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Research Article

Comparison of Dexmedetomidine and Magnesium Sulfate for Middle Ear Surgery Under Monitored Anesthesia Care(Mac)

Dr. Kusum B. Bilwal [1*], Dr. Sheetal M Shah[2]

1. *R3, Department of Anaesthesia, Smt. SCL general hospital and Smt. NHL Medical College, Ahmedabad, Gujarat.*

2. *Assistant professor, Smt. NHL MMC college, Ahmedabad, Gujarat.*

[*]**Correspondence to:** Dr. Kusum B. Bilwal, R3, Department of Anaesthesia, Smt. SCL general hospital and Smt. NHL Medical College, Ahmedabad, Gujarat.

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Abstract

Introduction: *Middle ear surgeries[MES] are usually done under LA with sedation under MAC.Commonly used medication for MAC in our hospital are fortwin[F] and phenargan[P]. Dexmedetomidine, a α2 receptor agonist with analgesics and conscious sedative effect seems to be a better choice than the old traditional regime. magnesium sulphate is a competitive NMDA receptor antagonist.NMDA receptor antagonist has analgesic, sedative and muscle relaxant effect.We studied patient's and surgeon's satisfaction score. sedation score of patients is used to compare the effectiveness of dexmedetomidine and magnesium sulfate intravenously.*

Aim & Objectives: *To assess:*

1.Sedation score of patients(RSS)

2.Analgesia via VAS

3.Satisfaction score of patients and surgeons.

4.Adverse events if any.

Methodology:

INCLUSION CRITERIA:

1. Patients undergoing middle ear surgeries under MAC

2.ASA status 1 & 2

3.60 Adult patients

4.Age: 18-60 yrs

EXCLUSION CRITERIA:

1. Patients having allergy to study drug.

2.α receptor agonist or antagonist therapy taken earlier

3.Patient having any cardiac disease

4.Chronic obsructive lung disease

5.Upper respiratory tract infections

6.Pregnant and lactating female

Were randomly allocated into two groups.

Group D received i.v.Dexmedetomidine 1µg/kg over 10mins followed by 0.5µg/kg .

Group M received i.v MgSO4 40mg/kg for 10 min followed by 10mg/kg at the onset of surgery. Vitals parameter and Ramsay sedation score[RSS] of patient were noted after the time of administration of sedative. Patient and surgeon satisfaction score and adverse effects were compared.

Results:

RSS was satisfactory in group D as compared to group M intra-operative HR and MAP were significantly lower than the baseline value in group D. Surgeon and patient satisfactory score were better in group D than Group M.

Name of statistical test: statistical package of social science[SPSS]

Conclusion:

Dexmedetomidine is more effective to provide promising surgical field condition, favorable controlled hypotension and less necessity of opioid or analgesia administration. Near bloodless microscopic surgical field with better surgeon and Patient satisfaction.

Introduction

MES are usually done under local anesthesia(LA) with sedation under MAC

MAC: according to American Society of Anesthesiologist, MAC is a planned procedure in which surgery is done under LA with sedation and analgesia. Dexmedetomidine, a α2 receptor agonist with analgesic and conscious sedative effect and Magnesium sulfate, a competitive NMDA receptor antagonist which also has analgesic,sedative and muscle relaxant effect seem to be better choice for MES under MAC.

Aim and Objectives

Sedation score of the patient(Ramsay sedation score).

Analgesia via visual analogue scale (VAS)

Satisfaction score of surgeons.

Adverse event, if noted.

INCLUSION CRITERIA:

1) Patients undergoing middle ear surgeries under MAC

2) ASA physical status 1 & 2

3) 60 adult patients

4) Age: 18-60 yrs

EXCLUSION CRITERIA:

1) Patient having allergy to study drug

2) α2 receptor agonist or antagonist therapy taken earlier

3) Patients having any cardiac disease, chronic obstructive lung disease, upper respiratory tract infections, pregnant and lactating female.

Materials and Methodology

- Thorough pre-op assessment,all routine investigations and written informed consent taken.

- Explanation of procedure and reassurance to the patients done.

- 60 Patients, 18 - 60 yrs, two equal groups

1) Dexmedetomidine Group [Group-D]:

i.v. Inj. dexmedetomidine 1µg/kg over 10 mins

and then continued throughout the surgery 0.5µg/kg/hr.

2) Magnesium sulfate Group [Group-M]:

i.v. Inj. magnesium sulfate 40mg/kg for 10 min at onset of surgery followed by 10 mg/kg/hr throughout the surgery.

- Once RSS 3 is achieved, surgeon administered LA using 2% lignocaine with adrenaline(1:2,00,000) 6-7ml/kg in the post-auricular area to block grater auricular nerve, auriculo-temporal nerve and four quadrants of external auditory canal.

- Surgery was started after confirmation of adequate analgesia.

- Rescue bolus 1µg/kg was given to all those patients responding with the pain or body movement.

