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Comparison of Dexmedetomidine Infusion with Saline Placebo for Smooth Extubation in Hypertensive Patient for Major Surgery

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Abstract:

Background: *The objective of this study was to compare the effects of intravenous dexmedetomidine and saline placebo on recovery characteristics in hypertensive patients.*

Methods: *In a double blinded trial, forty patients detected to have hypertension were randomly allocated to receive either dexmedetomidine 0.5 µg /kg/h (Group D) (n = 20) or saline placebo (Group N) (n = 20) intravenously. Level of sedation and coughing was evaluated using observer assessment sedation score (OSSA). The time for tracheal extubation and emergence from anaesthesia were recorded.*

Results: *The degree of sedation and airway reflexes and circulatory responses at suction and extubation were analyzed and was found to be better in Group D (P=0.013). Smoothness of extubation assessed as coughing on endotracheal tube was comparable in both the groups (P=0.527). There was highly statistically significant increase in time for tracheal extubation and emergence from anaesthesia in group D (P<0.001).*

Conclusion: *These findings suggest that an infusion of dexmedetomidine in hypertensive patients attenuates airway reflexes during surgery and at extubation, thus provided stable safe and reliable extubation.*

Keywords: ***Dexmedetomidine; hypertension; responses; tracheal; extubation.***

Introduction

Tracheal extubation can be performed in a light plane of anaesthesia. Events such as laryngospasm, aspiration, airway obstruction, or inadequate ventilator drive can result in hypoxia.[1, 2]

Coughing is a significant clinical problem in most patients during emergence from general anaesthesia.[1] Smooth extubation requires the absence of straining, movement, coughing or laryngospasm[1, 3,18]

The objective of this study was to evaluate the effects of dexmedetomidine infusion on smooth extubation in hypertensive patients.

Materials and Methods

In this prospective, randomized, single-blinded study, following ethics committee approval and written informed consent, forty, ASA physical status I–II, adult patients, of both genders, aged between 18 and 65 years, scheduled for elective surgery, were randomly assigned to one of two groups (20 patients in each group). Patients in whom tracheal intubation was suspected to be difficult, those with any pathology of the neck and patients with Mallampatti class 3 or 4 were not studied. Group N (patients receiving normal saline 0.9% infusion), Group D (patients receiving dexmedetomidine infusion 0.5 mcg/kg/h).

To prepare the infusion, dexmedetomidine was withdrawn in a 50 ml syringe and was diluted to the final concentration of 2 mcg/ml. Dexmedetomidine or normal saline infusion was given through syringe infusion pump. Depending on the weight of the patient, the pump was set so as to deliver the targeted infusion rate. Thus, the syringe was same, volume of prepared solution was same, only the rate of injection was different according to the weight and group of patient.

All patients were premedicated with 10 mg diazepam orally.Induction was done using propofol, fentanyl, vecuronium, nitrous oxide – oxygen and sevoflurane. Baseline monitoring was done with electrocardiography, pulse oximetry (SpO_2) and non-invasive blood pressure .Immediately after intubation, specified infusion was started. At the time of skin closure, inhalation agent was cut off.

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Infusion was stopped at the end of surgery. Residual neuromuscular blockade was reversed with neostigmine 0.05 mg/kg and atropine 0.02 mg/kg IV. When the patient regained consciousness, had sufficient spontaneous breathing, intact gag reflex, purposeful movement and spontaneous eye opening, patient was extubated after oropharyngeal suctioning. The anaesthesiologist performing the extubation was blinded to the study drugs.

Patients were observed for time to extubate the trachea, post-operative sedation level and the adverse effects. The level of sedation during suction and extubation was assessed using observer assessment sedation score [Table 1]. and airway response to suction was noted by five-point scale [Table 2]. Extubation time was counted from stoppage of anaesthetic agent to time, when the extubation was done.

