

Is General Anaesthesia Better for Tympanoplasty Than Local Anaesthesia?

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ABSTRACT

BACKGROUND

Tympanoplasty is a common surgery done for the repair of perforated tympanic membrane in case of inactive mucosal Chronic Suppurative Otitis Media (CSOM). This procedure is performed under both local and general anaesthesia, both having their own advantages and disadvantages. The advantages of local anaesthesia in tympanoplasty are, the ability to test hearing during surgery, faster recovery time and less bleeding. But the common disadvantages of local anaesthesia were anxiety, noise during surgery, backache, claustrophobia and earache. These can be eliminated by providing sedation to patient or by administering general anaesthesia.

METHODS

Eighty patients of either sex, aged between 18 and 50 years, of ASA Grades I and II, undergoing tympanoplasty under local anaesthesia or general anaesthesia were included. Patients in Local Anaesthesia group received a bolus dose of injection dexmedetomidine 1 µg / Kg IV over 10 min followed by an infusion started at 0.4 µg / Kg / h I.V. Patients of General Anaesthesia group received inj. propofol 1 mg / Kg, followed by 1 mg / Kg of vecuronium bromide. After 2 minutes patients were put on LMA and maintained with oxygen and nitrous oxide in the ratio of 1 : 1 and 0.5 mac of isoflurane throughout the procedure and were switched off on the commencement of skin stitch.

RESULTS

A total of 80 patients were enrolled and were equally divided in to two groups. Males were predominant in both groups. 9 patients had slight bleeding requiring suctioning in group A. 17 in group B which had more than slight bleeding and 2 out of them required frequent suctioning. In 22 cases of group A surgeon had excellent satisfaction whereas it was 18 cases in group B. Group B experienced more complications than group A. Nausea and vomiting were present in 7 cases of group B whereas it was 3 cases of group A.

CONCLUSIONS

Local anaesthetic technique with sedation has an edge over general anaesthesia technique with LMA being preferred by the surgeon, and the haemodynamic milieu was better managed with fewer complications.

KEYWORDS

The local anaesthetic technique with sedation had an edge over general anaesthesia technique with LMA as it was more preferred by the surgeon and the haemodynamic milieu was better managed with fewer complications.

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BACKGROUND

Tympanoplasty (reconstruction of tympanic membrane) is a common surgery done for repair of perforated tympanic membrane in case of inactive mucosal Chronic Suppurative Otitis Media (CSOM). Given the unique location, size and delicate content of the middle ear great care has to be taken during the perioperative period. This procedure of tympanoplasty is done in both Adult and children and this procedure is also performed under both local and general anaesthesia. Different anaesthesia techniques have their advantages and disadvantages. According to survey by young, he found the most common discomfort reported in case of local anaesthesia were anxiety, noise during surgery, backache, claustrophobia and earache. Usually the pain was felt at the beginning when multiple injection of local anaesthetics were given for four quadrant block of great auricular / auriculo temporal nerve. Advantages with the local anaesthesia techniques are less bleeding, early recovery, post - operative analgesia, inexpensive and most important one is the ability to test the hearing of the patient intra operative.

Commonly used medications for sedation during surgery under local anaesthesia with monitored anaesthesia care including opioids, benzodiazepines, propofol and $\alpha 2$ agonists.^{1,2,3} Despite these advantages most tympanoplasty are still done under general anaesthesia due to special concern as younger patients, anxiety, severe hearing loss limiting the ability to cooperate and also fear of sudden movement of patient during operation.^{4,5} Adult patients are aware and cooperative unlike the paediatric patients. So, immobility and sedation are paramount in paediatric anaesthesia. Only a well sedated patient will allow for the for four quadrant block of great auricular/ auriculotemporal nerve. General anaesthesia has been administered to such patients and the associated complication of airway management and side effects of the anaesthetics are well known. The use of nitrous oxide in middle ear surgery is again controversial and its use in anaesthetic practice has declined in recent years as a result of concern over both physical and metabolic effect.^{6,7} Nitrous oxide is more soluble than nitrogen in blood and enters middle ear cavity rapidly in high concentration than nitrogen leaves. During surgery when the middle ear is open to atmosphere, there is no build - up of pressure. But when the graft is placed to close the middle ear, continued use of nitrous oxide causes rise in middle ear pressure and dislodgement of graft. Also, at the end of surgery when it is discontinued, nitrous oxide is rapidly absorbed resulting in negative pressure again causing graft dislodgement, serous otitis media and disarticulation of steps.⁸ There is gradual shift from inhalational to intravenous anaesthetics uses in such kind of procedure. Amongst the intravenous induction agents Propofol in contrary has the advantage of short recovery time and better patient and surgeon satisfaction due to its anti - emetic and euphoric properties.

