J. Yelich and Michael H. M. Dykes *et al*. (1983) conducted a study to evaluate the blood pressure and heart rate changes during awake fibreoptic nasotracheal intubation under local anaesthesia. They concluded that flexible fibreoptic endoscopy provides the opportunity for tracheal intubation in awake and sedated patients, producing minimal pressure on stimulation of the oropharyngeal tissues, which thereby limits increases in mean arterial pressure and heart rate [5].

Lee LS and Chau SW *et al*. (1990) studied the usefulness of awake nasotracheal fibreoptic intubation in 30 adult patients of ASA class II-III with difficult airway. The change in blood pressure, heart rate and arterial oxygen saturation of these patients at 4 stages: I) Preanaesthesia II) Transtracheal local block III) During intubation IV) Post-intubation were evaluated. Results showed no significant difference in comparing the parameters among these 4 stages. Additionally, fibreoptic intubation enhanced the successful rate of difficult intubation and minimized further trauma and discomfort to the patient [6].

P. Kundra, S. Kutralam, M. Ravishankar *et al*. (2000) conducted a study to evaluate the efficacy of upper airway anaesthesia produced by nebulised lidocaine against combined regional block for awake fibreoptic nasotracheal intubation. They concluded that both nebulisation of lidocaine and combined regional block produced satisfactory anaesthesia of the upper airway, but combined regional block provided better patient comfort and haemodynamic stability [7].

Lt Col N Sethi, Surg Capt VK Tarneja (Retd) and Brig TP Madhusudanan *et al*. (2005) studied the successful conduct of fibreoptic aided intubation by comparing three different methods of anaesthetizing the airway. The patients received 4 ml of 4% lidocaine either by transtracheal injection (n=20, group A), via intubating fibrescope (Pentax F1-10P2) using ‘spray as you go’ technique (n=20, group B) or by nebulizer (Devilbiss 5610W) before intubation (n=20, group C). Patients were asked to score the procedure using visual analogue scale and severity scores.

Results showed group B patients had better visual analogue scores with shorter intubation time and had a lower incidence of coughing and choking [8].

Conclusion

- During fibreoptic scopy, mean SBP changed from 115.8 mm of hg to 115 mm of hg in group I & 119.4 mm of hg to 113.7 mm of hg in group II.
- During fibreoptic scopy mean DBP changed from 74.4 mm of hg to 75 mm of hg in group I & 74.5 mm of hg to 74 mm of hg in group II.

References

1. Zhang X, He W, Wu X, Zhou X, Huang W, Feng X. TCI remifentanil vs. TCI propofol for awake fiber-optic intubation with limited topical anaesthesia. Int J Clin Pharmacol Ther. 2012 Jan;50(1):10-6.
2. Tsai CJ, *et al*. Dexmedetomidine versus propofol sedation for fibreoptic intubation Anaesthesia. 2010;65:254-259.
3. Hickey S, Cameron AE, Asbury AJ, Murray GD. To measure the timing of the peak cardiovascular response following laryngoscopy and endotracheal intubation. Acta Anesth Scand. 1992 Jan;1(36):21-24.
4. Kudret Dogru, Tugba Arik, *et al*. The effectiveness of intramuscular dexmedetomidine on haemodynamic responses during tracheal intubation and anaesthesia induction of hypertensive patients. Current therapeutic research. 2007 Sep-Oct;68(5):292-302.
5. Ovassapian A, Yelich SJ, Dykes MH, Brunner EE. Blood pressure and heart rate changes during awake fiberoptic nasotracheal intubation. Anesth Analg. 1983;62:951-954.
6. Lee LS, Chau SW. Clinical study of awake fiberoptic nasotracheal intubation for difficult opening mouth patients. Ma Zui Xue Za Zhi. 1990 Sep;28(3):343-9.
7. Kundra P, Kutralam S, Ravishankar M. Local anaesthesia for awake fibreoptic nasotracheal intubation. Acta Anaesthesiol Scand. 2000;44:511-516.
8. Lt Col N Sethi, Surg Capt VK Tarneja, Brig TP Madhusudanan, Sqn Ldr S Shouche. Local Anaesthesia for Fiberoptic Intubation: A Comparison of Three Techniques. MJAFI. 2005;61:22-25.