



Comparative Study of Iv Dexmedetomidine Versus Iv Midazolam for Sedation During Tympanoplasty and Modified Radical Mastoidectomy.

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ABSTRACT

AIM: Comparison of the efficacy of Dexmedetomidine vs Midazolam during monitored anaesthesia care in minor ENT surgical procedures with special emphasis on the sedative properties and the effectiveness of sedation, the number of doses of rescue analgesics given and the haemodynamic properties measured.

Materials: 80 patients aged between 18-50 years undergoing ear surgeries under local anaesthesia randomly received Inj. Dexmedetomidine 1µg/kg intravenously, over 10 mins followed by 0.5µg/kg/hr(Group D) or Inj. Midazolam 0.05mg/kg diluted intravenously slowly, followed by 0.01 mg/kg/hr(Group M) followed by dextrose normal saline infusion at 0.2 ml/kg/hr. Sedation was titrated to Ramsay sedation score (RSS) of three. Vital parameters, intraoperative pain intensity by visual analogue scale (VAS)>3.

RESULTS : Mean Heart Rate (HR) and Mean Arterial Pressure (MAP) were significantly decreased from baseline in group D as compared to group M (p<0.001). RSS, in group M was significantly higher as compared to group M throughout the surgery. Rescue sedation was given in 3 patients in group BD while in group D, 9 patients required additional sedation (p<0.001) There was fall in heart rate and fall in blood pressure in Group D. No such changes in hemodynamics seen in Group M. Quality of anaesthesia was better in Group D than Group M.

KEYWORDS

Dexmedetomidine, Midazolam, sedation, ENT surgeries

INTRODUCTION

Anxiety is the commonest presentation in patients in the perioperative period, which generally starts few days prior to surgery and reaches its peak just before induction of anaesthesia. Anxiety is also an intraoperative problem especially in patients undergoing surgical procedures under regional anaesthesia leading to various manifestations like increasing oxygen consumption, respiratory rate and heart rate due to circulating level of endogenous catecholamines and their untoward effects. Control of anxiety and pain is very much necessary in an attempt to control the above metabolic derangements and for the safety and comfort of the patient in the perioperative period.

A quiet patient is need for any surgery under local or regional anaesthesia. Sedation improves patient's tolerance to surgery, relieves stress and anxiety.

Several drugs have been used for sedation during surgery under local anaesthesia with MAC including propofol, benzodiazepines and opioids. Midazolam is the most frequently used sedative and has been reported to be well tolerated when used in MAC.

Alfa-2 adrenoreceptor agonists i.e. CLONIDINE and DEXMEDETOMIDINE have been recently used preoperatively for their SEDATIVE, ANALGESIC, And SYMPATHOLYTIC and CARDIOVASCULAR STABILISING EFFECTS with reduced anesthetic requirements. Dexmedetomidine offers beneficial pharmacological properties producing sedation, analgesia, and anxiolysis without relevant respiratory depression¹. It decreases sympathetic outflow and hence, has been reported to reduce bleeding significantly in ENT surgeries.

Tympanoplasty is a surgical technique to repair a defect in the tympanic membrane with the placement of a graft. It is superficial, less invasive surgery and can be done under local anaesthesia with or without sedation in cooperative and well counseled patients.

Modified radical mastoidectomy is a less severe form of radical mastoidectomy. Not all middle ear bones are removed and the eardrum is rebuilt. .

Advantages of Local anaesthesia are cost effectiveness, intraoperatively hearing can be tested, less bleeding, early recovery, less post-operative pain².

Use of continuous intravenous infusion of short acting sedative-hypnotic drugs is associated with fewer side effects and shorter recovery times than traditional intermittent bolus techniques. It also provides stable level of sedation³.