Intraoperative Monitoring:

1) Heart Rate, Pulse oxymetry, Mean Arterial Pressure

2) Ram say sedation score(RSS)

3) Assessment of pain by VAS(Visual Analogue Scale)

4) Assessment of bleeding by intraoperative bleeding scale.

Ram say sedation score(RSS):

1. Anxious,agitated or restless

2. cooperative,oriented and tranquil

3. asleep,responds to command

4. asleep but has a brisk response to light glabellar tap or loud auditory stimulus.

5. asleep has a sluggish response to a light

Visual Analogue Scale(VAS)(0-10)

0	No Pain
1-3	Mild Pain
4-6	Moderate to Severe Pain
7-9	Very Severe Pain
10	Worst Pain

Intraoperative bleeding scale:

0	No bleeding
1	Slight bleeding; no suctioning of blood required.
2	Slight bleeding; occasional suctioning required. Surgical field not threatened.
3	Slight bleeding; frequent suctioning required. Bleeding threatened Surgical field a few seconds after suction removed
4	Moderate bleeding; frequent suctioning required.Bleeding threatened Surgical field directly after suction was removed.

- Surgeon's satisfaction score were evaluated as excellent, good, average & bad.

- If need for 1st rescue analgesia - intraoperative time were also noted.

- Postoperative Monitoring:

1) Vitals

2) Surgeon satisfaction score(excellent, good, average & bad)

3) Adverse events if any

Results

TABLE 1: DEMOGRAPHIC DATA:

Comparison of groups was was done with MEAN and SD Value using "SPSS" software. "P" value of <0.05 was considered as statistically significant.

	Group S(n=30) Mean±SD	**Group G(n=30) Mean±SD**
Age (Years)	38.36±7.06	40.43±5.23
Weight (Kg)	61.93±10.36	62.8±7.69
Sex M:F	18:12	17:13
ASA Grading (1/2)	20:10	16:14

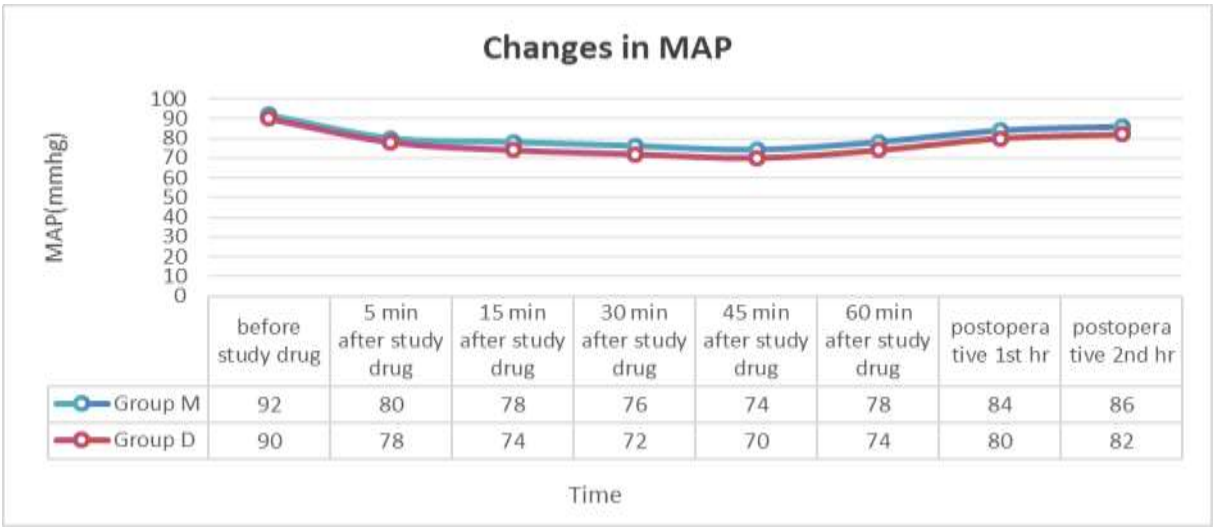
TABLE 2:Patient and surgeon satisfaction score and sedation score:

Study variables	Group D N=30(median)	Group M N=30(median)	P value
RSS	3-4(4)	1-2(2)	0.024
VAS	3-4(3.6)	6-7(5.5)	0.0173
Intraoperative bleeding score	1-2(1)	2-3(2.4)	0.0162

HEART RATE

Above table shows HR in both groups is comparable with P value >0.05

MEAN ARTERIAL PRESSURE



Above Table shows difference in MAP is not significant(P value >0.05)

TABLE 3: ADVERSE EFFECT

Study variables	Group D	Group M
Nausea & Vomiting	0	2
Dry mouth	0	0
Tachycardia	0	1
Bradycardia	2	0
Hypotension	2	0
Hypertension	0	2

Discussion

Ear surgery under LA

Primary Aim:

- Ability to test hearing during surgery
- Bloodless operative field and a calm patient in ear surgery
- It is provided by:

Physical & pharmacological techniques

- head up tilt 15˚to 20˚

- avoidance of venous obstruction

- Normocapnia

- controlled hypotension(3)

Controlled hypotension:

- It is allowed upto reduction of 30% of baseline MAP.