The aim of our study was to compare the effect of local anaesthesia with sedation against general anaesthesia in tympanoplasty based on surgeon satisfaction of graft uptake and uneventful surgery and also patient satisfaction level.

METHODS

After Institutional Ethics Committee approval, written informed consent was taken from all patients who were included in the study.

Inclusion Criteria

Eighty patients of either sex.
Aged between 18 to 50 years,
ASA Grades I and II, undergoing tympanoplasty under local or general anaesthesia.

Exclusion Criteria

Patients with known sensitivity to local anaesthetics,
Allergy to study drugs, heart disease,
Renal and hepatic insufficiency,
Diabetes and hypertension,
Weight < 45 Kg or obesity (body mass index > 30 Kg / m),
Pregnant and lactating females.

Patients were divided randomly into two group, Group A (local anaesthetic) and group B (general anaesthesia with LMA). The patients were randomly allocated to the groups. On arrival in operation theatre routine monitoring like noninvasive blood pressure, electrocardiogram, pulse oximetry was applied to all patients. Baseline recording of all the parameters were done. The patients were pre - medicated with glycopyrrolate. (0.2 mg), Pentazocine. (5 mg / Kg) & midazolam (1 mg). Patients in Group A received a bolus dose of injection dexmedetomidine (1 µg / Kg) IV over 10 min followed by an infusion started at (0.4 µg / Kg / h) IV. The level of sedation was assessed using Ramsay Sedation Score (RSS).⁹ Where the desired sedation level was defined as RSS ≥ 4 achieved. Local anaesthetic infiltration was performed by the operating surgeon who used lignocaine 2% with adrenaline 1 : 200,000 for blocking the tympanic branch of auriculo - temporal nerve and great auricular nerve. In patients of Group B induction was done with inj. Propofol (2 mg / Kg) following the loss of verbal command a bolus dose of vecuronium bromide (0.1 mg / Kg) was administered I.V. After 2 minutes of bag and mask ventilation patients were put on an appropriate size LMA according to their weight. Intermittent bolus dose of vecuronium bromide were administered at a regular interval to facilitate adequate muscle relaxation. The patients were maintained with oxygen and nitrous oxide in ratio of 1 : 1 and 0.5 mac of isoflurane was given throughout the procedure and were switched off on the commencement of skin stitch.

In group A if the patients complain of pain then Additional infiltration with Local anaesthetic was done at the site along with it Intravenous Paracetamol 1 gm was given as a rescue analgesic. If RSS was < 4 or if the patients' movements were noted during the surgical procedure then, rescue sedation with a bolus dose of midazolam (0.01 mg / Kg) was given. Sedation score, assessment of surgical bleeding and haemodynamic parameters were recorded

every 10 minutes and any untoward events were noted. Similarly in group B if the haemodynamic parameters fluctuated beyond 25 % of the base line on higher side 2 ml bolus dose of Propofol was administered and isoflurane concentration was increased to 1 mac. If the haemodynamic parameter does not return toward base line then that patient is left out of the study. If the haemodynamic parameters fluctuate beyond 25 % of the base line on lower side then Isoflurane is switched off if the parameters return towards base line we continue with our study lest we leave the subject out of our study.

Statistical Analysis

Haemodynamic data was evaluated using t test for group comparisons. Data not normally distributed was compared using Mann Whitney U test. Categorical data was analysed using Chi square test. p value less than 0.05 was considered as significant.

