Research Article

Induced hypotensive anesthesia by using premedication Atenolol in comparison to intraoperative Nitroglycerin during Functional Endoscopic Sinus Surgery (FESS)

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Abstract

Objective: This study was done to compare the effect of preoperative Atenolol with intraoperative Nitroglycerin in patients undergoing FESS Regarding hemodynamic and surgical conditions. **Material and Methods**: 38 patients of (ASAI) 18-53 years scheduled for FESS were randomly divided into two groups 19 each. Group A patients were premedicated orally with Atenolol 50 mg 3 hours before induction. Group B patients received Nitroglycerin Infusion 1-4 mcg/kg/min titrated to a mean arterial blood pressure of 60-70 mm/Hg. **Results:** the operative field visibility was better also mean arterial pressure was lower in group B in comparison to group A , while mean heart rate was lower in group A. **Conclusion:** Nitroglycerin infusion have better quality of surgical field, lesser blood loss, shorter duration of surgery in comparison to premedication with Atenolol, However Atenolol maybe a good alternative when Nitroglycerin infusion is contra indicated or not feasible.

Keywords: Atenolol, Nitroglycerin, FESS

Introduction

Functional endoscopic sinus surgery FESS has been a major advancement in the management of a chronic sinusitis and other sino-nasal diseases (Masrat et al., 2001). There are some limiting factors in this surgery and the main consideration is blood loss because mucosal bleeding often interferes with the optimal visualization of the intranasal anatomy (Rice, 1995). There are several pharmacological and non-pharmacological techniques for an appropriate control of intraoperative bleeding. The non-pharmacological (mechanical) methods for deliberate hypotension include positioning the patient and IPPV to control venous return. The various pharmacological interventions include volatile anaesthetics, direct acting vasodilator drugs, ganglion blocking drugs, alpha blockers, beta blockers, combined alpha and beta blockers, calcium channel blockers, Propofol, magnesium sulphate, alpha-2 agonists, prostaglandins, Tranexamic acid. Therefore this study was conducted to compare the effect of oral Atenolol as premedication with intraoperative intravenous nitroglycerin to reduce the blood loss and improve surgical field during FESS.

Materials and Methods

After approval from ethical and scientific committee of Hospital and study of detailed history, clinical examination, informed with written consent of all patients. All 38 ASA I patients under aged 18 to 53yrs., of either sex were scheduled for FESS under general Anesthesia. They were randomly allocated for this prospective controlled study including patients with preoperative hemoglobin above 10 gms/dl who were to undergo FESS were included in study. Patients with hypertension, Bronchial asthma, alcohol or drug abuse, breast feeding and pregnancy, anticoagulation therapy, bleeding diathesis were excluded. Patients were randomly allocated to two groups of 19 each. All patients were evaluated thoroughly by the anesthesiologist on the previous day of surgery. The anesthetic and surgical procedure was explained to the patient. All patients were premedicated orally with Ranitidine 150 mg HS.

Group A: Atenolol 50 mg 3 hours before induction with sips of water (withheld if heart rate less than 60 / min or blood pressure less than 100 / 60 mm /Hg).

Group B: Inj. Nitroglycerin 25 mg/50 ml normal saline infusion was started after induction at 1-4 mcg/kg/min and

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titrated to a mean arterial blood pressure of 60-70 mm/Hg.

All patients underwent the procedure under standard general anesthesia technique. Surgery was performed by the unit chief of the E.N.T. department. Intraoperative monitoring included electrocardiogram, noninvasive blood pressure, and pulse oximetry. all patients received just Pre induction i.v. Paracetamol infusion 1000 mg / 100 ml. Inj Fentanyl 2 mcg/Kg i.v. and Inj. Midazolam 0.03 mg/Kg i.v. Induction was done with Inj. Propofol 2mg/kg and Inj. Atracurium 0.5 mg/Kg and patient was intubated. Maintenance was done with Isoflurane 1 MAC, Inj Atracrium 0.1 mg/Kg, while inj Fentanyl 50 mcg iv has been given hourly post induction All patients were placed in 15° reverse Trendelenburg position. After induction nasal mucosa was infiltrated with 2 ml of 2% lignocaine with adrenaline (1:200,000). If mean arterial pressure (MAP) decreased to less than 50 mm Hg, ephedrine in increments of 5 mg i.v. was given and patient was excluded from the study, surgeon assessed quality of surgical field according to:

Grading system of bleeding during Endoscopic sinus surgery

Boezaart and van der Merwe Grading (Boezaart et al., 1995)

Grade 1: Cadaveric conditions with minimal suction required.