- It can cause tissue hypoxia by reducing micro-circulatory auto-regulation of vitals organs.

- Head up position & hypotension: more chances of air embolism & more reduction in arterial & venous pressure in areas above the heart.

Dexmedetomidine: α-2 agonist, presynaptic activation of alpha 2 receptors inhibits the release of norepinephrine, terminating the propagation of pain signals.postsynaptic activation of alpha 2 adreno receptors in the CNS, inhibits sympathetic activity and decrease BP and HR.It can augment anesthesia by providing dose related sedation, anxiolysis without respiratory depression, decreased upper airway secretions, perioperative hemodynamic stability and analgesia(10,11).

Magnesium sulfate: Is a non competitive NMDA receptor antagonist with Anti-nociception effects.It acts as a cell membrane stabilizer by limiting the outflow of calcium from sarcoplasmic reticulum through the inhibition of Ca- ATPase and Na-K-ATPase involved in transmembrane ion exchange.It also has a vasodilating effect by increasing the synthesis of prostacyclin and inhibiting angiotensin converting enzyme activity, so it can be a good agent for controlled hypotension which is due to its analgesic effect(12).

Our results are comparable with other(14,15,16) and Hassan PF et al(1), studied randomized 46 patients of dexmedetomidine (D) group (n = 23) and magnesium sulfate (M) group (n = 23). In the D group, after induction of anesthesia but before the surgery, a bolus dose of 0.4 μg/kg slowly infused over 10 min, then infusion at rate of 0.4 μg/kg/h until the end of surgery. In M group, magnesium sulfate 10% (50 mg/kg) was given slowly, then continuous infusion by a rate of 10 mg/kg/h during the whole surgery. They noticed that

both drugs were effective in achieving hypotensive anesthesia though dexmedetomidine proved to have better effect on the surgical field and blood loss compared to magnesium sulfate with no intra- and post-operative complications.

Akkaya et al(6) in 2014, conducted a randomized clinical study on 60 patients scheduled for functional endoscopic sinus surgery to evaluate role of I.v dexmedetomidine 1 µg/kg and magnesium sulfate 50 mg/kg 10 min before induction followed by infusion 0.6 µg/kg and 15 mg/kg respectively. They found dexmedetomidine provided better hemodynamic stability with better visual surgical field and reduced bleeding without any major adverse effect than magnesium sulfate group.Our study goes with this study.

Our study also goes with Mohamed et al(7),they used dexmedetomidine in 30 patients loading dose 1 µg/kg hr in 200ml NS followed by 0.5 µg/kg/hr, in other 30 patients magnesium sulfate loading dose 50 mg/kg in 200ml NS followed by 15 mg/kg/hr maintenance dose in adult patients posted for middle ear surgery.They noticed better surgical field with dexmedetomidine than magnesium sulfate group.

In agreement with our hemodynamic findings, El Saied et al(5). found that dexmedetomidine showed a significant reduction in intraoperative HR and MAP more than fentanyl. Moreover, the intraoperative reduction in hemodynamic parameters (MAP and HR) in both groups was within 20% from baseline values.

Recovery time in dexmedetomidine group was not prolonged in spite of sedative effects. This was explained by the reduction of intraoperative anesthetic requirements. Moreover, sedation of dexmedetomidine is easily to be aroused. Gupta et al[9] who studied the effect of dexmedetomidine on achieving oligemic field for middle ear surgery and found that dexmedetomidine did not affect awakening time or delayed recovery from anesthesia.

Our results are comparable with Dikman et al(8) who studied Forty patients undergoing middle ear surgery under Anesthesia.In group D, dexmedetomidine 0.1µg.kg for 10 minutes was administered before induction and continued with a rate between 0.2-0.7 µg/kg/h and Saline group, received normal saline at rate of 50 ml/h.Infusions were stopped with the end of microsurgery.They concluded that dexmedetomidine was effective in inducing consistent and sustained controlled hypotension, and achieved clear surgical field during surgery with no need for additional use of a potent hypotensive agent.

In our study, nausea and vomiting incidence were higher in Magnesium sulfate group than Dexmedetomidine group which is comparable with the results of Mohamed et al[7].

Limitation of our study is that there was no controlled group, small sample size, postoperative serum dexmedetomidine and magnesium concentration was not measured.

Conclusion

- We found both Dexmedetomidine and Magnesium sulfate are satisfactory agents to provide sedation, analgesia & bloodless operative field.
- Dexmedetomidine has advantages like arousable sedation and analgesia without respiratory depression but long recovery period and high probability bradycardia should be deliberated.

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