

Original Research

Dexmedetomidine infusion as anaesthetic adjuvant during middle ear surgery

¹Ganesh Raghunath Khade, ²Vinay Kumar Singh

¹Assistant Professor, Department of Anaesthesia, Gouri Devi Institute of Medical Sciences & Hospital, Durgapur, West Bengal, India

²Assistant Professor, Department of General Medicine, Narayan Medical College & Hospital, Sasaram, Bihar, India

ABSTRACT:

Background: Middle ear surgery under general anaesthesia is revolutionised with the introduction of hypotensive anaesthesia. The present study evaluated the role of dexmedetomidine infusion as anaesthetic adjuvant during middle ear surgery. **Materials & Methods:** 80 adult patients scheduled for elective middle ear surgery were divided into 2 groups. Group I patients received infusion of dexmedetomidine 0.5 µg/kg/hour and group II patients received placebo infusion of normal saline during middle ear surgery after induction of anaesthesia till 20 minutes before completion of surgery. All patients were assessed intra-operatively for bleeding at surgical field and haemodynamic changes. **Results:** Group I had 16 males and 24 females and group II had 20 males and 20 females. The mean surgical time in group I was 95.2 minutes and in group II was 102.4 minutes, mean percentage of isoflurane requirement of 0.82% in group I and 1.50 % in group II heart rate (beats/min) was at baseline in group I was 93.1 and in group II was 93.8, after induction was 72.3 in group I and 73.0 in group II, after intubation 5 min was 71.6 in group I and 76.4 in group II, 30 min was 70.6 in group I and 77.8 in group II, at 60 min was 67.7 in group I and 86.2 in group II and after extubation was 83.5 in group I and 96.3 in group II. **Conclusion:** Dexmedetomidine infusion was safe to provide oligoemic surgical field for middle ear surgery.

Key words: Dexmedetomidine, Middle ear surgery, general anaesthesia

Corresponding author: Vinay Kumar Singh, Assistant Professor, Department of General Medicine, Narayan Medical College & Hospital, Sasaram, Bihar, India

This article may be cited as: Khade GR, Singh VK. Dexmedetomidine infusion as anaesthetic adjuvant during middle ear surgery. J Adv Med Dent Sci Res 2018;6(3):174-177.

INTRODUCTION

Middle ear surgery under general anaesthesia is revolutionised with the introduction of hypotensive anaesthesia that provides a relatively bloodless field while using an operating microscope. Tympanoplasty can be done both under local or general anaesthesia. Some surgeons prefer using local anaesthesia for middle ear surgery owing to various advantages such as less bleeding and being able to test hearing during the surgery itself.¹ However, local anaesthesia alone has been reported to be associated with anxiety, dizziness, claustrophobia, and earache; hence, there is always a quest to find out an anaesthetic drug, which can be used with local anaesthetic block with

maximum benefit and with minimum associated disadvantages.²

A variety of drugs are being used viz., propofol, benzodiazepines and opioids have been used for hypnosis, sedation and analgesia in the middle ear surgery in order to enhance the patient and surgical comfort; however, none has been completely complication free. Among various complications reported are over-sedation, respiratory depression, disorientation and hampered patient's cooperation during surgery. Dexmedetomidine (dexM), is a centrally acting α -2 receptor agonist with analgesic and conscious sedative effect without respiratory depression.³ It has been reported to significantly

reduce the opioid requirements both during and after surgery. It is valuable because of its anaesthetic and analgesic-sparing effects with predictable and dose-dependent haemodynamic effects.⁴ There have been several reports on the successful use of dexM as the primary sedative drug for orthopedic, ophthalmic, dental, and plastic surgery, and for diagnostic procedures.⁵ Due to its analgesic properties, cooperative sedation and lack of respiratory depression, dexM is increasingly being used as a sedative for monitored anesthesia care, dexM has a sympatholytic effect that can attenuate the stress response to surgery (tachycardia and hypertension) and maintains hemodynamic stability.⁶ As dexM inhibits the central sympathetic outflow and inhibits the norepinephrine release by stimulation of α -2 adrenoceptor, it is expected to decrease MAP.⁷ The present study evaluated the role of dexmedetomidine infusion as anaesthetic adjuvant during middle ear surgery.

MATERIALS & METHODS

The present study comprised of 80 adult patients of American Society of Anaesthesiologists (ASA) physical status I and II of both genders scheduled for elective middle ear surgery. All were enrolled with their written consent.

Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups of 40 patients each. Group I patients received infusion of dexmedetomidine 0.5 μ g/kg/hour and group II patients received placebo infusion of normal saline during middle ear surgery after induction of anaesthesia till 20 minutes before completion of surgery. All patients were assessed intra-operatively for bleeding at surgical field, haemodynamic changes, awakening time and post-operative recovery. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I: Distribution of patients

Groups	Group I	Group II
Agent	Dexmedetomidine	Placebo
M:F	16:24	20:20

Table I shows that group I had 16 males and 24 females and group II had 20 males and 20 females.

Table II: Comparison of parameters

Parameters	Variables	Group I	Group II	P value
Surgical time (minutes)	Surgical time (minutes)	95.2	102.4	0.03
	percentage of isoflurane requirement	0.82	1.50	
Heart rate (beats/min)	Baseline	93.1	93.8	0.02
	After induction	72.3	73.0	
	After intubation 5 min	71.6	76.4	
	30 min	70.6	77.8	
	60 min	67.7	86.2	
Intra- operative bleeding	After extubation	83.5	96.3	0.04
	Intra- operative bleeding 0	0	0	
	1	25	7	
	2	15	23	
	3	0	10	

Table II shows that mean surgical time in group I was 95.2 minutes and in group II was 102.4 minutes, mean percentage of isoflurane requirement of 0.82% in group I and 1.50 % in group II heart rate (beats/min) was at baseline in group I was 93.1 and in group II was 93.8, after induction was 72.3 in group I and 73.0

in group II, after intubation 5 min was 71.6 in group I and 76.4 in group II, 30 min was 70.6 in group I and 77.8 in group II, at 60 min was 67.7 in group I and 86.2 in group II and after extubation was 83.5 in group I and 96.3 in group II. The difference was significant (P< 0.05).

DISCUSSION

Middle ear surgery under general anaesthesia is revolutionised with the introduction of hypotensive anaesthesia that provides a relatively bloodless field while using an operating microscope.⁸ The primary methods to minimise blood loss during middle ear surgery included mild head elevation of 15°, and infiltration or topical application of epinephrine (1: 50,000 or 1: 200,000).⁹ Currently, many inhalational

or intravenous anaesthesia techniques were evaluated to offer ideal intra-operative conditions for middle ear surgery with their advantages and disadvantages.¹⁰ The present study evaluated the role of dexmedetomidine infusion as anaesthetic adjuvant during middle ear surgery.

We found that group I had 16 males and 24 females and group II had 20 males and 20 females. Verma et al¹¹ assessed efficacy and safety of intravenous

dexmedetomidine in comparison to propofol. Eighty patients were randomly allocated to receive either dexmedetomidine or propofol as intravenous bolus followed by the same in infusion supplemented with local anaesthesia for tympanoplasty. Dexmedetomidine and propofol provides adequate sedation but the use of propofol is associated with more requirements of rescue analgesia and poor patient and surgeon satisfaction.

We found that mean surgical time in group I was 95.2 minutes and in group II was 102.4 minutes, mean percentage of isoflurane requirement of 0.82% in group I and 1.50 % in group II heart rate (beats/min) was at baseline in group I was 93.1 and in group II was 93.8, after induction was 72.3 in group I and 73.0 in group II, after intubation 5 min was 71.6 in group I and 76.4 in group II, 30 min was 70.6 in group I and 77.8 in group II, at 60 min was 67.7 in group I and 86.2 in group II and after extubation was 83.5 in group I and 96.3 in group II. Bekker et al¹² patients received an initial loading dose of 1 µg/kg of dexmedetomidine over 10 min, followed by a continuous infusion of 0.5 µg/kg/h and they determined that intra-operative dexmedetomidine infusion was effective for blunting the perioperative haemodynamic responses with no incidence of hypotension or bradycardia. Ear surgery may cause post-operative dizziness (vertigo), nausea and vomiting as inner ear is intimately involved with a sense of balance. Induction with propofol decreases the post-operative nausea and vomiting in patients undergoing middle ear surgery. Prophylaxis with palonosetron, a 5-hydroxytryptamine 3 receptor blocker in premedication may be considered.

Gupta et al¹³ in 64 adult patients which were randomised into two comparable equal groups of 32 patients each for middle ear surgery under general anaesthesia with standard anaesthetic technique. Group I were given dexmedetomidine infusion of 0.5 µg/kg/h and patients of Group II were given placebo infusion of normal saline. Isoflurane concentration was titrated to achieve a systolic blood pressure 30% below the baseline value. Statistically significant reduction was observed in the required percentage of isoflurane ($0.8 \pm 0.6\%$) to maintain the systolic blood pressure 30% below the baseline values in patients receiving dexmedetomidine infusion when compared to those receiving placebo infusion ($1.6 \pm 0.7\%$). Patients receiving dexmedetomidine infusion had statistically significant lesser bleeding at surgical field ($P < 0.05$). The mean awakening time and recovery from anaesthesia did not show any significant difference between the groups.

