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Efficacy of low dose intraoperative dexmedetomidine infusion on emergence agitation and quality of recovery after nasal surgery

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***Abstract*---**Background: Sevoflurane in Nasal Surgeries has a slightly higher incidence of emergence. The purpose of this study was to observe the effect of Dexmedetomidine over Emergence from General Anaesthesia (GA) in Nasal Surgeries. Method: It is an observational study with 120 participants aged between 18 and 60 years belonging to ASA class 1 and 2, undergoing elective Nasal Surgeries under General Anaesthesia (GA). Partcipants were grouped into 2 groups with one group receiving low dose of Dexmedetomidine infusion and the other saline infusion. RICKER score was observed post extubation. Data was analysed using Fishers test. p value < 0.05 was considered significant. Results: The RICKER score was better with Dexmedetomidine, with p value of 0.003, which was highly significant. Conclusion: Emergence from General Anaesthesia (GA) is smoother with Dexmedetomidine in Nasal Surgeries.

***Keywords*---**Alpha 2 agonist, Emergence delerium, RICKER score.

Introduction

Postoperative agitation or emergence agitation is short lived but potentially dangerous for the patient and the staff attending to him/her which may lead to self extubation or removal of catheters causing Hypoxia, Aspiration Pneumonia, Bleeding or Re-operation [1].

Emergence agitation is defined as any score on the sedation-agitation scale >5[2]. Most important factor is found to be inhalational anaesthetics like sevoflurane and desflurane. It has been shown that for sedation, dexmedetomidine can be given instead of BZDs as the former decreases incidence of agitation following nasal surgeries and also in children [3,4]

Dexmedetomidine is a selective α_2 receptor agonist and has sympatholytic, analgesic and sedative properties [5]

Peri-operative use of dexmedetomidine also decreases post-operative opioid consumption, pain intensity and use of anti-emetic therapy[6-9]

In this study we tried to show the benefits of intraop dexmedetomidine infusion on the emergence agitation and smooth recovery post nasal surgeries. Also we have tried to show its benefits on post-operative pain, cough and Nausea-Vomiting.

Materials and methods

a) **Selection and Description of Participants**: Study was an observational study which was conducted at hospitals under Kasturba Medical College, Mangalore. Study duration was from June 2020 to August 2020**.** Patients who fulfilled the inclusion criteria only were included in the study that is patients aged between 18-60 years and ASA class 1-2 patients undergoing elective Nasal Surgery. A total of 120 patients were enrolled for the study. Patients were divided into 2 groups with 60 in each group:

   Group D: Patients receiving dexmedetomidine at a rate of 0.4µg/kg/hr from induction to end of the procedure.

   Group C: Control group receiving volume matched normal saline infusion.

b) **Technical Information**

   i. **Primary Objective**: To compare and study the benefit of intraoperative low dose dexmedetomidine infusion in preventing emergence agitation and facilitating smooth recovery in post nasal surgeries in adults in two groups – Control and Group D. **Secondary Objective:** To assess the level of agitation during emergence. To record the duration from time zero to first verbal response and extubation. To assess grade of cough during emergence. Also postoperative nausea-vomiting, pain score will be assessed

c) **Methodology**

After approval from the Institutional Ethics Committee, the study commenced. Patients were explained regarding the procedure and benefits and side effects of the drug and a written consent was obtained. A thorough pre-anaesthetic check-up was done. All patients were preloaded with crystalloids and premedicated with IM Midazolam 0.04 mg/ kg

10 minutes before induction of anaesthesia. Dexmedetomidine infusion at dose of 0.4µg/kg/hr was started 10mins prior to induction. Routine monitors, including electrocardiogram, pulse oximeter saturation (SpO2), non-invasive arterial pressure, and end-tidal CO2 (ETCO2) was applied. Patient was given Fentanyl 1µg /kg and induced with Propofol 2mg /kg. After the administration of Rocuronium bromide 0.6-0.8mg/kg, orotracheal intubation was performed using a 6.5 and 7.5mm tracheal tube for women and men respectively. Mechanical ventilation was maintained with 8ml/kg tidal volume and ventilation frequency adjusted to maintain ETCO2 between 4.6-5.3 kPa in 50% O_2/air. Maintenance of anaesthesia was done with sevoflurane, regulated at 0.9 to 1 age-adjusted minimal alveolar concentration (MAC). Surgery duration for all patients was around two to two and a half hours but not beyond that.Once the surgery was completed, reversal agents (glycopyrrolate 0.004 mg/ kg and neostigmine 0.02 mg/ kg) were given after confirming the return of neuromuscular function. Mechanical ventilation was then converted to manual ventilation with 100% oxygen at 8 L/ min. Dexmedetomidine was continued till extubation for group D patients. Level of agitation was evaluated using the RICKER sedation-agitation scale:

- 1-minimal or no response to noxious stimuli
- 2-arouse to physical stimuli but does not communicate
- 3-difficult to arouse but awakens on verbal stimuli or gentle shaking
- 4-calm and follows command
- 5-anxious calms to verbal instructions
- 6-requiring restraint and remunding of limits
- 7-pulling out ET tube, removing catheters.