Dexmedetomidine is chemically described as (+)-4-(S)-[1-(2,3-dimethylphenyl)ethyl]-1 H-imidazole monohydrochloride. It has a molecular weight of 236.7. It has a pH in the range of 4.5-7. It is water soluble, has a pKa of 7.1. Its partition coefficient in octanol: water at pH 7.4 is 2.89.⁴

Midazolam HCL first was synthesized by Fryer and Walsler in 1976.⁵ It is a short-acting, water soluble^{5,4} benzodiazepine drug that acts similarly to diazepam. It has replaced diazepam for use in preoperative medication & conscious sedation. Compared to diazepam it is two to three times more potent & its affinity for the benzodiazepine receptors is twice that of diazepam. Compared to other benzodiazepines amnestic effects are more potent than sedative effects.

METHOD

Prospective, randomized, single blind, clinical comparative study of Dexmedetomidine and Midazolam intravenous infusion in patients undergoing tympanoplasty and modified radical mastoidectomy under local anaesthesia. 80 patients of either gender, aged between 18-50 years of ASA grade I & II undergoing tympanoplasty and modified radical mastoidectomy under local anaesthesia .

INCLUSION CRITERIA:

- * Age 18-50 years
- * Patient of either gender
- * ASA Grade I and II
- * Patients undergoing Tympanoplasty and modified radical mastoidectomy under local anaesthesia with MAC
- * Consenting for the procedure

EXCLUSION CRITERIA:

1. Patients belonging to American Society of Anaesthesiologist physical status III and IV
2. Patients allergic to Dexmedetomidine or Midazolam.
3. Emergency procedures
4. Patients having arrhythmias, valvular heart diseases.
5. Patients on -blockers, vasodilator therapy.
6. Pregnant women.
7. Those who refuse consent.

STUDY GROUPS: 80 patients of either gender, aged 18-50 years were allocated randomly in two groups containing 40 patients each to receive either Inj. DEXMEDETOMIDINE (Group D) or Inj. MIDAZOLAM (Group M) for sedation during surgery.

Group D: Dexmedetomidine group (n= 40) - Inj. Dexmedetomidine 1µg/kg in 100 ml Normal Saline over 10 min followed by inj. Dexmedetomidine infusion 0.5µg/kg/hr. given with infusion pump

Group M : Midazolam group (n=40) Inj. Midazolam 50µg/kg in 100 ml Normal Saline over 10 min, followed by inj. Midazolam infusion 10µg/kg/hr. given with infusion pump.

All the patients were examined the day before surgery and thoroughly investigated according to institute protocol. They were counseled with regards to sedation, local anaesthesia as well as the operative procedure.

Patients meeting above criteria were asked to participate in study after informed consent and kept fasting overnight.

On the morning of surgery, Baseline HR, SpO2 and BP will be recorded. The 20-gauge venous cannula will be inserted into the dorsum of the hand.

Premedication in the form of inj. Glycopyrrolate [10mcg/kg of body weight] iv, inj. Ondansetron [0.1 mg/kg] iv and inj. Diclofenac 75 mg intramuscularly 30 min before operative procedure will be given.

Patients in group D received - Inj. Dexmedetomidine 1µg/kg, in 100 ml Normal Saline over 10 min followed by 0.5µg/kg/hr iv infusion.

Loading dose of Inj. Dexmedetomidine calculated and diluted to 100ml with 0.9% Normal saline and kept at constant rate of 10ml/min given over 10 min.

Inj. Dexmedetomidine infusion was prepared by adding 100 mcg in 100 ml of 0.9% normal saline containing 1mcg/ml @0.5 mcg/kg/hr.

Patients in group M received - Inj. Midazolam 50µg/kg in 100 ml Normal Saline over 10 min, followed by 10µg/kg/hr iv infusion.

Loading dose of Inj. Midazolam calculated and diluted to 100ml with 0.9% Normal saline and kept at constant rate of

10ml/min given over 10 min.

Inj. Midazolam infusion was prepared by adding 2000µg in 100 ml of 0.9% normal saline containing 20µg/ml @10µg/kg/hr.

After the loading dose of the drug, Ramsay Sedation Score (RSS) was assessed with target sedation of RSS 3. RSS was assessed throughout the duration of surgery and in postoperative period every 15 min till 120 min.

Once RSS was 3, Local anaesthesia was given by the operating surgeon, using Lidocaine 2% with adrenaline 1:200,000, 6-7 ml. The maintenance infusion was commenced at constant infusion rate for both the groups, according to weight of patient.

