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Dexmeditomedine vs Esmolol for Hypotensive Anaesthesia in Oro-Maxillo Facial Surgeries in Tertiary Care Hospital, Kanchipuram District

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Abstract

Introduction: Oro-maxillofacial surgeries are done worldwide. Extensive blood loss is a major concern in these surgeries. To make these procedures uncomplicated we need a good co-operating surgical and anesthesiologist team, very less tissue bleeding making surgical field clean and clear. Controlled hypotension[1,2] technique is employed or maxilla facial surgeries in which the systolic blood pressure is reduced to 80-90 mm of Hg, mean arterial pressure reduced to 55% to 60% or mean arterial pressure reduced 30% of baseline value. *Aim of the Study*: In this study we compared dexmeditomedine and esmolol and their effectiveness and advantage for controlled hypotension in oral-maxillofacial surgeries. *Materials and Methodology*: This study was conducted at Karpaga Vinayaga Institute of Medical Sciences and Research Centre as a double-blind randomised control trial involving 50 patients 25 in each group posted for our-maxillofacial surgery. Heart rate and Blood pressure were measured preoperatively, at 15 minutes 30min and 45 min after induction and during surgery, 10 min after infusion drug stoppage, at the end of surgery. After extubation emergence time of both the drugs after surgery was recorded. In both groups sedation scores were measured at 15,30 and 60 min after surgery ended. Intra-operative serum cortisol level were measured in both the groups and recorded separately. *Results*: In both groups target mean arterial pressure of 55-60 mm of Hg was achieved. In esmolol group heart rate and blood pressure was higher than dexmeditomedine group at 5 and 10 min. stoppage of study drug and at end of surgery. Dexmeditomedine group showed higher emergence time and sedation score at 15 and 30 min of surgery. There was no difference found intraoperatively in relation to serum cortisol level between the two groups. *Conclusion*: The observation in this study shows that dexmeditomedine and esmolol are equally effective in producing controlled hypotension with haemodynamic stability in oro-Castillo facial surgeries. Apart from the above dexmedetomidine has additional advantage of sedation and analgesic-sparing effect in compared to esmolol.

Keywords: Hypotension; Oro-Maxillofacial Surgeries; Esmolol; Dexmeditomedine.

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Introduction

Oro-maxilla facial surgeries [2] are associated with extensive blood loss making operating field bloody and requiring transmission of blood. The technique used to control blood loss and making surgical field clear intraoperatively is called controlled hypotension. It should be done with an ideal hypotensive agent [3] which has ease of administration, predictable hypotensive response, the absence of serious adverse effect and maintenance of adequate perfusion for end organs. Though many anesthetic agents and

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vasoactive drugs are used to produce controlled hypotension in this study we produced control hypotension using dexmeditomedine and esmolol. Dexmeditomedine [4,5,6] is a potent alpha2 adrenoreceptor agonist with a sedative. Analgesic and sympatholytic property. It decreases Noradrenaline release causing a reduction in heart rate and means arterial pressure [7]. It has sedative property and added an analgesic-sparing effect which is not associated with significant respiratory depression (opioid sparing drug). It decreases the activity of a Non-adrenergic neuron in Locus Cerulus of the brain stem and thereby increasing the activity of inhibitory GABA neurons in the ventral-lateral preoptic nucleus and cause sedation [8]. Esmolol [9] is a cardioselective B1 receptor blocker having a rapid onset and short duration of action with no significant intrinsic sympathomimetic on membrane stabilizing activity at therapeutic doses. It acts on by blocking B - adrenergic receptors of the sympathetic nervous system and decreases the force and rate of heart contraction [9]. These Beta receptors are found in heart and other organs of the body. In this prospective randomized control trial, we compared dexmedetomidine and esmolol has a hypotensive agent for controlled hypotension in oro-maxillofacial surgeries and evaluated their properties, quality of the surgical field, time to recovery and presence of any added advantages.