Bajwa et al¹⁴ compared dexmedetomidine with nitroglycerine to achieve controlled hypotension in patients scheduled for middle ear surgery. The infusion rate of drugs was titrated to maintain a mean arterial pressure between 65 mm Hg and 75 mmHg. They concluded that dexmedetomidine was better for maintaining hemodynamic stability and a drier

surgical field, and was devoid of reflex tachycardia and rebound hypertension.

CONCLUSION

Authors found that dexmedetomidine infusion was safe to provide oligoemic surgical field for middle ear surgery.

REFERENCES

- Hall JE, Uhrich TD, Barney JA, Arain SR, Ebert TJ. Sedative, amnestic, and analgesic properties of small-dose dexmedetomidine infusions. *AnesthAnalg*2000;90:699-705.
- Lee YY, Wong SM, Hung CT. Dexmedetomidine infusion as a supplement to isoflurane anaesthesia for vitreoretinal surgery. *Br J Anaesth*2007;98:477-83.
- Tanskanen PE, Kytä JV, Randell TT, Aantaa RE. Dexmedetomidine as an anaesthetic adjuvant in patients undergoing intracranial tumour surgery: A double-blind, randomized and placebo-controlled study. *Br J Anaesth*2006;97:658-65.
- Yildiz M, Tavlan A, Tuncer S, Reisli R, Yosunkaya A, Otelcioglu S. Effect of dexmedetomidine on haemodynamic responses to laryngoscopy and intubation: Perioperative haemodynamics and anaesthetic requirements. *Drugs R D* 2006;7:43-52.
- Jellish WS, Owen K, Edelstein S, Fluder E, Leonetti JP. Standard anesthetic technique for middle ear surgical procedures: A comparison of desflurane and sevoflurane. *Otolaryngol Head Neck Surg*2005;133:269-74.
- Ayoglu H, Yapakci O, Ugur MB, Uzeen L, Altunkaya H, Ozer Y, et al. Effectiveness of dexmedetomidine in reducing bleeding during septoplasty and tympanoplasty operations. *J Clin Anaesth*2006;53:646-52.
- Sudheesh K, Harsoor S. Dexmedetomidine in anaesthesia practice: A wonder drug? *Indian J Anaesth*2011;55:323-4.
- Patel A, Davidson M, Tran MC, Quraishi H, Schoenberg C, Sant M, et al. Dexmedetomidine infusion for analgesia and prevention of emergence agitation in children with obstructive sleep apnea syndrome undergoing tonsillectomy and adenoidectomy. *AnesthAnalg*2010;111:1004-10.
- Marchal JM, Gómez-Luque A, Martos-Crespo F, Sánchez De La Cuesta F, Martínez-López MC, Delgado-Martinez AD. Clonidine decreases intraoperative bleeding in middle ear microsurgery. *Acta AnaesthesiolScand*2001;45:627-33.
- Firat Y, Kizilay A, Akarcay M, Yucel A, But K, Yoluglu S. The effect of dexmedetomidine on middle ear pressure. *Otolaryngol Head Neck Surg*2007;137:218-23.
- Verma R, Gupta R, Bhatia V K, Bogra J, Agarwal S P. Dexmedetomidine and propofol for monitored anesthesia care in the middle ear surgery. *Indian J Otol*2014;20:70-4.
- Bekker A, Sturaitis M, Bloom M, Moric M, Golfinos J, Parker E, et al. The effect of dexmedetomidine on perioperative hemodynamics in patients undergoing craniotomy. *AnesthAnalg*2008;107:1340-7.

13. Gupta K, Bansal M, Gupta PK, Pandey M N, Agarwal S. Dexmedetomidine infusion during middle ear surgery under general anaesthesia to provide oligoemic surgical field: A prospective study. *Indian J Anaesth* 2015;59:26-30.
14. Bajwa SJ, Kaur J, Kulshrestha A, Haldar R, Sethi R, Singh A. Nitroglycerine, esmolol and dexmedetomidine for induced hypotension during functional endoscopic sinus surgery: A comparative evaluation. *J Anaesthesiol Clin Pharmacol.* 2016;32:192–197.