Heart rate (HR), Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), Mean arterial pressure (MAP), Respiratory Rate (RR), Oxygen Saturation (SpO₂) were recorded at the start of loading infusion, 5min after, at the end of loading infusion and every 15mins thereafter till the end of surgery and post-operatively for 2 hours.

Sedation score was analyzed by **Ramsay Sedation Scale (RSS)**

Ramsay Sedation Scale (RSS)	
1	Patient is anxious and agitated or restless, or both
2	Patient is co-operative, oriented, and tranquil
3	Patient responds to commands only
4	Patient exhibits brisk response to light glabellar tap or loud auditory stimulus
5	Patient exhibits a sluggish response to light glabellar tap or loud auditory stimulus
6	Patient exhibits no response

RESULTS

Table 1: General Profile of subjects

	Group				P value
	Group D		Group M		
	Mean	SD	Mean	SD	
Age (years)	33.30	7.68	32.93	9.24	0.844
Weight (Kg)	57.23	7.70	54.78	7.66	0.158

Table 2: Gender distribution of subjects

	Group				P value	
	Group D		Group M			
	Count	%	Count	%		
Gender	Female	17	42.5%	18	45.0%	0.822
	Male	23	57.5%	22	55.0%	

Table 3: Distribution of subjects based on Diagnosis and Surgery performed.

	Group				P value	
	Group D		Group M			
	Count	%	Count	%		
Diagnosis	Lt CSOM	20	50.0%	20	50.0%	1.000
	Rt CSOM	20	50.0%	20	50.0%	
Surgery	MRM	10	25.0%	10	25.0%	1.000
	Tympanoplasty	30	75.0%	30	75.0%	

Table 4: Duration of surgery and Ramsay Sedation Score

	Group				P value
	Group D		Group M		
	Mean	SD	Mean	SD	
Duration of Surgery (mins)	97.62	26.48	97.12	24.04	0.930
Time taken to achieve RSS of 3	8.42	1.53	8.32	1.42	0.763

Figure 1: Line diagram showing Heart rate variation between two groups at different time intervals

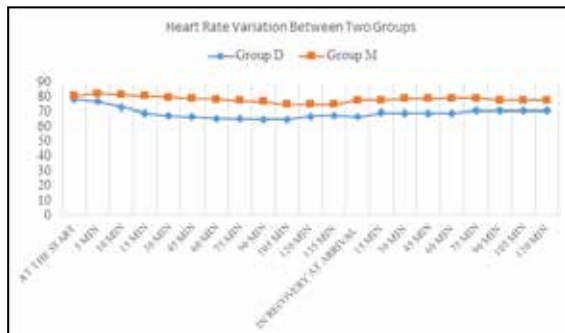


Figure 2: Line diagram showing SBP variation between two groups at different time intervals

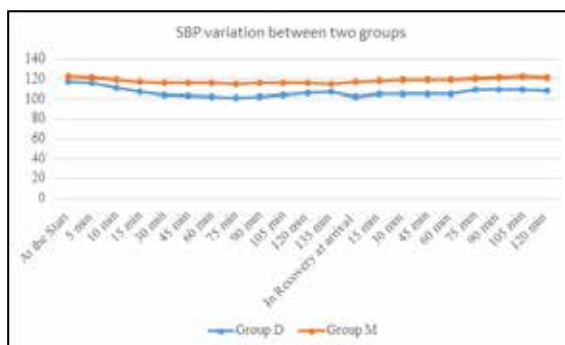
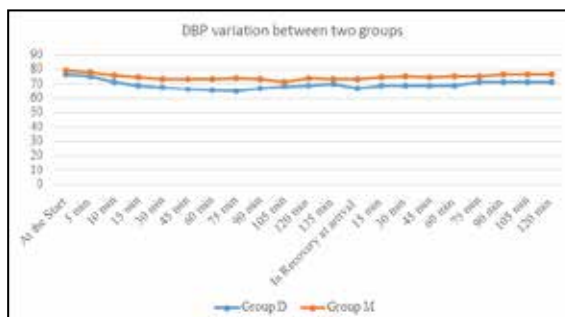


