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Original Research

Analgesic and sedative efficacy of two different loading doses of Dexmedetomidine for tympanoplasty

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ABSTRACT:

Background: Tympanoplasty involves reconstruction of perforated tympanic membrane with or without ossiculoplasty. The present study was conducted to assess the intraoperative analgesic and sedative efficacy of two different loading doses of Dexmedetomidine for tympanoplasty. **Materials & Methods:** Sixty American Society of Anaesthesiologists (ASA) physical status grade I or II patients, age 16-65 years scheduled for tympanoplasty were enrolled in study. Patients were divided into 2 groups of 30. Group I patients received injection dexmedetomidine at a loading dose of 1.0 µg/kg and Group II received 0.5 µg/kg respectively over 10 min followed immediately by a continuous infusion of 0.4µg/ kg/h. Degree of sedation and pain intensity were assessed using Ramsay Sedation Score (RSS) and Visual Analogue Scale (VAS) respectively. Total rescue doses of Fentanyl and Midazolam as well as surgeon and patient satisfaction scores (Numerical Rating Scale NRS 0-10) were noted. All findings were recorded and compared in both groups and statistically determined. **Results:** SpO2 was 99.1 in group I and 99.4 in group II, mean SBP (mm Hg) was 120.4 and 126.2, mean DBP (mm Hg) was 78.4 and 72.0, mean respiratory rate (beats/min) was 14.5 and 13.9, surgeon satisfaction score was 8.7 and 6.7 and patient satisfaction score was 8.5 and 6.21 in group I and II respectively. The difference was significant (P< 0.05). **Conclusion:** Dexmedetomidine at loading dose of 1 µg/kg provides better sedation, analgesia, patient satisfaction and surgeon satisfaction as compared to loading dose of 0.5 µg/kg.

Key words: sedation, analgesia, Dexmedetomidine

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INTRODUCTION

Tympanoplasty involves reconstruction of perforated tympanic membrane with or without ossiculoplasty. It can be done both under local or general anaesthesia. The main advantages of performing tympanoplasty under local anaesthesia are less bleeding, postoperative analgesia, faster mobilization of the patient, cost-effectiveness and the ability to test hearing intraoperatively.[1]

Surgical repair (tympanoplasty) of the perforated tympanic membrane (TM) is indicated to restore hearing ability as well as to prevent recurrent otorrhea. Tympanoplasty was introduced by Berthold and later developed and modified by Wullstein and Zollner. The various surgical approaches to tympanoplasty include endomeatal (per meatal), endaural, and post-auricular routes. These approaches have a different effect on surgical outcome, depending on the size and site of perforation. A surgical technique using either underlay or overlay of grafts over the perforated TM has been employed by various surgeons. The underlay is widely used and is relatively simple to perform, as the graft is placed entirely medial to the remaining drum and malleus.[2]

Dexmedetomidine is a centrally acting selective alpha 2–receptor agonist having property of analgesia, sympatholysis and sedation in the titrated dose without major respiratory depression. It is increasingly being used as a sedative-analgesic for MAC for various surgical procedures.[3] Dexmedetomidine for MAC is often delivered as initial bolus dose range from 0.5-1.0 µg/kg over 10 - 20 min followed by a continuous infusion of 0.2-0.7 µg/kg/hr. Though there are many studies comparing Dexmedetomidine with other sedatives and analgesics (like Midazolam, Propofol, Fentanyl, and other opioids) for use during MAC, but very few studies have compared different doses of Dexmedetomidine

to find out the optimal loading dose during MAC and especially so during tympanoplasty.[4] The present study was conducted to assess the intraoperative analgesic and sedative efficacy of two different loading doses of Dexmedetomidine for tympanoplasty.

