Tramadol attenuates the post anaesthetic emergence events-a randomised clinical trial

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Abstract

Introduction: General anesthesia is most commonly used anesthesia technique for most of the cases. Emergence phenomenon is very commonly encountered by the anesthesiologists during extubataion. Adverse emergence events can have harmful effects on the patient's outcome, so controlling of emergence events is at most important to have good outcome after general anesthesia.
Objectives: to assess the tramadol efficiency in suppressing post-anaesthesia emergence.
Methods: A total of 100 adult patients age between 20-40 years, with ASA I and II undergoing surgeries under general anesthesia, were divided into two groups each of 50. One group received tramadol and other group receive saline of equal quantity and approximately 30 min before reversal. We have monitored and recorded the incidence of shivering, onset of cough (weak or forceful), post-extubation laryngeal spasm, breath holding and increased muscle tone and lastly awakening and restlessness.
Results: Tramadol reduced the incidence of shivering, reduced the restlessness, own attempt to extubate, zero percentage of patients had increased muscle tone and breath holding. We also observed that zero percent of forceful cough in tramadol group and post extubataion laryngeal spasm.
Conclusion: A dose of 1 mg/kg tramadol administered intravenously 30 min before reversal of anesthesia has decreased incidence of coughing, sudden awakening, restlessness, own attempt to extubate, post-extubation laryngeal spasm and incidence of shivering.

Keywords: Emergence phenomenon; Tramadol; General anesthesia.

Access this article online	
Quick Response Code:	Website: www.innovativepublication.com
	DOI: 10.5958/2394-4994.2016.00077.9

Introduction

Hypertension and tachycardia are often being provoked during reversal and tracheal extubaion as seen during Laryngoscopy and tracheal intubation .Such haemodynamic responses precipitates adverse cardiovascular events.[1,2] Majority of ASA I and II patients tolerate the haemodynamic stress without significant consequences either during intubation or extubation. But patients with coronary artery diseases may end up in myocardial ischemia. Along with haemodynamic stress response patients may have additional problems during reversal and extubation which are as follows,

1. Sudden awakening, restlessness and own attempt to extubate
2. Coughing either mild or forceful
3. Breath holding may associated with increase in skeletal muscle tone
4. Appearances of chills and rigors
5. Laryngeal irritation may be associated with mild to severe laryngeal spasm after extubation.

These above mentioned problems together called as emergence events.[3] Emergence events may lead to airway morbidity. So in principle haemodynamic stress response and emergence events need to be attenuated in both induction with intubation and reversal with extubation. Coughing related to intubation is very common during emergence phenomenon from general anaesthesia. It is often not related to complication rather appropriate cough can take secretion during emergence. But during emergence complications like hypertension, tachycardia and may also result in postoperative haemorrage, intraocular hypertension. Many modalities have been used for the prevention of emergence events like deeper plane extubation, use of laryngeal mask airway, topical or intracuff application lidocaine. But these modalities proved unreliable and increases the chances of aspiration[4].

So many drugs are being used either alone or in combination like opoid or lidocaine to suppress haemodynamic stress response and post anesthesia emergence events. Here we have limited to our study to use of tramadol in suppressing the post-anaesthesia emergence events only. This is the reason we have included the patients of ASA I, II in our study. However hemodynamic changes during reversal and extubataion are recorded and data is provided for the information. Hence very few studies on the effect of

tramadol, so our studies has been conducted to assess the tramadol efficiency in suppressing post-anaesthesia emergence.

Methodology

After institutional ethical committee approval and informed consent, the study was conducted on 100 patients Of ASA I and II, which include both male and female patients between 20-40 years taken for routine surgeries under general anesthesia. Patients divided into two groups of 50 each. Group I: Saline group, Group II: Tramadol group.

Anesthesia management: Premedication inj glycopyrrolate, inj Fentanyl and midazolam. Induction with Propofol 2 mg/kg, scoline 2 mg/kg with intubation of appropriate size tube.