RESULTS

Profile	Group A	Group B
Age	38.7	37.3
Sex (M / F)	26 / 14	24 / 16
BMI	23.8	24.6
ASA (gr I / II)	36 / 4	37 / 3
PR*	88.6	86.4
SBP**	117.3 (5.17)	115.5 (4.11)
DBP***	79.4 (4.27)	78.9 (4.35)
SpO ₂	99	99

Table 1. Demographic Profile & Baseline Vitals

*- pulse rate ** Systolic Blood Pressure *** Diastolic Blood Pressure

Both the groups were comparable according to age, sex, BMI & ASA grading and baseline vitals.

Grade	Group A	Group B
Grade - 0	0	0
Grade - 1	31	23
Grade - 2	9	15
Grade - 3	0	2
Grade - 4	0	0
Grade - 5	0	0

Table 2. Boezaart Grading Scale for Scoring of Surgical Field Bleeding

0: No bleeding (cadaveric conditions) 1: Slight bleeding — no suctioning required 2: Slight bleeding — occasional suctioning required 3: Slight bleeding — frequent suctioning required. Bleeding threatens surgical field a few seconds after suction is removed 4: Moderate bleeding — frequent suctioning required. Bleeding threatens surgical field directly after suction is removed 5: Severe bleeding — constant suctioning required. Bleeding appears faster than can be removed by suction; surgical field severely threatened and surgery usually not possible [The intraoperative bleeding was comparable in both the group. (p=0.125)]

	Group A		Group B	
Grade	Surgeon	Patient	Surgeon	Patient
Excellent	21	15	18	18
Very Good	13	16	14	14
Good	5	5	8	6
Average	0	4	0	2
Bad	0	0	0	0

Table 3. Satisfaction Scores of the Surgeon and Patients

(Surgeon satisfaction (p=0.698) & Patient satisfaction (p=0.289) was comparable in both the group.)

	Group A			Group B		
Time	PR*	SBP**	DBP***	PR	SBP	DBP
0	88.6 (7.6)	117.3 (5.17)	79.3 (4.27)	86.4 (7.94)	115.5 (4.11)	78.8 (4.35)
10	92.7 (10.51)	121.1 (8.86)	81.3 (4.22)	93.4 (11.26)	119.7 (4.78)	80.7 (5.32)
20	92.2 (7.28)	127.1 (8.19)	82.8 (5.52)	92.7 (10.51)	129.6 (9.35)	82.0 (6.84)
30	90.2 (9.11)	119.7 (4.78)	80.7 (5.32)	90.8 (8.69)	121.1 (8.86)	81.3 (4.22)
40	88.4 (8.35)	118.6 (7.51)	80.7 (4.56)	89.0 (7.03)	117.9 (4.47)	80.7 (5.32)
50	87.7 (7.98)	117.1 (7.03)	79.7 (4.74)	88.0 (6.74)	116.1 (4.23)	79.2 (5.21)
60	88.4 (7.94)	115.9 (6.76)	78.5 (4.19)	88.4 (7.94)	115.7 (4.99)	78.0 (4.26)

Table 4. Physiological Variables

*- pulse rate ** Systolic Blood Pressure *** Diastolic Blood Pressure the values are average mean and numerical in brackets are standard deviation.

(The peroperative PR (p=0.69), SBP (p=0.44), DBP (p=0.31) were comparable in both group and statistical evaluation shows no significant difference).

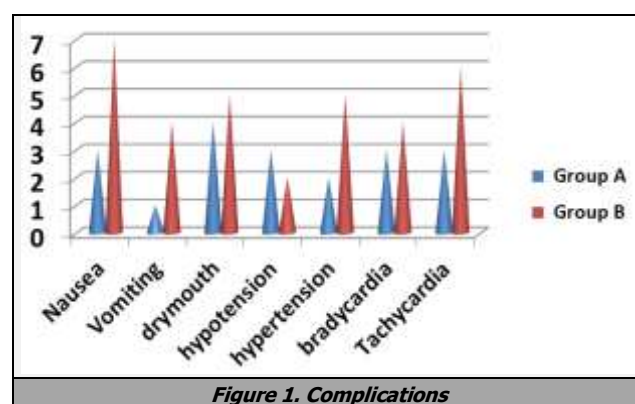


Figure 1. Complications

The incidence of complication was more in general anaesthesia group as compared to local anaesthesia group.

