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ORIGINAL ARTICLE

Topical use of adrenaline in different concentrations for endoscopic sinus surgery

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Summary

The ideal adrenaline concentration remains unknown. **Aim:** Compare topical adrenaline solutions in different concentrations. **Study design:** Prospective, double blind, randomized trial. **Patients and methods:** 49 patients divided in 3 groups underwent endoscopic sinus surgery, using only topical solutions of adrenaline in different concentrations (1:2,000, 1:10,000 and 1:50,000). We compared the duration of surgery, intra-operative bleeding, plasmatic levels of catecholamines, hemodynamic parameters and changes in heart rhythm. **Results:** Surgery time was shorter in the group using adrenaline 1:2,000, which also showed less bleeding in all evaluations (objective and subjective - $p < 0.0001$). Plasmatic levels of epinephrine rose in all groups, more sharply in the 1:2,000 group. There was a trend towards elevation of blood pressure in the groups using adrenaline 1:2,000 and 1:10,000, with a greater occurrence of hypertensive peaks. **Discussion:** We found a very significance bleeding difference favoring the 1:2,000. The blood pressure elevation in the 1:2,000 and 1:10,000 groups was progressive but very slow throughout the procedure, which could be associated with the anesthesia technique. **Conclusion:** We favor the use of topical adrenalin 1:2,000 due to a clear superiority in hemostasis. Further investigation is needed to corroborate our findings.

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INTRODUCTION

A limiting factor in nose surgery has been the difficulty in manipulating surgical instruments in the nasal fossae and attaining a good view of the operating field. The main hurdles against an adequate view for surgeons are a narrow and tortuous nasal fossa anatomy, inadequate lighting, and abundant bleeding of the mucosa due to the rich local vascularization.

Nasal endoscopic surgery, which started in the early 70s, substantially minimized the first two hurdles mentioned above. Endoscopes can reach further, magnify the field of view, and provide angulated optics, which has enabled surgeons to reach until then inaccessible recesses.[1] However, the third hurdle - bleeding - has in a way increased. With surgery being guided by an endoscopic image, any minor bleeding that covers the tip of the endoscope may cloud the surgeon's view. Thus, hemostasis of the nasal mucosa, which was already important, has become paramount for operability.

Except for septoplasty, in which some authors find no benefit in using vasoconstrictive solutions,[2,3] all other surgeries use these agents for controlling blood loss. The use of cocaine and its derivatives have been widely used. However, its price and use for illicit ends has led many countries to ban these substances. Adrenalin has become popular because it is inexpensive and available in nearly every hospital.

The major difficulty with adrenalin is to establish the dose that provides the best safety and efficacy; there is no standard concentration defined for this substance in the medical literature. Furthermore, when applying adrenalin topically, the total amount that is used is hard to establish.

Adrenalin concentrations - when mentioned - have varied widely in the literature, ranging from 1:200 000 to 1:1 000 for topical use, and 1:200 000 to 1:50 000 for infiltration.[1,4,5] The idea that higher concentrations of adrenalin are needed for improved operability in nasal endoscopic surgery has subtly gained strength. This has been due mostly to the protocols used in health care centers with more experience in endoscopic surgery worldwide, which adopt concentrations for topical use of 1:5 000, 1:2 000 or 1:1 000.[6,1]

Although there has been a world trend to use more concentrated solutions, studies demonstrating improved hemostasis and safety (incidence of systemic effects) with these concentrations, compared to lower concentrations, are lacking. Systemic side effects are proportional to the absorption of adrenalin, another topic that has been poorly investigated.

The purpose of this study was to compare the topical use of adrenalin solutions at different concentrations in nasal endoscopic surgery, assessing its efficacy in hemostasis, systemic absorption, and onset of adverse effects.

PATIENTS AND METHODS

A prospective controlled double-blind study was done on a sample of randomly selected patients. The Research Ethics Committee of the Hospital X approved this study (approval number 207/04 - CEP).

Fifty-four consecutive patients aged over 18 years undergoing endoscopic nasal surgery for the treatment of nasosinusal polyposis at our hospital were selected.

Inclusion and exclusion criteria are shown on Table 1. Before surgery, all patients were assessed with an electrocardiogram, the prothrombin time (PT), the activated partial thromboplastin time (PTT), and a surgical risk assessment by a clinician or cardiologist. Only patients classified preoperatively as ASA class I or II (American Society of Anesthesiology) were included.7 Patients with signs of cardiac disease, elevated systemic blood pressure, or blood dyscrasia were excluded. Eligible patients signed a free informed consent form.

All patients were given prednisone (40 mg/day) during five days before surgery, followed by gradual removal postoperatively.

Patients were chosen randomly by a draw to one of three study groups, according to the concentration of adrenalin used during surgery: 1% lidocaine solution with adrenalin at 1:2 000, 1:10 000 or 1:50 000 concentrations. An anesthesiologist who was not involved in the surgery prepared the solution. Surgeons and the surgical team were unaware of which solution was used. The anesthesiologist that was involved in the surgery was also unaware of the concentration, but could request this information if it was deemed necessary at any point during surgery.

Anesthesia

Preanesthetic sedation was not used in any patient. Induction of anesthesia was done in all patients with propofol and alfentanil. Maintenance of anesthesia was done with propofol and fentanil, repeating the doses as needed. Muscle relaxation was attained with rocuronium and/or atracurium. Controlled positive pressure ventilation (33% oxygen in nitrous oxide) was used in all cases. The inhaled anesthetic was isoflurane.

Using the adrenalin solution

Adrenalin solutions were used topically. Cotton strips were imbibed with the solution; the excess was carefully removed until the cotton strip was saturated but not dripping even upon compression. Removal of the excess solution was done over the recipient containing the solution to avoid waste. Each strip absorbed about 1 ml of the solution. The cotton strips were then inserted in the nasal fossae (one each side) for 4 minutes in all of the surgeries.