Table 1: Observer assessment sedation score

OBSERVATION	Score level
Responds readily to name spoken in normal tone	5
Lethargic response to name spoken in normal tone	4
Responds only after name is called loudly and/or repeatedly	3
Responds only after mild prodding or shaking	2
Does not respond to mild prodding or shaking	1

Table 2: Grading of airway reflexes

Grade	Description
1	Excellent [breathing well, no response to laryngoscopy, and suctioning]
2	Good [breathing well, minimal grimacing response to laryngoscopy and suction]
3	Satisfactory[breathing well, coughing attempt to laryngoscopy and suction]
4	Poor [breathing well, coughing on tube during laryngoscopy]
5	Very poor [coughing on tube with breath holding]

Time for recovery from anaesthesia was counted from time to sustained eye opening on command after reversal of neuromuscular blockade.

Statistics

The results were tabulated and statistically analysed using SPSS (Statistical Package for Social Sciences) Software version 17.0, Chi-square test was used for qualitative data (sex, extubation quality, sedation scoring) and the results were expressed as mean ± standard deviation. P >0.05 was considered insignificant, P<0.05 as significant and highly significant if P<0.001.

Results

A total of 40 patients with age ranging from 18 to 65 years were enrolled in the study protocol. Groups were comparable with respect to ASA status, gender, age, weight [Table 3]. (P > 0.05).

Table 3: Demographic data

Parameters	Group D (n=20)	Group N (n=20)	P
Age in years (mean ± SD)	52.9±8.1	60.3±5.14	0.387
Sex			
Male	12(20)	11(20)	0.749
Female	8(20)	9(20)	
Weight in kg (mean ± SD)	62.65±5.48	57.7±5.30	0.279
Duration of anaesthesia (in hours)	1.74 ± 0.786	1.4 ± 0.503	0.251
Duration of surgery (in hours)	1.74 ± 0.786	1.4 ± 0.503	0.251
Time to extubation	10.00±1.214	5.70±1.342	<0.001
Time to recovery	7.5±1.3	4.5±1.8	<0.001

There was no significant difference among groups with regards to the duration of anaesthesia or surgery, but the time from end of surgery to eye opening was significantly longer in group D. (P < 0.001) and so also time to extubation was significantly longer in group D (P <0.001) [Table 3].

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Table 4; Level of sedation during extubation

OSSA	Category				Total	
	Group D		Group N			
	N	%	N	%	N	%
Grade 1	3	15.0	0	0.0	3	7.5
Grade 2	9	45.0	2	10.0	11	27.5
Grade 3	5	25.0	7	35.0	12	30.0
Grade 4	2	10.0	5	25.0	7	17.5
Grade 5	1	5.0	6	30.0	7	17.5
Total	20	100.0	20	100.0	40	100.0

χ^2=112.645 P= 0.013

Data expressed as number of patients. P<0.05 is statistically significant.

There was highly significant difference among the two groups with reference to extubation time (10±1.214, 5.70±1.342 min) in group D and group N respectively (P<0.001) and time to recovery was (7.5±1.3 , 4.5±1.8 min) in group D and group N respectively (P<0.001) [Figure 3].

Smoothness during extubation without coughing on endotracheal tube was comparable between the two groups (P=0.527). 45 % of patients in group D and 55% of patients in saline placebo group had coughing.