DISCUSSION

Middle ear cavity is an air filled space between the tympanic membrane and the oval window and the eustachian tube connects it to the nasopharynx. Middle ear pathological condition requiring surgery in adult includes tympanoplasty, stapedectomy or ossiculoplasty for otosclerosis, mastoidectomy for removal of infected air cells within the mastoid bone, removal of cholesteatoma. Common middle ear surgery in children includes tympanoplasty, mastoidectomy, myringotomy, grommet insertion and cochlear implantation.² The challenges in anaesthetizing adults and children are altogether different. Specially in children due to the heightened airway reflexes airway management becomes difficult and blockage of eustachian tube can cause retraction following graft imposition due to absorption of nitrous oxide as most tympanoplasty are done under general anaesthesia. This is not a concern in adult patient as they are consolable and cooperative unlike children so most of the center prefer local anaesthesia for such procedure. If monitor anaesthesia care with local infiltration is used it can be extended to paediatric patients. The child will be sedated and made unresponsive and local anaesthesia can be administered without the sight or pain of

the needle. The surgeon and anaesthesiologist may face different set of challenges in Tympanoplasty.

The surgeon requires an immobile subject with a bloodless field with least chances of distension or retraction of the tympanoplasty graft. The ideal medication for anaesthesiologist would be an easy titratable level of sleepiness, predictable amnesia, decreased level of anxiety, with a rapid recovery with minimal side - effects. Sympathetic stimulation and movements of an anxious patient cause increased bleeding and disturb the fine microscopic nature of the surgery which may even lead to graft failure. The advantages of local anaesthesia include possibility of testing of hearing intra operatively, having less bleeding, detecting the complications early and a quicker postsurgical emergence^{3,10} Good patient counseling prior to the procedure will lead to adequate patient cooperation. Patients should understand that local anaesthetics provide analgesia, but does not eliminate tactile sensation in the infiltrated area, which means one can feel the manipulation of tissues and noise of instruments, but not pain more over they will have to keep the head in a particular position till the completion of surgery. Yung found the most common discomforts reported were noise during surgery and anxiety, followed by dizziness, backache, claustrophobia, and earache. Despite these discomforts, however, 89% of patients said they would prefer local anaesthesia for similar operations in the future.

A wide variety of drugs are available for providing sedation, anxiolysis and analgesia like midazolam, diazepam, propofol, thiopentone, ketamine, fentanyl, alfentanil, remifentanyl. We used opioids, low dose midazolam and dexmedetomidine infusion for sedation. Monitored Anaesthesia Care (MAC) is the terminology used for sedation given along with the local anaesthesia for short procedures.¹⁰ Over sedation leading to respiratory depression is an important mechanism of patient injuries during MAC. In our study due to use of continuous dexmedetomidine there was no respiratory depression. Durmus¹¹ et al. have evaluated this property of Dexmedetomidine for providing controlled hypotension in general anaesthesia for tympanoplasty cases and concluded that it is a useful adjuvant to decrease bleeding when a bloodless surgical field is required. Reduction in intraoperative patient movements and surgical time are also contributory factors. One of the main benefits of middle ear surgery under local anaesthesia is to enable the surgeon to communicate with the patient throughout the procedure and test the hearing after hearing restoration procedure. The voice or the whisper test is a quick and effective way of testing the hearing gain and identifying the best position of the ossicular prosthesis. It is natural for the patients to feel nervous under local anaesthesia because they do not know what to expect during the operation. Careful selection and preparation of patient for the procedure is important so as the sedation to be appropriate for the procedure. Many middle ear surgeries are also performed under general anaesthesia due to special concerns, some are related to patients' anxiety which is augmented in some by their hearing loss, limiting their ability to cooperate in others concerns are related to surgeon comfortability with the

hypotensive general anaesthetic techniques, and the fear of sudden patient movement during operation. Though nitrous oxide use is controversial in the middle ear surgery we used in in ratio of 50 % with oxygen. Post-operative oxygenation was continued for ten minutes after regaining consciousness for complete removal of nitrous oxide. Propofol was used as the induction agent hence there were less incidence of post-operative nausea and vomiting with better haemodynamic control. In our study Vecuronium bromide was used as the muscle relaxant and was given until 30 minutes of the expected time of completion of surgery. We used Laryngeal Mask Airway instead of Endo Tracheal tube in our study. There by the use of laryngoscope and the pressor response in relation to laryngoscopy and intubation was avoided. So the haemodynamic parameter and the postoperative complications were comparable in both the groups.^{12,13}