Materials and Methods

This study was a prospective randomized double-blind control trial involving fifty patients 25 in dexmedetomidine (D) group and 25 in esmolol (E) group undergoing oro-maxillofacial surgery in Karpaga Vinayaga Institute of Medical Sciences and Research Centre. As per our institution protocol a detailed history, routine blood investigations. like complete blood count, renal function test, serum electrolytes, chest X-ray and ECG were taken. Criteria fulfilling patients were randomly allocated to one of the study groups after getting consent from them. The allocation was done on the basis of the computerized randomized list. In both the groups pre-medication with Glycopyrollate 0.2 mg IM 45 min prior to surgery, Midazolam 0.05 mg/kg IV and Fentanyl 2 micro/kg IV were given. In group (E) esmolol 1mg/kg IV over 1 min as a loading dose and a infusion 0.5-0.8mg/kg/hr IV before induction was given. Titration of infusion dose was done to obtain a mean arterial pressure between 55-65mm of Hg. In group (D) dexmeditomedine, 1micro/kg diluted in 10ml of 0.9% saline was given as a loading dose over 10min and an infusion at the rate of 0.5 to 0.8micro / kg/hr before induction. Infusion dose was titrated to obtain a mean arterial pressure 55-65mm of Hg. In this study both the groups received same inducing agent propofol 1-2mg/kg and surgery was done by the same surgeon who was blinded to a hypotensive agent used so as to ensure the consistency and estimation of surgical field quality. Evaluation was done by following parameters such as heart rate and blood pressure pre-operatively and after induction, 15, 30, 45 min during surgery, 5 and 10 min after stopping the study drugs, at the end of surgery, after extubation, intraoperative serum cortisol level, emergence time, quality of surgical field, post-anesthetic recovery score by modified Aldrete score, sedation score (Ramsay sedation score) at 15, 30 and 60 min and first rescue analgesia.

Results

Our study included fifty patients who were randomly allocated to either D group or E group. Age, weight, ASA grading was noted. The outcomes measured are heart rate, Blood pressure. Serum control level, emergence time, quality of the surgical field, post-anesthesia recovery score, sedation score and first rescue analgesia were recorded as follows.

Table 1: Demographic Data

Study Group	Group D	Group E	P Value
Age (years)	33.08+7.3	31.84+8.6	0.5
Weight (Kg)	56+9.1	57.04+9.7	0.7

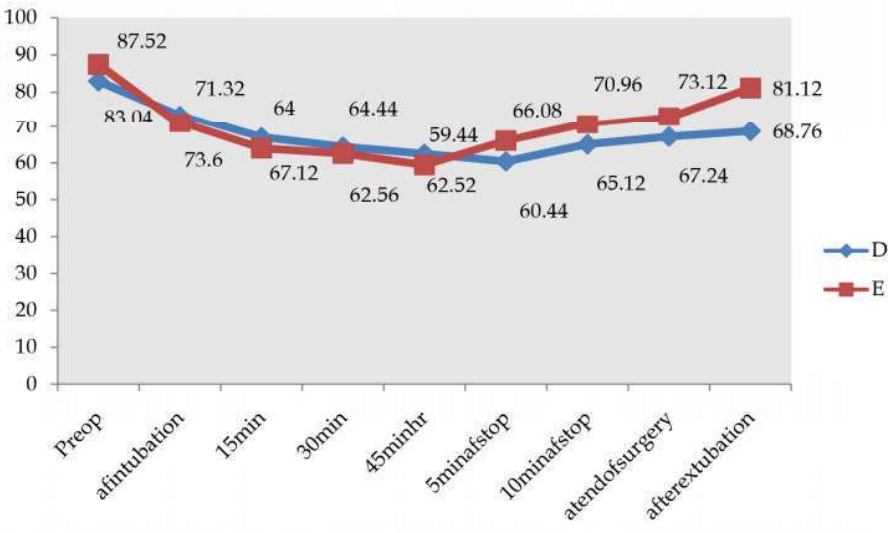
Graph 1 Comparision of heart rate for two groups pre-operatively (p Value 0.058), after induction at 15 (p Value 0.082), 30 (p Value 0.05) and 45 (p Value 0.09) min during surgery showed no significant statistical differences. Heart rate comparison at 5 (p Value <0.001), 10 min (p Value 0.002) after stoppage of study drug, at the end of surgery (p Value 0.002) were higher in Group E than Group D.

