

Transient Hypotension after Submucosal Infiltration of Xylocaine with Adrenaline Solution during Functional Endoscopic Sinus Surgery

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Abstract

Introduction: Xylocaine or normal saline along with 1:2,00,000 adrenaline is commonly used for presurgical infiltration. Local infiltration containing adrenaline often causes cardiovascular side effects which may be variable ranging from tachycardia, hypertension, arrhythmias and hypotension in some cases. **Case Report:** We report a case of 54 year old female a known case of hypothyroidism, dyslipidemia with current admission diagnosis of deflected nasal septum, bilateral nasal polyposis and chronic sinusitis who underwent Functional Endoscopic Sinus Surgery (FESS) and septoplasty. Preprocedure the surgical site was infiltrated with 1:2,00,000 freshly prepared xylocaine with adrenaline solution. Subsequent to this infiltration patient developed hypotension which was transient in nature and responded to intravenous fluid bolus. **Conclusion:** The infiltration of xylocaine with adrenaline may lead to β_2 receptor activation leading to skeletal muscle vasodilation and decrease in preload leading to hypotension. This was the most probable attributable cause of transient hypotension in our case although this hypotensive effect is not seen commonly.

Keywords: Hypotension, Lidocaine, Nasal Septum, Saline Solution, Sinusitis.

Introduction

In patient undergoing Functional Endoscopic Sinus Surgery (FESS) and septoplasty, the nasal mucosa is often infiltrated with local anaesthetic solution that contains adrenaline to aid hemostasis. Local infiltration containing adrenaline, often cause cardiovascular side effects which may be variable ranging from tachycardia, hypertension, arrhythmias and hypotension in some cases. Transient hypotension following the infiltration of adrenaline containing local anaesthetics may be caused by stimulation of β_2 adrenoceptors in skeletal muscles by adrenaline producing vasodilation [1].

Case Report

A 54 years old female came with chief complaints of nasal blockade since last few months along with history of snoring and occasional headaches. After clinical evaluation and relevant investigations patient was diagnosed as a case of deflected nasal septum with bilateral nasal polyposis and chronic sinusitis. The co-morbidities were hypothyroidism with present euthyroid state and dyslipidemia. Pre-operatively she underwent exercise electrocardiogram which was mildly positive. Otherwise patient had no cardiac symptoms and had good exercise tolerance. Patient was planned for FESS along with removal of nasal polyps and correction of deflected nasal septum.

General anaesthesia along with standard monitoring was planned for the procedure. During anaesthesia patient was monitored using 2 lead electrocardiogram (Lead II and V 5), pulse oximetry, temperature, capnography and anaesthesia gas monitoring. Invasive arterial blood pressure was monitored in lieu of pre-operative mildly positive electrocardiogram exercise testing and dyslipidemia. Right radial artery was cannulated with the 20 gauge flow switch cannula for invasive arterial pressure monitoring.

Anaesthesia was induced with propofol, fentanyl and atracurium in usual doses and maintained with oxygen air mixture, sevoflurane and intermittent muscle relaxation with atracurium. Paracetamol and diclofenac sodium was given to supplement analgesia along with fentanyl. All drugs were used in the standard doses. Before starting surgical procedure, nasal mucosa was infiltrated with 1:2,00,000 xylocaine with adrenaline solution (14 ml). Approximately 1-2 minutes after the injection of xylocaine with adrenaline patient developed hypotension; the mean blood pressure which was maintaining around 70-75 mm of Hg dropped down to 40-45 mm of Hg and this rapid change was easily visible on monitor as invasive arterial blood pressure was being monitored. This hypotensive episode was transient in nature and responded to fluid bolus in form of 200-300 ml of Ringer's Lactate solution and came to baseline levels in a few minutes.

During the further course of surgery the hemodynamic parameters remained stable. No further infiltration was given using xylocaine with 1:2,00,000 adrenaline solution. After the completion of surgical procedure muscle relaxation was reversed with neostigmine and glycopyrrolate; patient was extubated uneventfully and shifted to post-operative area. The patient did well post-operatively and was discharged on the 2nd post-operative day.

Discussion

Local anaesthetics infiltration containing adrenaline, which often cause cardiovascular side effects are routinely used in functional endoscopic sinus surgery for the main purpose of hemostasis. This infiltration also allows better visualization of vascular structures during surgery [2]. Head and neck is a highly vascular area and absorption of adrenaline is rapid. Submucosal infiltration in the nasal mucosa of solutions containing various concentrations of epinephrine may lead to variable hemodynamic changes. Transient hypertension (lasting 1-5 min), and arrhythmias may result due to inadvertent high concentration (10-20 µg/mL), large volume of solutions, rapid infiltration or accidental intravenous infiltration. Numerous reports have shown that injection of adrenaline, even in therapeutic doses, can lead to increased heart rate and stroke volume, resulting in arrhythmias in susceptible patients [3,4]. The incidence of cardiovascular toxic adverse effects has been shown to increase in a dose-dependent manner. Sometimes dilute adrenaline solutions may cause fall in blood pressure due to activation of β_2 receptors in skeletal muscle. Prolonged intra-operative hypotension after subcutaneous infiltration of diluted adrenaline is an uncommon scenario but a possibility as reported by Shyam Bhandari *et al.* [5].

Adrenaline is really a sympathomimetic amine with each alpha as well as beta-adrenergic receptor agonist effects. Skin, mucosa, as well as kidney arterioles display vasoconstriction on account of alpha-receptor predominant activation. Low concentrations of adrenaline lead to preferential β_2 receptor activation leading to vasodilatation in bronchiolar smooth muscle while increased ranges activates alpha-receptor-mediated vasoconstriction in vascular smooth muscle [6]. Due to high vascularity of the nasal area even dilute adrenaline solutions (1:2,00,000) may cause fall in blood pressure due to activation

of β_2 receptors in the skeletal muscles. Altered pharmacokinetics and pharmacodynamics of drug can lead to exaggeration of some of the effects. The activation of β_2 receptors may be further exaggerated if the patient is already anaesthetized as there is blunting of sympathetic response. In one of the studies it was mentioned that the lighter plane of anaesthesia may be protective against adrenaline induced hypotension [7]. The increased β_2 receptor sensitivity may be one of the reasons for profound hypotension. Another remote possibility may be the occurrence of Bezold-Jarisch reflex which is a cardioprotective reflex [8].

Conclusion

The hypotensive effects of infiltration of epinephrine containing solutions at sub-therapeutic concentrations are attributed to the preferential stimulation of the β_2 receptors at lower concentrations. This was the most probable attributable cause of transient hypotension in our case although this hypotensive effect is not seen commonly. The controversies concerning hemodynamic effects of adrenaline in local infiltration are widely discussed, but there is no definite conclusion. Close hemodynamic monitoring should always be considered, whenever adrenaline containing solutions are used for presurgical infiltration for head and neck surgeries. We should remain vigilant whenever these techniques are used in conjunction with adrenaline infiltration as precipitous fall in blood pressure may occur.

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