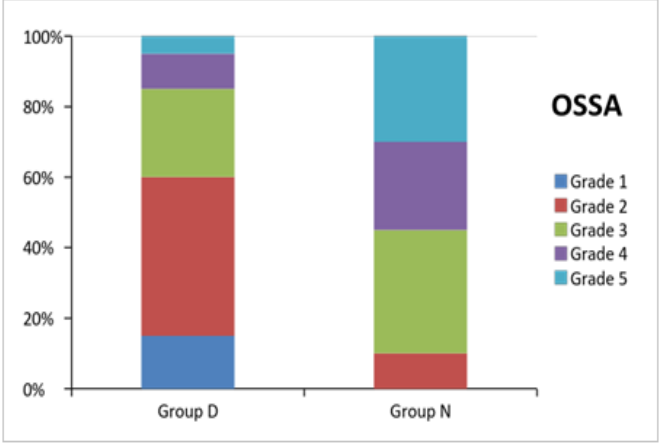

Figure1; Level of sedation during extubation

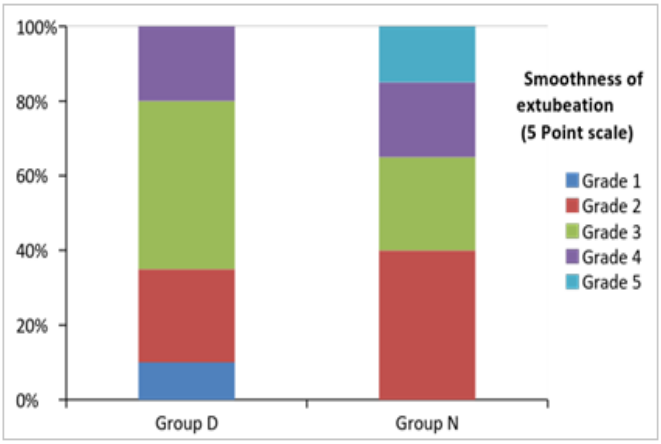

Figure 2: Grading of airway reflexes during suction

Discussion

In major surgeries, especially in a hypertensive patient, a smooth emergence from general anaesthesia is preferred because coughing and bucking during awakening often stimulate the airway-circulatory reflexes which may result in complications like tachycardia, hypertension, hypoxemia.[1,2]

In the present study, dexmedetomidine 0.5 µg/kg/h IV infusion was associated with significantly less coughing and better quality of extubation than control group.

The dose of dexmedetomidine ranges from 0.5-1 mcg/kg. In the present study, only 5% of patients in dexmedetomidine group responded readily to name spoken in normal tone at the time of extubation (grade 5 OSSA) while the same was 30% in control group. There was highly statistically significant difference in the time to extubation as well as time to recovery (P<0.001) and thus served to aim our primary target which was the evaluation of sedation and attenuation of airway reflexes[1,24,25] by dexmedetomidine infusion when compared with normal saline group. In the present study, there was no case of laryngeal spasm or severe desaturation.

Turan et al showed that dexmedetomidine 0.5 mcg/kg administered 5 minutes before the end of surgery can be used to stabilize haemodynamics, allow easy extubation, provide a more smooth recovery and allow early neurological examination following intracranial operations.[24]

Sedation produced by α2 agonists is dose-dependent and reaches its peak after 45-60 min. Sedation decreases gradually after stopping the infusion. The quality of sedation is better and the need for rescue sedation is less with dexmedetomidine use as compared with midazolam and there is no significant adverse effect on hemodynamic or respiratory function. At a dose of 0.25mcg/kg /h, dexmedetomidine was approximately equivalent to midazolam at 0.22 mg/kg/h.[17] At 0.5 µg/kg/h, dexmedetomidine provided more effective sedation as

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demonstrated by the need for fewer bolus doses of morphine, a decrease in the 24- hour requirements for supplemental morphine, as well as a decrease in the total number of assessment points with a Ramsay score of 1 (Inadequate Sedation).[17]

Compared with propofol,[14] dexmedetomidine provided a slower onset and offset of sedation. Dexmedetomidine was associated with an analgesia - sparing effect[14] which can be of use in the recovery room, as dexmedetomidine has a half-life of two hours.

Fan et al[16] did a similar study comparing remifentanil with two doses of dexmedetomidine 0.5 µg/kg and 0.7 µg/kg for otology surgery and observed that higher percentage of patients in dexmedetomidine group had smooth extubation regarding the absence of bucking and coughing with head movement during surgical dressing.

Prolonged duration of recovery from general anaesthesia encountered in the dexmedetomidine group may be considered as a drawback. However, when it comes to patient safety, it is probably a minor concern. As shown in the present study, there were no airway-related complications.

Conclusion

Dexmedetomidine infusion is a safe alternative for smooth tracheal extubation and it may be favored as a drug of choice for maintenance of anaesthesia, particularly in airway surgery or when the patient risk factors like hypertension require that coughing and hypertension during emergence from anaesthesia is minimized.