Duration to first verbal response and extubation was recorded. Also the grade of cough during emergence, postoperative nausea/vomiting and pain score was assessed.

Statistical Analysis

Collected data was summarized for possible assessment by frequency, percentage, mean, s.d, median and IQR (interquartile range). Comparison between the groups was done by chi-square test, Fishers exact test, Mannwhitney test and t test.

Analysis was performed using Statistical Package for Social Sciences (SPSS -17) software.

Results

A total of 120 patients undergoing elective Nasal surgeries were studied.Of which 60 were grouped under the Dexmedetomidine group, which is the study group. 60 were grouped under Non Dexmedetomidine group which is the control group. The demographics like Age, Gender, Height, and Weight, were compared between the two groups using t test and Fishers Exact Test, p values for each variable was more than 0.05 which shows that they were not significant. On comparison of RICKER scores, incidence of emergence delirium was lesser in dexmedetomidine group with p value 0.003 (Table 1). On Comparison of NRS Pain Scores, pain was lesser in Dexmedetomidine group. This was confirmed by Fishers exact test with P value of 0.005, which was highly significant.(Table2). Time to verbal response was longer in the Dexmedetomidine group which was confirmed by Fishers exact test with p value of 0.000 which was highly significant. (Table3). Grade of cough was lesser in the Dexmedetomidine group which was confirmed by chi square test with a P value of 0.000 indicating it was highly significant. (Table 4). Grade of Nausea and vomiting was analyzed using the chi square test which showed P value of 0.198.This indicates that it was not significant between the two groups.(Table 5).

Tables

Table 1: Comparison of RICKER Scores between Two Groups Using Fishers Exact Test

	Group				Total	
Ricker Score	DEXMEDETOMIDINE		NON-DEXMEDETOMIDINE			
	Count	%	Count	%	Count	%
2	6	10.0%	0	.0%	6	5.0%
3	28	46.7%	18	30.0%	46	38.3%
4	18	30.0%	23	38.3%	41	34.2%
5	8	13.3%	19	31.7%	27	22.5%
Total	60	100.0%	60	100.0%	120	100.0%

Fishers exact test p=.003, HS

The incidence of emergence was lower in the Dexmedetomidine group. Fisher's exact test showed a P value of 0.003 which was also highly significant.

Table 2: Comparison of NRS Pain Scores between Two Groups Using Fisher Exact Test

	Group				Total	
NRS Pain Scale	DEXMEDETOMIDINE		NON-DEXMEDETOMIDINE			
	Count	%	Count	%	Count	%
1	1	1.7%	0	.0%	1	.8%
2	25	41.7%	10	16.7%	35	29.2%
3	24	40.0%	30	50.0%	54	45.0%
4	10	16.7%	20	33.3%	30	25.0%
Total	60	100.0%	60	100.0%	120	100.0%

Pain score was lower in Dexmedetomidine group. This was confirmed by Fishers exact test with P value of 0.005, which was highly significant.

Table 3: Comparison of Time to Verbal Responses between Two Groups Using Fishers

Exact Test

Time to Verbal Response(min)	Group				Total	
	DEXMEDETOMIDINE		NON-DEXMEDETOMIDINE			
	Count	%	Count	%	Count	%
9 - 11min	18	30.0%	51	85.0%	69	57.5%
11.1 - 13min	35	58.3%	9	15.0%	44	36.7%
13.1 - 15min	7	11.7%	0	.0%	7	5.8%
Total	60	100.0 %	60	100.0 %	120	100.0 %

Fishers exact test p=.000, HS

Time to verbal response was longer in the Dexmedetomidine group which was confirmed by Fishers exact test with p value of 0.000 which was highly significant.

Table 4: Percentage Comparison of Grade of Cough between Two Groups Using Chi

Square Test

Grade of Cough	Group				Total	
	DEXMEDETOMIDINE		NON-DEXMEDETOMIDINE			
	Count	%	Count	%	Count	%
0	31	51.7%	9	15.0%	40	33.3%
1	25	41.7%	36	60.0%	61	50.8%
2	4	6.7%	15	25.0%	19	15.8%
Total	60	100.0%	60	100.0%	120	100.0 %

Chi square test p=.000, HS

Grade of cough was lesser in the Dexmedetomidine group which was confirmed by chi square

test with a P value of 0.000 indicating it was highly significant.

]Table 5: Comparison of Presence (or) Absence of Nausea and Vomiting in Between Two

Groups Using Chi Square Test.