Maintenance: Anesthesia was maintained with 60% N2O in O2 and isoflurane under controlled ventilation with atracurium dose of 0.5 mg/kg as initial dose with intermittent boluses of atracurium doses. Blood pressure and heart rate are monitored and maintained within the range with either increasing or decreasing the concentration of isoflurane. Approximately 30 minutes prior to reversal either saline or tramadol were administered .These medications were prepared well before the in equal volumes and their identity was not known to other colleagues, who later collected the data as per proforma. Here we administer tramadol ¼th of the calculated dose of therapeutic dose (2mg/kg). Isoflurane was totally discontinued approximately 10 min prior to reversal which was already brought to smaller concentration. After completion of surgery N2O discontinued and reversed with neostigmine 0.05mg/kg and glycopyrrolate 4 microgm/kg. The recovery was assessed by the spontaneous, regular, adequate breathing and hand grip. Proper suctioning done. Extubataion was done after deflating the cuff. Immediately after tracheal extubataion 100% O2 was administered through face mask for next 5 minutes. Above mentioned protocol followed for rest of all patients. Any deviations in above mentioned protocol will excluded from study group.

Results

We have studied total 100 cases. All the cases included in the study have no gross protocol deviation, in SBP, DBP and HR values increased in both the groups during tracheal extubation. This is because we have not used any established technique to suppress the haemodynamic stress response. The demographic characteristics of the patients are summarized. No differences were found with respect to patient characteristics, proportion of smokers, duration of anaesthesia, emergence time. Good quality of tracheal extubation was observed in tramadol group than in saline group. In our study we observed 20% of patients in control group had chills and rigors (shivering) whereas zero percentage in tramadol group. We have observed that 10% of patients had restlessness and own attempt to extubate in control group in comparison with 6% in tramadol group. We also observed breath holding, increased muscle tone is 0% in case of tramadol group whereas 8% in control group. Incidence of forceful cough is 20% in control group where 0% in tramadol group. Post-extubation laryngeal spasm zero percentage in study group and 4% in tramadol group. Administration of tramadol significantly reduced the incidence of chills and rigors, breath holding, forceful cough and post-extubation laryngeal spasm. However we have collected the data of hemodynamic responses and provided to readers in this article for their reference and information.

Table 1: Observation of study subjects

Sl. No	Observation during the study	Group I (control group)	Group II (Tramadol group)
1	Appearance of chills and rigors	10 (20%)	0 (00%)
2	Restlessness and own attempt to extubate	05 (10%)	03 (06%)
3	Breath holding and increased muscular tone	06 (12%)	0 (00%)
4	Weak cough	15 (30%)	09 (18%)
5	Forceful cough	10 (20%)	0 (00%)
6	Post extubation laryngeal spasm	02 (04%)	0 (00%)

Table 2: Parameters of study participants

Indicator	Heart rate		Systolic Blood pressure		Diastolic blood pressure	
	Group S	Group T	Group S	Group T	Group S	Group T
Just before reversal	98±4	100±5	130±5	125±5	85±3	86±4
During tracheal extubation	120±7	118±7	160±5	150±6	105±3	99±4
One minute of	108±7	106±5	140±8	185±7	100±5	100±4

tracheal extubation						
5 minutes after tracheal extubation	96±5	92±5	120±6	120±7	90±3	90±4
10 min after extubation	78±3	74±3	120±4	120±6	80±3	84±3

Table 3: Patient characteristic comparison

Variables	Tramadol group	Saline group
Gender(M/F)	30/20	26/24
ASA(I /II)	31/19	29/21
Age (years)	32(21-40)	34(22-38)
Smokers (n)	10(20%)	8 (16%)
Duration of anaesthesia (min)	124±30	128±26
Emergence time in min	12±4	08±3s

Discussion

The study confirms that post anaesthesia emergence event is blunted to significant extent in patients who received tramadol. However in this no measures have taken to blunt the haemodynamic stress response, but as routine we collected haemodynamic data SBP, DBP and HR which were higher side in both the groups. However in our study the complete disappearance of shivering occurred by the end of 5 minutes in case of Tramadol and 20 minutes in control group. Whereas our study concluded that 20% of the control group had shevering, whereas 0% in tramadol group. In our study we have used tramadol for the prevention of cough and successfully proved it.