Summary

Tympanoplasty can be performed by different methods of anaesthesia. Both the technique of anaesthesia has certain advantages and disadvantages. The preference of patients was more for the general anaesthesia technique. With general anaesthesia the complication such as nausea, vomiting dry mouth and hypertension were more despite this the patients satisfaction was more owing to non - recall of peri - operative events. In the local anaesthetic technique with sedation group the complications associated were less in comparison to general anaesthesia group. There was less requirement of analgesics immediately following surgery, the intraoperative surgical field was better in comparison to the general anaesthesia group.

CONCLUSIONS

The local anaesthetic technique with sedation had an edge over general anaesthesia technique with LMA as it was more preferred by the surgeon and the haemodynamic milieu was better managed with fewer complications.

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REFERENCES

- [1] Candiotti KA, Bergese SD, Bokesch PM, et al. Monitored anaesthesia care with dexmedetomidine: a prospective, randomized, double blind, multicenter trial. *Anaesth Analg* 2010;110(1):47-56.
- [2] Liang S, Irwin MG. Review of anaesthesiafor middle ear surgery. *Anaesthesiol Clin* 2010;28(3):519-528.
- [3] Parikh DA, Kolli SN, Karnik HS, et al. A prospective randomizeddouble - blind study comparing dexmedetomidine vs. combination of midazolam - fentanyl for tympanoplasty surgery under monitored anaesthesia care. *J Anaesthesiol Clin Pharmacol* 2013;29(2):173-178.

- [4] De Araujo SKM Jr, Tomita S. Retroauricular tympanoplasty and tympanomastoidectomy under local anaesthesia and sedation. *Acta Otolaryngol* 2009;29(7):726-728.
- [5] Yung MW. Local anaesthesia in middle ear surgery: survey of patients and surgeons. *Clin Otolaryngol Allied Sci* 1996;21(5):404-408.
- [6] Irwin MG, Trinh T, Yao CL. Occupational exposure to anaesthetic gases: a role for TIVA. *Expert Opin Drug Saf* 2009;8(4):473-483.
- [7] Sanders RD, Weimann J, Maze M. Biologic effects of nitrous oxide: a mechanistic and toxicologic review. *Anesthesiology* 2008;109(4):707-722.
- [8] Miller RD. *Miller's Anaesthesia*. Vol. 2. 8th edn. Pennsylvania: Elsevier/ Churchill Livingstone 2015.
- [9] Riessen R, Pech R, Tränkle P, et al. Comparison of the RAMSAY score and the Richmond Agitation Sedation Score for the measurement of sedation depth. *Crit Care* 2012;16(Suppl 1):P326.
- [10] Dogan R, Erbek S, Gonencer HH, et al. Comparison of local anaesthesia with dexmedetomidine sedation and general anaesthesia during septoplasty. *Eur J Anaesthesiol* 2010;27(11):960-964.
- [11] Durmus M, But AK, Dogan Z, et al. Effect of dexmedetomidine on bleeding during tympanoplasty or septorhinoplasty. *Eur J Anaesthesiol* 2007;24(5):447-453.
- [12] Bhananker SM, Posner KL, Cheney FW, et al. Injury and liability associated with monitored anaesthesia care: a closed claims analysis. *Anesthesiology* 2006;104(2):228-234.
- [13] Kumar V, Paranjpe JS, Gosavi SD, et al. Comparison of three drug combinations for sedation during middle ear surgeries under local anaesthesia: a multicentric randomized double blind study. *JKIMSU* 2015;4(3):32-40.