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Effect of Dexmedetomidine on Emergence Agitation after Nasal Surgeries

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ABSTRACT

Background: *Emergence agitation is a short lived phenomenon occurring commonly after nasal surgery. In this study we used dexmedetomidine infusion in the intraoperative period to decrease the incidence of emergence agitation in adult patients posted for nasal surgery.*

Methods: *100 adult patients (ASA I-II, 20-60 years posted for nasal surgery were randomly divided into two groups. Group D received infusion of dexmedetomidine 0.4mcg/kg/hr during the intraoperative period, and Group C received normal saline infusion as placebo. All patients were induced with fentanyl (1mcg/kg) and propofol (1.5mcg/kg) and maintained with isoflurane. Incidence of agitation, hemodyanamics, pain scores, time to verbal commands and extubation were evaluated.*

Results: *Incidence of emergence agitation was lower in Group D (26%) than Group C (50%). Group I showed more stable hemodyanamics than Group II. Time to verbal response and extubation was more prolonged for Group D than Group C ($p < 0.05$) though it was not clinically significant.*

Conclusion: *The use of dexmedetomidine as intraoperative infusion resulted in smooth emergence with more stable hemodyanamics.*

Keywords: *emergence agitation, dexmedetomidine, nasal surgery, adults*

INTRODUCTION

Occurrence of agitation on emergence from general anaesthesia is common after nasal surgeries in which intranasal packing is used[1]. Emergence agitation increases the risk of bleeding, falling, removal of catheters and self extubation, which lead to further complications like hypoxia and aspiration[2]. This also increases the need for continuous monitoring, medication and physical restraint[2]. Mostly, after nasal surgeries awake extubation is preferred, which may aggravate emergence agitation[3]. Many patients complain of difficulty in breathing caused by intranasal packing. These factors favour emergence agitation[1].

Dexmedetomidine is a highly selective alpha-2 receptor agonist having sedative, analgesic and sympatholytic properties, associated with reduction in opioid and anaesthetic requirements[4]. One significant advantage is that in clinical dose range there is no respiratory depression[5,6,7]. Dexmedetomidine infusion reduces agitation on emergence from general anaesthesia in paediatric patients[8,9]. We performed this study to evaluate the benefit of using intraoperative dexmedetomidine infusion in adult patients undergoing elective nasal surgeries in terms of postoperative agitation.

METHODS

This study was performed in the department of Anaesthesiology in SMHS Hospital. After obtaining approval from the institutional ethical committee, a total of 100 adult patients of either sex, aged between 20 to 60 years, belonging to ASA class I or II, posted for elective nasal surgery in which nasal packing on each side was used postoperatively were included in the study. In order to avoid any interference with the results, following patients were excluded from the study: history of uncontrolled hypertension, ischaemic or valvular heart disease, use of MAO inhibitors or adrenergic blocking drugs, cognitive impairment, patients taking antipsychotics, renal insufficiency or liver dysfunction.

Patients were randomly assigned to two groups with 50 patients in each group. Group D received dexmedetomidine infusion at a rate of 0.4 mcg/kg/h from induction of anaesthesia up to the time of extubation, and group C, the placebo group received normal saline infusion. All patients were taken to the operating room without receiving any premedication, and the patients were reminded that there could be discomfort from nasal packing following surgery. An i.v. line was established and baseline heart rate, non-invasive blood pressure, arterial oxygen saturation and ECG were recorded after attaching the monitoring devices. All patients were given i.v. glycopyrrolate 0.1 mg before induction of anaesthesia. After preoxygenation with 100% oxygen, induction was done with i.v. fentanyl 1 mcg/kg and propofol 1.5 mg/kg. Then a bolus dose of muscle relaxant atracurium 0.5 mg/kg was given following which the patients were intubated with appropriate sized endotracheal tubes. For maintenanceof anaesthesia isoflurane was used along with a mixture of nitrous oxide and oxygen in a 1:1 ratio as inhalation gas. For tachycardia (heart rate > 110 beats/min) i.v. esmolol in 10mg increments was given and for bradycardia (heart rate < 45 beats/min) i.v. atropine 0.5mg was given. I.v. diclofenac as infusion in 50 to 100 ml normal saline was administered to both groups at the time of nasal packing

At the end of the procedure, the inhalational anaesthetic was stopped and 100% oxygen was used at 8 litres per minute. The reversal agent (0.05mg/kg neostigmine and 0.01mg/kg glycopyrolate) was given when return of neuromuscular function was confirmed using train of four peripheral nerve stimulation, and patients were extubated when they were breathing spontaneously and responding to verbal commands. After that, dexmedetomidine or saline infusion was stopped.