Figure 3: Line diagram showing DBP variation between two groups at different time intervals



DISCUSSION

Monitored anaesthesia care (MAC) may be applied in varies ENT surgeries in which an adequate sedation and analgesia are desirable for the comfort of both the patient and surgeon. MAC involves administration of local anaesthesia with intravenous sedatives, anxiolytic and analgesic drugs with detailed monitoring of vital parameters. It has many advantages such as less bleeding, cost-effectiveness, postoperative analgesia, faster recovery and ability to test hearing intraoperatively. Thus the primary objective in providing MAC is to ensure patient comfort, safety, and satisfaction during surgery¹³.

All the patients are comparable with respect to the demographic parameters: age, weight and sex . In Group D mean age was **33.30** years and in Group M it was **32.93** years. In Group D there were **23** male and **17** female patients where as in Group M there were **18** male and **22** female patients. The mean weight in Group D was **57.23** kg and in Group M it was **54.78**kg. So, the groups were comparable and there was no statistically significant difference when both the groups were compared (**Table 1,2**)

There were **30** patients of Tympanoplasty and **10** patients of

MRM in each group. The mean duration of surgery in Group D was **97.62 mins** while in Group M it was **97.12 mins**. Both the groups were comparable in type and duration of surgery and there is no statistically significant difference between two groups.

In our study we found The Median RSS score of 3 was achieved in both groups at 10 min after anesthesia. Time taken to achieve target sedation score (RSS 3) was comparable in both groups i.e for Group D 8.42 mins and for Group M 8.32 mins. There was no statistically significant difference between two groups.

We also found significantly more sedation with Dexmedetomidine than midazolam infusion during the surgical procedure at 30mins, 45 mins and 60 mins. but thereafter it was comparable in both the groups.

In post-operative period, there was significant difference in RSS score at arrival, 15 mins and 30 mins there after it was comparable in both groups.

Similar results found in studies conducted by M. Celik, N. Koltka, B. Cevik , H. Baba⁸ , Kazim Karaaslan, Fahrettin Yilmaz, et al (2007)⁹, Dr Vyas DA et al.¹⁰, Dr Parikh DA et al (2013)¹¹ , Dr Padmaja A et al.(2015)¹²

Dr Padmaja A et al.(2015)¹² when Dexmedetomidine was infused in patients it produced reduction in mean arterial pressure (15-20%) in 40% of the subjects and pulse rate (5-10%) in 30% when compared to midazolam.

However midazolam did not produce significant changes in mean arterial pressure, where 15-20% of the reduction is seen in only 15% of the subjects (P >0.05) and 5-10% decrease in heart rate in only 5% of the subjects (P >0.05). Hence fall in the mean arterial pressure (MAP) and heart rate was noted to be a statistically significant component in group D.

In our study similar results are found. We observed that there was significant difference in SBP and DBP between Group D and Group M. The significant difference was seen from baseline after anesthesia and existed throughout the study duration. Higher SBP was observed in Group M than Group D. The variation was in Normal Range in both groups i.e. no hypotension and no hypertension was observed in both groups.

Within group there was significant decrease in SBP and DBP at various intervals compared to baseline values in both Group D and Group M during anesthesia and significant increase was observed during Post-operative period.

Parikh DA et al (2013)¹¹ found that intraoperative mean HR and MAP in Dexmedetomidine group were lower than the baseline values and the corresponding values in Midazolam-Fentanyl group. In our study, we also found significant reduction in HR, SBP, DBP, and MAP in group D compared with baseline values and corresponding values in group M, intraoperatively and postoperatively.

CONCLUSION

By summarizing above comparisons we can conclude that for monitored anaesthesia care in ENT surgeries like tympanoplasty and modified radical masoidectomy performed under local anaesthesia, intravenous Dexmedetomidine could be a better alternative compared to conventional sedation with Midazolam, since it provides a calm patient with better intraoperative analgesia, and a bloodless surgical field leading to increased satisfaction of both patient and surgeon.

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