ABSTRACT

Objectives: 1) Review one surgeon’s first year of experience using concentrated topical epinephrine (1:1000) for hemostasis in functional endoscopic sinus surgery (FESS) with standard infiltration and anesthetic techniques; 2) establish epinephrine’s safety in this application.

Study Design: Retrospective chart review of patients undergoing functional endoscopic sinus surgery by the lead investigator were reviewed. Among other measures, percent changes in intraoperative blood pressure and heart rate were calculated and compared to accepted values for induction agent alone. Adverse cardiovascular events were recorded.

Results: 83 patients, 19-87 years old were studied. Anesthesia was induced with propofol and maintained with sevoflurane. Average percent changes from baseline blood pressure at 30 minutes, 60 minutes and at the end of surgery were -16.78%, -18.36% and -18.40% respectively. Percent changes in pulse at these intervals were -6.48%, -4.71% and -0.93% respectively. These changes fall within reported ranges resulting from propofol use alone. Two patients (2%) with history of atrial fibrillation experienced atrial fibrillation intra-operatively.

Conclusions: Hemodynamic changes associated with topical 1:1000 epinephrine fall within expected ranges of anesthetic agents alone. No adverse cardiovascular events occurred in this study. These results support topical epinephrine’s safety in FESS, but further study and caution are advised.

INTRODUCTION

Over the past decade, increasing anecdotal evidence supports the application of concentrated topical epinephrine (1:1000) for hemostasis during endoscopic sinus surgery. While its topical intranasal use is gaining in popularity, the body of evidence supporting this application is relatively small, and no studies have definitively established its safety or superiority to other agents (1-8).

The major concerns relate to possible adverse cardiovascular side effects after systemic absorption of epinephrine through the nasal mucosa. The current study seeks to document one surgeon’s first year experience with concentrated 1:1000 topical epinephrine in functional endoscopic sinus surgery through a retrospective chart review.

METHODS AND MATERIALS

Patient Database - In this retrospective review, the records of all patients undergoing FESS by the primary investigator from January 1, 2009 to December 31, 2009 were analyzed.

Figure 1. Patient selection

| Sinonasal procedures from UAMS billing department | 553 |
| 446 duplicates and clinic procedures excluded |
| 6 patients excluded due to use of different vasoconstrictor or lack of operative records |

89 patients undergoing FESS
83 patients included in the final analysis

Variables Assessed - Information gathered from patient records includes those listed in Table 1 as well as medical co-morbidities, surgical diagnosis, methods of anesthesia, and complications of surgery. Vital signs recorded include blood pressure and heart rate from time points just prior to induction, every thirty minutes (for up to three hours) during the procedure and a final reading at the end of the case.

Analysis - No control group was used in this study. Individual blood pressure readings were converted to mean arterial pressure (2/3 diastolic BP + 1/3 systolic BP = MAP). The calculated intra-operative MAP values were compared to the preoperative values to calculate a percent change in BP. These changes were then compared to accepted normal values for the induction agent (propofol) found in the anesthesia literature (5). A similar comparison to normal values was applied to the data for heart rate.

RESULTS

A total of 83 patients ranging from 19-87 (mean 49) years of age were included in the final analysis. The cohort included 34 men (40.9%) and 49 women (59.1%). Four percent (4%) had prior sinus surgery, two patients (2.4%) had preexisting atrial fibrillation and one patient (1.2%) had a pre-existing pacemaker at the time of surgery. All patients were induced with propofol and maintained with sevoflurane or desflurane, and average total anesthesia time was 163.8 minutes. See Table 1 for all results and Figure 2 for the distribution of diagnoses. All patients were prepared for intraoperative endoscopy in a similar fashion. One vial (30 mL) of 1:1000 epinephrine solution was placed in a sterile bowl. Half inch by three inch cotton pledgets were then soaked in the solution, pressed to remove excess solution, and applied to the appropriate areas of nasal mucosa for the planned procedure. Pledgets were left in place for approximately 7-10 minutes prior to beginning additional endoscopy. In addition to the topical epinephrine, 5-10 mL of 1% lidocaine with 1:100,000 epinephrine was infiltrated into the middle turbinate, lateral nasal wall and septum if deemed necessary for the procedure. Additional 1:1000 epinephrine soaked pledgets were then placed in the sinonasal passages throughout the case as needed for decongestion and hemostasis. (Fig. 3)

Average baseline MAP and HR were 101.3 mm Hg and 78.7 beats per minute (bpm) respectively. The average MAP at 30 and 60 minutes and at the end of the case were 82.9, 81.4 and 81.3 mm Hg. Intraoperative HR measurements at these times were 72.4, 73.5 and 76.3 bpm respectively. Two patients (2%) displayed atrial fibrillation (AF) during the procedure. These were the same two patients with a history of AF and displayed no rhythm changes during or after the operation. The other patient converted to AF 60 minutes into the case but returned to sinus rhythm before the operation ended. No adverse events occurred in any of the patients during the study.

Table 1. Patient Characteristics

| Age 19-87 (49) |
| Gender Male 34 Female 49 |
| Average BMI 23.2 |
| ASA status I; II-52: III-30 |
| Patients with pre-existing arrhythmia 2 (2%) |
| Patients concurrently on anticoagulant or antiplatelet therapy 22 (26.5%) |
| Patients with prior FESS 4 (4.8%) |
| Average number of operated sinuses per patient 3.2 |
| Average operative time 163.8 min |
| Average estimated blood loss 145.7 mL |

*Anticoagulant and antiplatelet therapy was held for 21 of the 22 patients prior to surgery.

DISCUSSION

Our experience illustrates that topical epinephrine was a safe option for our patient population. While a mild and transient tachycardia was elicited in some individuals, there were no nascent adverse cardiovascular effects associated with the use of concentrated epinephrine in this capacity. When compared to the induction agent alone, the addition of topical epinephrine did not significantly affect blood pressure or heart rate at the time points measured. The hypotension observed by some authors studying infiltrated epinephrine was not observed in this cohort. The potential cardiac complications, particularly mentioned above, both of these patients had a documented history of AF prior to surgery, and neither suffered adverse sequelae from the arrhythmia.

Figure 3. Hemodynamic impact of concentrated topical epinephrine

The average percent changes from baseline MAP and HR in patients receiving concentrated topical 1:1000 epinephrine are shown in the first three bars. Percent change for these parameters expected from administration of propofol alone are shown in the anesthesia literature and are provided for comparison.

CONCLUSIONS

We conclude that concentrated topical epinephrine for hemostasis during FESS is safe in appropriately selected and monitored patients. Future studies will include evaluation of the efficacy of epinephrine in this application as well as direct comparisons to the other agents frequently used for hemostasis in FESS.

REFERENCES