Level of agitation was assessed with the help of Ricker sedation-agitation scale[10] and the highest agitation score for each patient was recorded: 1=minimal or no response to noxious stimuli; 2=arousal to physical stimuli but does not communicate; 3=difficult to arouse but awakens to verbal stimuli or gentle shaking; 4=calm and follows commands; 5=anxious or physically agitated and calms to verbal instructions; 6=requiring restraint and frequent verbal reminding of limits; 7=pulling at tracheal tube, trying to remove catheters or striking at staff. Emergence agitation was defined as any score >/=5. Dangerous agitation was defined as a score = 7. Level of pain was measured with the help of 11-point numeric rating scale (NRS) (0=no pain, 10=unimaginably severe pain). Patients received 25 mcg fentanyl i.v. when NRS score was found to be >/= 5. Time to first verbal response and time to extubation was measured from the time of discontinuation of isoflurane. Heart rate and mean arterial pressure were recorded before induction of anaesthesia, 10 min after the start of procedure, 30 min after the start of procedure, at the end of procedure, at extubation and 2 min after extubation.

The patients were observed for any complications including nausea, vomiting, desaturation, laryngospasm, hypersalivation. 4 mg ondensetron was given for nausea or vomiting.

The data was analysed by Graph Pad Prism 6 statistics using unpaired t test, one-way ANOVA and Fisher's exact test.

RESULTS

There was no significant difference between the demographic characteristics i.e; age, weight and sex among the two groups.

fig 1 (p > 0.05)

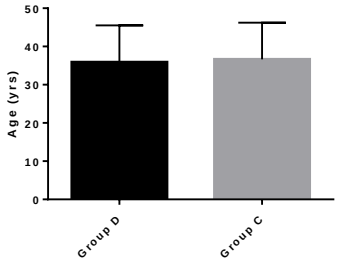


fig 2 (p > 0.05)

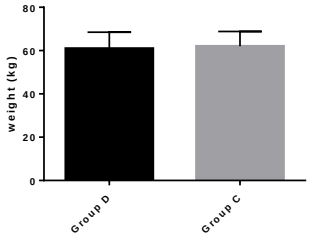
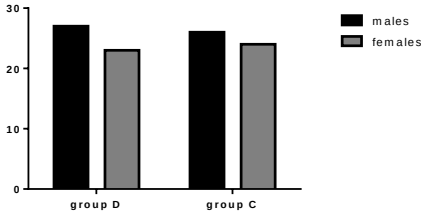
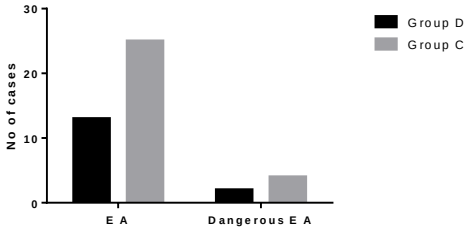


fig 3 (p > 0.05)



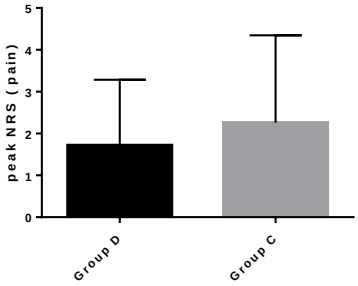
The incidence of emergence agitation was lower in Group D (26%) than in Group C (50%) and the difference was statistically significant. However, incidence of dangerous agitation did not show statistically significant difference between the two groups. Two patients in Group D had residual sedation in PACU (score 3 as per the Ricker sedation-agitation scale[10]) while none of the patients in Group C had residual sedation.

fig 4 (p < 0.05)



Peak NRS score for pain did not show a significant difference between the two groups. Analgesic in PACU was required in 4 patients (8%) in Group Dand 8 patients (16%) in Group C.

fig 5 (p > 0.05)



Mean arterial pressure (MAP) and heart rate (HR) in Group D did not show statistically significant variations throughout the procedure while in Group C significant variations were seen ($p < 0.05$). Group D patients showed more stable hemodyanamics compared to Group C. None of the patients experienced bradycardia or hypotension. Esmolol was given to 6 patients in Group C for tachycardia but no patient in Group D required esmolol.

fig 6 (p > 0.05)

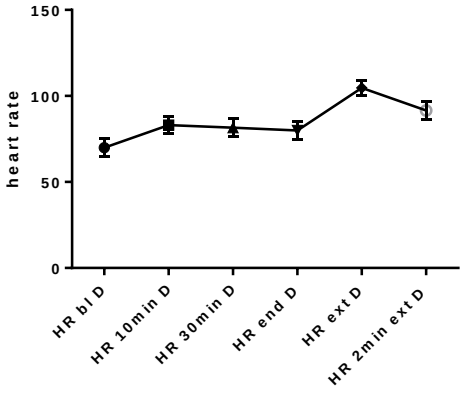
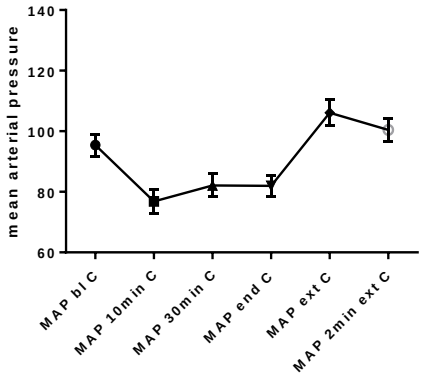


fig 7 (p < 0.05)