MATERIALS & METHODS

The present study consisted of 60 American Society of Anaesthesiologists (ASA) physical status grade I or II patients, age 16-65 years scheduled for tympanoplasty. Patients were divided into 2 groups of 30. Group I patients received injection dexmedetomidine at a loading dose of 1.0 µg/kg and Group II received 0.5 µg/kg respectively over 10 min followed immediately by a continuous infusion of 0.4µg/ kg/h. Degree of sedation and pain intensity were assessed using Ramsay Sedation Score (RSS) and Visual Analogue Scale (VAS) respectively. Total rescue doses of Fentanyl and Midazolam as well as surgeon and patient satisfaction scores (Numerical Rating Scale NRS 0-10) were noted. All findings were recorded and compared in both groups and statistically determined.

RESULTS

Table I Distribution of patients

Groups	Group I	Group II
Agent	1.0 µg/kg dexmedetomidine	0.5 µg/kg dexmedetomidine
M:F	20:10	14:16

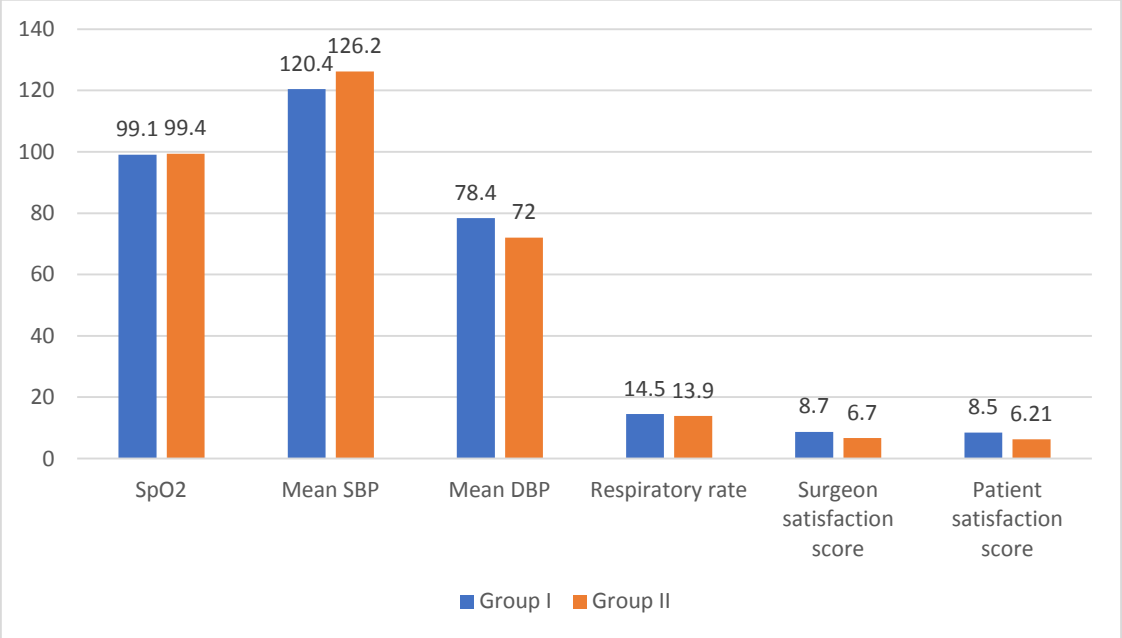
Table I shows that group I had 20 males and 10 females and group II had 14 males and 16 females.

Table II Comparison of parameters

Parameters	Group I	Group II	P value
SpO_2	99.1	99.4	0.12
Mean SBP	120.4	126.2	0.19
Mean DBP	78.4	72.0	0.21
Respiratory rate	14.5	13.9	0.34
Surgeon satisfaction score	8.7	6.7	0.01
Patient satisfaction score	8.5	6.21	0.02

Table II, graph I shows that SpO2 was 99.1 in group I and 99.4 in group II, mean SBP (mm Hg) was 120.4 and 126.2, mean DBP(mm Hg) was 78.4 and 72.0, mean respiratory rate (beats/min) was 14.5 and 13.9, surgeon satisfaction score was 8.7 and 6.7 and patient satisfaction score was 8.5 and 6.21 in group I and II respectively. The difference was significant (P< 0.05).