Graph 2 Comparision of systolic blood pressure showed no statistical significance preoperatively (p Value 0.098), 15 min (p Value 0.05), 30 min (p Value 0.08), 45 min (p Value 0.17) of surgery. Statistically significant difference in systolic blood pressure was found in 5 (p Value <0.001), 10 min (p Value <0.001) after stoppage of drug, end of surgery (p Value <

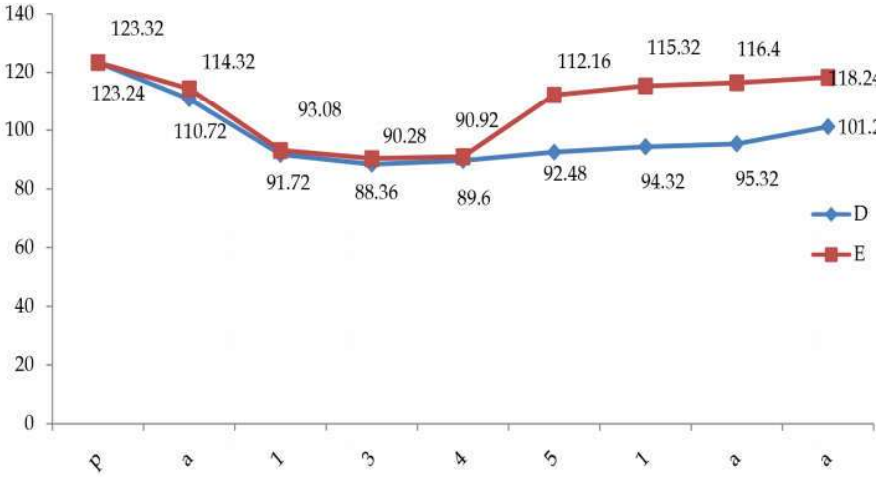
0.001) and after extubation (p Value <0.001) with high systolic blood pressure in Group E than Group D.

Graph 3 Comparision of diastolic blood pressure between two groups showed no statistical difference preoperatively (p Value 0.27), intubation (p Value 0.31), 15 min (p Value 0.54), 30 min (p Value 0.15), 45 min (p Value 0.19) during surgery. Statistically significant difference was found after 5 min (p Value<0.001), 10 min (p Value < 0.001) of drugs stoppage, end of surgery (p Value < 0.001) and at extubation (p Value in which diastolic Blood pressure was higher in Group E and Group D).

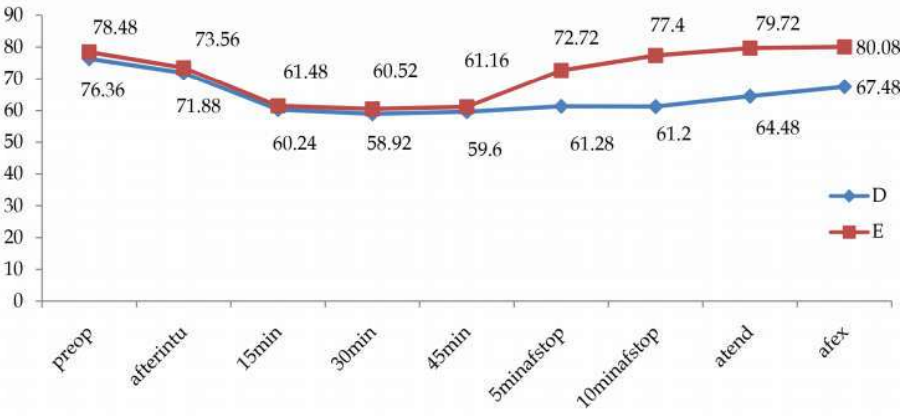
Graph 1:



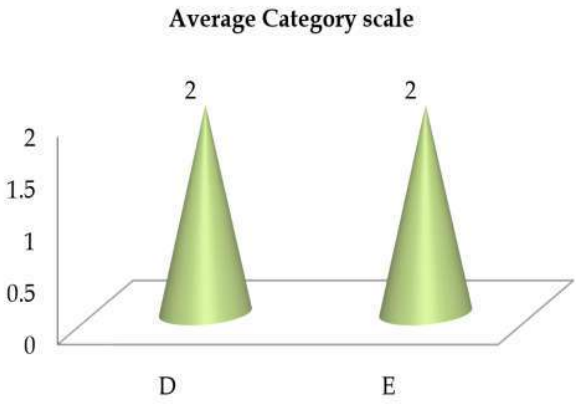
Graph 2:



Graph 4:



Quality of Surgical Field – Average Category Scale



Daigram 1:

Table 2 Comparison of Emergence time showed the statistically significant difference between two group. Group D higher than Group E. Post Anesthesia Recovery Score showed statistical differences between two groups. To achieve a modified Aldrete score of more than 9 the time take by Group D was higher than group E. Sedation Score revealed statistically significant difference at 15, 30 min after surgery with Group D higher than group E. No statistical difference was found 60 min after surgery in both groups. Rescue Analgesia showed statistical differences in which time for rescue analgesia is higher in Group D than Group E.