Time to verbal response and time to extubation both were increased in Group D in comparison to Group C and the difference was statistically significant, but was not clinically significant. Maximum time to extubation in a patient in Group D was 12 minutes.

fig 8 (p < 0.05)

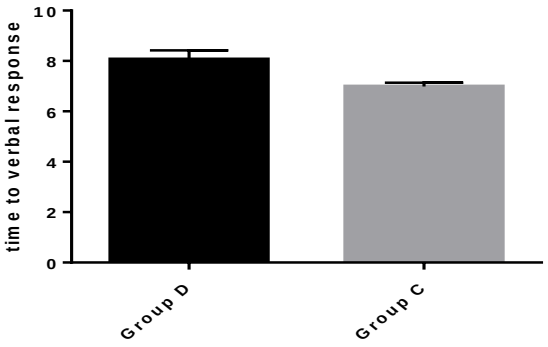
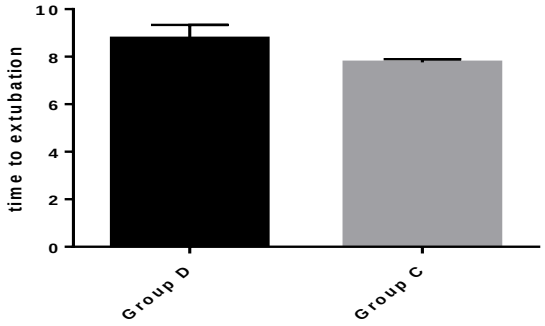


fig 9 (p < 0.05)



Two patients in GroupD and three patients in Group C required antiemetic in the PACU. There were no complications in any patientin either group.

DISCUSSION

Emergence agitation is a temporary state of agitation which occurs at the time of emergence from general anaesthesia[11]. Emergence agitation is more common after nasal surgeries in which nasal packing is used postoperatively. Our study aimed at decreasing the incidence of postoperative agitation in adult patients undergoing nasal surgeries by using intraoperative dexmedetomidine infusion.

In previous studies dexmedetomidine has been used as premedication 1 microgram per kg intranasal 45 minutes before induction[12], loading dose 2 mcg/kg followed by maintenance dose 0.7 mcg/kg/hr[8], and at a dose of 0.3 mcg/kg i.v. 10 minutes before discontinuation of anaesthetics[13]. The results of all these studies showed a decrease in emergence agitation. These studies have been conducted in paediatric patients. Our study shows that dexmedetomidine in the form of intraoperative infusion at the rate of 0.4mcg/kg/hr resulted in reduction in the incidence of emergence agitation after nasal surgery in adult patients. Use of dexmedetomidine also produced more stable hemodyanamics throughout the intraoperative period in patients in which dexmedetomidine infusion was used. Even though there was a statistically significant delay in time to verbal response and extubation in patients receiving dexmedetomidine, the longest time to extubation was not more than 12 minutes, which is not clinically significant, and the delay did not produce any clinical problem.

Many studies have used other drugs for the purpose of decreasing the incidence of postoperative agitation like fentanyl[13] and clonidine[12,14]. The advantage of using dexmedetomidine in this study is that it has sedative and analgesic effect without causing respiratory depression[4,5,6,7].

The incidence of emergence agitation varies in different studies according to the researcher and the criteria used. In our study we used the Ricker sedation-agitation scale[10]. The incidence of emergence agitation in the control group in our study is 50%, which is similar to the results of previous studies[1,15].

Previous studies have evaluated several risk factors for emergence agitation including age, sex, use of inhalational anaesthetics, type of surgery, postoperative pain, presence of tracheal tube, presence of a urinary catheter[2,16]. To remove any bias in our study, we have taken adult patients with statistically insignificant gender ratio, used the same inducing agents, maintenance agents (except for the study drug), analgesia in all patients in both the groups. All patients underwent nasal surgery with bilateral nasal packing in the postoperative period, all patients were intubated

and urinary catheter was not used in any patient. The pain severity was also comparable between the two groups, as the NRS pain scale did not show statistically significant difference between the two groups.

In conclusion, the use of dexmedetomidine as intraoperative infusion from induction until extubation resulted in smooth emergence from general anaesthesia after nasal surgery with decreased incidence of emergence agitation without any complications.

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