In a study conducted by Adhiti Dimar et al compared synthetic opoid, Tramadol with Pethidine, which was gold standard for control of shivering[5]. Tramadol a synthetic opioid agonist prevents shivering by inhibiting the reuptake of norepinephrine and serotonin, hence activating the descending inhibitory spinal pathways. It also modulates the activity of nucleus median raphe acting centrally on the opioid receptors predominantly with minimal effects on k and d receptors. Tramadol has minimal effect on k receptors. The antishivering effect of Tramadol is mediated via serotonergic or noradrenergic receptor or both.[7] Pethidine controlled shivering better than Fentanyl and Morphine. Mukherjee AK study observed that shivering disappeared by 1 minute in case of Tramadol and 5 minutes in case of Pethidine and in comparison to earlier study, shivering reduced significantly at 1 minute after Tramadol but the dose was 2 mgkg[8]. Furthermore, the complete disappearance of shivering took 10 minutes in Tramadol group and 20 minutes in Pethidine group. Earlier studies have showed better results with Tramadol group.[9] We have used fentanyl which can cause cough after general anaesthesia. Many theories have been attributed to explain FIC; the first possible theory may be that fentanyl stimulates C-fiber receptors present in the smooth muscles of the trachea, bronchi, and alveolar wall causing constriction with deformation of bronchial mucosa and stimulation of irritant receptors triggering the cough reflex as selective B_2 agonist (Salbutamol) or NMDA antagonists (ketamine) were found to be effective in reducing the incidence of FIC coinciding with the results in this study, ketamine 0.15 mg/kg was given 1 min before fentanyl injection. The incidence of FIC decreased from 21.6% to 7.2%; premedication with oral dextromethorphane 40 mg 1 h before induction reduced the incidence of FIC from 59.8% to 3.9%[8]; huffing maneuver (forced expiration against open glottis) before induction reduced the incidence of cough response to fentanyl but this maneuver cannot be used in premedicated patients with midazolam; dilution of fentanyl 10 μg/ml with a prolonged injection time reduced FIC; premedication with intravenous clonidine 2 μg/kg decreased FIC from 38.7% to 17.3% with mild reduction in heart rate and blood pressure[6]; intravenous dexmeditomedine 0.5 μg/kg or 1 μg/kg effectively reduced the incidence of FIC[8], also intravenous ephedrine 5 mg and lidocaine 2 mg/kg before fentanyl decreased the incidence of cough response to fentanyl but ephedrine increases heart rate and blood pressure and lidocaine potentiates cardiovascular depressant effect of the induction agents. Study conducted by Jiang WW et al. studied effects of flurbiprofen axetil on postoperative serum IL-2 and IL-6 levels in patients with colorectal cancer. They compared between tramadol 1.5 mg/kg, morphine 0.1mg/kg and flurbiprofen 1.5 mg/kg. They concluded. IL-6 levels increased postoperatively in tramadol group and they found flurbiprofen axetil has similar type of action compared to tramadol which helps in reducing the emergence events after general anaesthesia[10]. Routinely many anesthesia personal do not follow measures to suppress the hemodynamic stress response and post anaesthesia emergence events in ASA I, II patients. But our study shows that tramadol in small doses well before reversal and extubation blunts the post anaesthtic

emergence events but not haemodynamic stress response. Tramadol is readily available and is having less respiratory depression with equivalent doses of morphine that is very much required during reversal and extubation period. The dose administered is ¼th calculated dose so respiratory depression is almost out of question. Not single patient showed forceful cough over the tube this can be explained that tramadol is synthetic codeine analgesic; codeine has antitussive effect involving the distinct receptors. In our study not a single patient showed hoarseness after extubataion. Tramadol has ability to suppress the shivering during anaesthesia.

Conclusion

Tramadol effectively used for reducing the emergence events and if you add some other drugs which are used routinely for stress response then we will have added advantage of reducing both.

Acknowledgement

Authors would like to thank all the participants of study. Authors also acknowledge the immense help received from the scholars whose articles are cited and included in references of this manuscript. The authors are also grateful to authors, editors and publishers of all those articles, journals and books from where the literature for this article has been reviewed and discussed.

Source of support: Nil

Conflict of interest: None

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