Nausea Vomiting	Group				Total	
	DEXMEDETOMIDINE		NON-DEXMEDETOMIDINE			
	Count	%	Count	%	Count	%
Absent	37	61.7%	30	50.0%	67	55.8%
Present	23	38.3%	30	50.0%	53	44.2%
Total	60	100.0%	60	100.0%	120	100.0%

Grade of Nausea and vomiting was analyzed using the chi square test which showed P value of 0.198.This indicates that it was not significant between the two groups.

Discussion

Emergence Agitation / Post – operative Agitation is a common problem encountered post general Anaesthesia. Its incidence is known to be slightly higher in Nasal surgeries. This may be attributed to a sense of suffocation. Nasal packing

and even inhalational agents may contribute to this. Dexmedetomidine induces sedation and analgesia without respiratory depression. Therefore in this study, we have used Dexmedetomidine in the form of a low dose infusion intraoperatively to prevent emergence agitation.There have been several studies which have shown that Dexmedetomidine helps in smoother recovery.

A randomized study was conducted by S.Y. Kim et al[10] among 100 patients undergoing Nasal Surgery in 2013. Patients were grouped into 2 groups with 50 each. Among them one group had received an intraoperative dexmedetomidine infusion of 0.4µcg/kg/hr along with other drugslike Fentanyl and Propofol and Desflurane as the inhalational agent. The study concluded that emergence was smoother in the patients who received Dexmedetomidine infusion. Similarly, our study was conducted among 120 patients with one group receiving an intraoperative dexmedetomidine infusion of 0.4µcg/kg/hr. Other drugs used were Fentanyl and Propofol. But Sevoflurane was the inhalational agent used in our study. The outcome of our study was similar with emergence being better in patients receiving Dexmedetomidine infusion.

Bielka et al[11] had conducted a study between 2016 – 2017 among 60 patients undergoing laproscopic cholecystectomy. Patients were grouped into 30 each. One group had received an intraoperative Dexmedetomidine infusion at 0.5µcg/kg/hr. along with other usual drugs like Propofol and Sevoflurane as inhalational agent.The study concluded that the number of patients with severe post-operative pain were less among the Dexmedetomidine group. Patients were assessed upto 24 hours post procedure.

Our study was conducted among 120 patients undergoing elective Nasal Surgery with one group receiving an intraoperative Dexmedetomidine infusion at 0.4µcg/kg/hr. Other drugs used were Propofol and Sevoflurane as inhalational agents. Our study concluded that pain scale using NRS pain scale was lower in patients receiving Dexmedetomidine. However patients were assessed only upto 1 hour post procedure.

There have been other studies where intraoperative Dexmedetomidine infusions have improved grade of cough and also Nausea vomiting in patients post extubation. One such study was conducted by Hu et al[12] in 2018 among 180 patients undergoing thyroid surgeries. Patients were grouped into 3 groups. One group received Dexmedetomidine infusion at 0.4µcg/kg/hr upto 30 minutes prior to the end of surgery. The other groups received infusion of Lidocaine at 1.5mg/kg and Normal Saline respectively. The study concluded that the grade of cough was lower in Dexmedetomidine and Lidocaine groups.

In our study, 120 patients undergoing elective Nasal surgeries were selected and grouped. One group had received Dexmedetomidine infusion of 0.4µcg/kg/hr and was continued till end of the procedure unlike the above mentioned study. However, the outcome was similar, showing a lower grade of cough in Dexmedetomidine group.

Recently, the effect of Dexmedetomidine on Post-operative Nausea – vomiting is being extensively studied. However, the effectiveness of Dexmedetomidine in this aspect is still being studied.

A meta-analysis was conducted by Jin et al[13] on all the relevant Randomized Controlled Trials published before August 2016. So, a total of 24 RCTs were studied. The analysis concluded that administration of Dexmedetomidine reduced the Post-operative Nausea in about 19 trials out of 24 trials studied in adults.

Our study is a observational study on 120 patients undergoing Nasal surgeries grouped into two groups with one group receiving low dose Dexmedetomidine infusion. Our study showed lesser percentage of patients receiving Dexmedetomidine infusion developing Nausea. However, it was not statistically significant when analyzed.

There was a study similar to ours conducted by Garg et al[14] in 2018 on 72 patients undergoing Nasal Surgeries using Dexmedetomidine infusion at 0.4µcg/kg/hr following a bolus of 1µcg/kg for 10 minutes. They concluded that Nausea was lower in Dexmedetomidine group but statistically insignificant.

Conclusion:

Use of low dose Dexmedetomidine infusion intraoperatively throughout procedure in a patient going through elective Nasal procedure under general anaesthesia has shown to improve the recovery quality of the patient from anaesthesia and also an improvement in pain and post anaesthesia.

Disclaimer:

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