References

[1] Miller, Kirk A, Harkin, Christopher P, Bailey, Peter L. Postoperative tracheal extubation. Anesthesia Analgesia. 1995; 80:149–72.
[2] Caplan RA, Posner KL, Ward RJ, Cheney FW. Adverse respiratory events in anesthesia: A closed claims analysis. Anesthesiology. 1990; 72: 828–33.
[3] Henderson J. Airway management in the adult. In: Miller RD, editor. Miller's Anaesthesia. Seventh edition. Philadelphia: Churchill Livingstone; 2010. pg. 1573 - 610.
[4] Bhana N, Goa KL, McClellan KJ. Dexmedetomidine. Drugs 2000; 59:263-8
[5] Yazbek-karam VG, Aouad MM. Perioperative uses of dexmedetomidine. Middle East Journal of Anaesthesiology. 2006; 18: 1043-58.
[6] Leech P, Barker J, Fitch W. Changes in intracranial pressure and systemic arterial pressure during termination of anaesthesia. British journal of Anaesthesia. 1974; 46:315–6.
[7] Ma D, Hossain M, Rajakumaraswamy N, Arshad M, Sanders RD, Franks NP and Maze M: Dexmedetomidine produces its neuroprotective effect via the alpha 2A- adrenoceptor subtype. European Journal of Pharmacology 502: 87-97, 2004.
[8] Koga K, Asai T, Vaughan RS, Latto I P. Respiratory complications associated with tracheal extubation. Timing of tracheal extubation and use of the laryngeal mask during emergence from anaesthesia. Anaesthesia. 1998, 53: 540–4.
[9] Bindu B, Pasupuleti S, Gowd UP, Gorre V, Murthy RR, Laxmi MB. A double blind, randomized, controlled trial to study the effect of dexmedetomidine on hemodynamic and recovery responses during tracheal extubation. Journal of Anaesthesiology Clinical Pharmacology 2013; 162-7.
[10] Hall JE, Uhrich TD, Barney JA, Arain SR, Ebert TJ. Sedative, amnestic, and analgesic properties of small-dose dexmedetomidine infusions. Anesthesia Analgesia 2000; 90:699-705.
[11] Chu KS, Wang FY, Hsu HT, Lu IC, Wang HM and Tsai CJ: The effectiveness of dexmedetomidine infusion for sedating oral cancer patients undergoing awake fibreoptic nasal intubation. European Journal of Anaesthesiology 27: 36-40, 2010.
[12] Arain SR and Ebert TJ: The efficacy, side effects and recovery characteristics of dexmedetomidine versus propofol when used for intraoperative sedation. Anesthesia Analgesia 95: 461-466, 2002.
[13] Guler G, Akin A, Tosun Z, Eskitascoglu E, Mizrak A, Boyaci A. Single-dose dexmedetomidine attenuates airway and circulatory reflexes during extubation. Acta Anaesthesiol Scand 2005; 49:1088-91.
[14] Fan Q, Hu C, Ye M, and Shen X. Dexmedetomidine for tracheal extubation in deeply anesthetised adult patients after otologic surgery: A comparison with remifentanil .BMC Anesthesiology 2015; 15:106.
[15] Tobias JD, Berkenbosch JW. Sedation during mechanical ventilation in infants and children: Dexmedetomidine versus midazolam. South Medical Journal 2004; 97: 451-5.
[16] Comparison of dexmedetomidine with fentanyl for maintenance of intraoperative haemodynamics in hypertensive patients undergoing major surgery: A randomized controlled trial. Kanchan V Bilgi, Arumugam Vasudevan, Prasanna V Udupi Bidkar .Anaesthesia: Essays and Researches. Year 2016, Volume 10, Issue 2 [p. 332-337].

DOI: 10.23958/ijirms/vol02-i08/08

[17] Turan G, Ozgultekin A, Turan C, Dincer E, Yuksel G. Advantageous effects of dexmedetomidine on haemodynamic and recovery responses during extubation for intracranial surgery. European Journal of Anaesthesiology, 2008; 25: 816-20.

[18] Aksu R, Akin A, Bicer C, Esmaoglu A, Tozun Z, Boyacy A. Comparison of the effects of dexmedetomidine versus fentanyl on airway reflexes and hemodynamic responses to tracheal extubation during rhinoplasty: A double-blind, randomized, controlled study. Current Therapeutic Research; Clinical and Experimental 2009; 70: 209-20.

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