Discussion

Oro-maxillofacial surgeries are widely performed and it requires a skillful team and a clear operating field. Many studies have stated the advantages of hypotensive anesthesia in these surgeries. In our study we compared the effects of Dexmeditomedine a loading dose of 1micro/kg over 10 min followed by 0.4-0.8 micro/kg/hr infusion with Esmolol a loading dose of 1mg/kg over 1 min followed by infusion 0.4-0.8 mg/kg/hr for controlled hypotension in oro-maxillofacial surgeries. Shen et al. [10] found heart rate and blood pressure was significantly reduced by using esmolol for hypotensive anesthesia in FESS. Malhotra et al. [11] found that use of dexmedetomidine for hypotensive anesthesia lower mean arterial pressure and heart rate. In our study we compared dexmeditomedine with esmolol in which both the drugs are equally comparable preoperatively and intra-operatively. But at 5min, 10 min after stoppage of study drug infusion, at end of surgery, after extubation dexmeditomedine showed lower mean arterial pressure and heart rate which was consistent with above two studies. Farah Nasreen et al. [12] studied the effects of dexmeditomedine in hypotensive anesthesia in middle ear surgery showed improved bloodless operating field. Boezaart et al. [9] compared Sodium Nitroprusside with esmolol and found that superior surgical field was seen with esmolol. In our study we compared dexmedetomidine with esmolol which showed equally comparable clear operating field which was consistent with the above study. Abdullah Aydin Ozcan et al. [13] compared remifentanil with dexmedetomidine for hypotensive anesthesia in FESS and found dexmeditomedine has a prolonged emergence time. In our study dexmedetomidine had a prolonged emergence time than esmolol. Koi IO et al. [14] compared dexmeditomedine with esmolol for hypotensive anesthesia in tympanoplasty and found esmolol had a shorter recovery which was also consistent in our study. Turan et al. [15] compared esmolol, remifentanil, dexmedetomidine and found that post-extubation recovery score was long in dexmeditomedine than the other two. In our study we had higher post-anesthesia recovery score in Group D than Group E. CR Patel et al. [16] study found that dexmeditomedine had higher postoperative sedation score than the control group. In our study sedation score was significantly higher in group D

Table 2: Serum cortisol level intra-operatively showed no statistical difference between the two groups

Parameters	Group D	Group E	P value
Serum Cortisol level (Intraoperatively)	4.04+0.5	3.75+0.5	0.007
Emergence Time	13.14+1.1	7.62+1.3	0.00
Post Anesthesia Recovery (Modified Aldrete score more than 9)	15.4+1.8	10.86+0.9	0.00
Sedation Score at 15 mins	2.76+0.4	2.36+0.4	0.00
Sedation Score at 30 mins	2.64+0.4	2.28+0.4	0.01
Sedation Score at 60 mins	2	2	
Time to first rescue analgesia	64.4+7.9	40.64+5.5	0.00

at 15 and 30 min after surgery when compared to esmolol and at 60 min there was no difference in sedation score in both the group. Gurbet et al. [17] study found that postoperative analgesic requirement was lower when dexmeditomedine used intraoperatively. Guptha et al. [18] studied that dexmeditomedine had lower pain score and time for rescue analgesia was longer. In our study we found dexmeditomedine having significantly long time for rescue analgesia than esmold group. Sarpkaya et al. [19] study found lower serum cortisol level in dexmeditomedine group than the control group when dexmedetomidine was used perioperatively for surgical stress response in hypotension patients. In our study intraoperative serum cortisol level was only measured and it had no significant differences in both the groups.

Conclusion

This study reveals that both Esmolol and Dexmeditomedine can be effectively used in controlled hypertension for oro-maxillofacial surgeries. Both were equally comparable with respect to the quality of the surgical field and intra-operative hemodynamics. Compared with Esmolol Dexmedetomidine had an added advantage of inherent analgesic property and sedation property.

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