Grade 2: Minimal bleeding with infrequent suction required.

Grade 3: Brisk bleeding with frequent suction required.

Grade 4: Bleeding covers surgical field after removal of suction before surgical instrument can perform maneuver.

Grade 5: Uncontrolled bleeding. Bleeding out of nostril on removal of suction, intraoperative heart rate, intraoperative mean arterial pressure were done using Analysis of variants test [ANOVA test]. Quantitative data presented as mean and SD and to compare the mean at two groups

Results and discussion

Both groups were similar demographically and there was no significant difference with respect to age, sex, weight (Table 1).

There was a statistically significant difference in heart rate Atenolol group had lesser heart rate as compared to Nitroglycerin. Mean arterial pressure was lower in Nitroglycerin group (Table 2).

Intraoperative bleeding which reduces visibility in the operative field is one of the major problems during FESS The surgeon needs a bloodless field which the anesthesiologist can achieve by lowering the patient's arterial blood pressure using controlled hypotension (Cincikas and Ivaskevicius, 2003; Saitoh et al., 2002; Eberhaet et al., 2003). Complications of hypotensive techniques include reactionary hemorrhage, persistent hypotension, cardiac ischemic injury and loss of vision (Williams, 2002).

Intravenous Nitroglycerin is well known to reduce blood loss and improve surgical field in FESS by inducing hypotension via dilatation of venous capacitance vessels, thus reducing venous return and cardiac output. But reflex tachycardia associated with Nitroglycerin partially offset the advantage of induced hypotension (Fahmy, 1978; Buniatin et al., 1984).

Beta blockers like Atenolol, Metoprolol and Esmolol were used preoperatively to control the heart rate in view of reducing blood loss (Na Young Kim et al., 2015; U. Srivastavaet et al., 2013; Poupak, 2012).

In our study we found that the visibility of the operative field was better in Group B when compared to Group A, The average blood loss was lower with Group B averaging 163

Table 1. Demographic distribution

Parameters	Group A (mean ± SD)	Group B (mean ± SD)	P value
Age (years)	33±6.27	34±3.21	0.05
Weight (Kg)	78±3.43	75±9.1	0.05
Sex (F:M)	10:9	9:10	0.05

Table 2. Intraoperative hemodynamic

Parameters	Group A (mean ± SD)	Group B (mean ± SD)	P value
Heart rate beats/min	65±7.66	82±5.41	0.001
Mean arterial pressure (mm/Hg)	74±3.11	63±5.2	0.001

Table 3. Grading of bleeding in the surgical field according to Boezaart & van der merwe

Grade	Group A		Group B	
	Number of cases	(%)	Number of cases	(%)
Grade 1	1	5.26	3	15.78
Grade 2	13	68.42	14	73.68
Grade 3	5	26.31	2	10.52
Grade 4	0	0	0	0
Grade 5	0	0	0	0

Table 4. Total blood loss during surgery

Parameters	Group A mean ± SD	Group B mean ± SD	P value
Total blood loss	201.1±41.71	163.7±30.21	0.001

ml while in Group A the average blood loss was 201ml. the mean blood pressure was lower in Group B (63 mm/Hg) when compared to Group A (74mm/Hg).

On comparing the mean intra operative heart rate between them the mean heart rate was significantly low in atenolol (65 beats/min) than the Nitroglycerin (82beats/min).

Mild hypotension occurred in four patients that responded to intravenous fluid administration. None of the patients had blood loss necessitating blood transfusion.

Conclusion

From the study result Nitroglycerin infusion appears to have lesser blood loss better quality of surgical field and reduced duration of surgery compared to premedication with Atenolol in patients undergoing functional endoscopic sinus surgery under general anesthesia. In view of the reported complications of induced hypotension and in conditions where Nitroglycerin infusion is contraindicated or not feasible, the use of Atenolol may be an acceptable safer and simpler alternative, However these study findings could be confirmed and explored further by comparing the hypotensive effects of the study drugs in other patient populations and in the patients undergoing other surgical procedures.

Conflicts of interest

There is no conflict of interest in the present study.

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