Graph I Comparison of parameters



DISCUSSION

Different TM reconstruction techniques for tympanoplasty using different types of grafts, including temporalis fascia, perichondrium, palisade cartilage and Cartilage Island, have been described. While temporalis fascia has better functional outcome

with respect to hearing, it is subject to poor dimensional stability. The poor dimensional stability of temporalis fascia grafts contributes to residual perforations following tympanoplasty, particularly in large TM perforations. Palisade cartilage and cartilage island techniques have the disadvantage of interfering with the sound-conducting mechanism, and hence patients may benefit only minimally with regard hearing restoration.[5]

Dexmedetomidine has a novel property of providing "conscious sedation" and has been used as a single agent in many painful procedures. Its sedative and anxiolytic effects result primarily from its activity in locus coeruleus of the brain-stem. It produces a modest reduction in Heart Rate (HR) and Blood Pressure (BP) ensuring a stable haemodynamic state.[6]

Use of fascia lata as a graft material was reported to have better dimensional stability and subsequently leads to better outcome, particularly with respect to achieving an intact TM and hearing improvement. In contrast, the anterior tympanotomy technique was introduced to overcome anterior blunting associated with the underlay technique and also to take care of residual anterior perforation.[7] The present study was conducted to assess the intraoperative analgesic and sedative efficacy of two different loading doses of Dexmedetomidine for tympanoplasty.

We found that group I had 20 males and 10 females and group II had 14 males and 16 females. Agarwal et al[8] compared the analgesic and sedative efficacy of two different loading doses of dexmedetomidine for tympanoplasty under MAC. After taking ethical committee approval, patients were allocated into two groups of 40 each. Group I and Group II patients received injection dexmedetomidine at a loading dose of 1.0 µg/kg and 0.5 µg/kg respectively over 10 min followed immediately by a continuous infusion of 0.4µg/ kg/h. Requirement of higher rescue doses of Fentanyl was more in Group II (100%) as compared to Group I (15.00%).

We found that SpO2 was 99.1 in group I and 99.4 in group II, mean SBP (mm Hg) was 120.4 and 126.2, mean DBP (mm Hg) was 78.4 and 72.0, mean respiratory rate (beats/min) was 14.5 and 13.9, surgeon satisfaction score was 8.7 and 6.7 and patient satisfaction score was 8.5 and 6.21 in group I and II respectively. CSOM as the major indication for tympanoplasty has also been published in previous studies. Other indications for tympanoplasty have been reported in literature.[9]

The endomeatal approach is mostly used. Using this route, the posterior and anterior tympanomeatal flaps (anterior and posterior tympanotomy) raised have been shown to be effective for disease clearance, proper graft placement, and better surgical outcome as well as ensuring stitchless surgery. Other patients with cholesteatoma were managed by tympanoplasty combined with modified radical mastoidectomy via the post-auricular approach.[10]

In a study of MAC with Dexmedetomidine (DEX) by Candiotti KA et al[11]., 326 patients were randomized 2:2:1 to DEX 0.5 mg/kg, DEX 1 mg/kg, or saline placebo initial loading dose, followed by a maintenance infusion of 0.2-1.0 mg/kg/hr of Dexmedetomidine (or equivalent volume of saline) titrated to a targeted level of sedation. In this study, requirement of rescue dose of Midazolam and Fentanyl was higher in DEX 0.5 µg/kg group as compared to DEX 1 µg/kg group. Gupta P et al[12]., also showed significant reduction in MAP and fall in HR (15-20%) from the baseline values in Dexmedetomidine group. This reduction was more obvious in group 1.0 mcg/ kg.

CONCLUSION

Authors found that dexmedetomidine at loading dose of 1 µg/kg provides better sedation, analgesia, patient satisfaction and surgeon satisfaction as compared to loading dose of 0.5 µg/kg.

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