Periocular Anesthesia in Aesthetic Surgery

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ABSTRACT

This article focuses on the administration of anesthesia for periocular aesthetic procedures. Special emphasis is given to office-based procedures, most often without any systemic sedation, highlighting the importance of open communication with patients. Finally, attention is given to potential pitfalls including anesthetic systemic toxicity, ocular injuries, and orbicularis myotoxicity.

KEYWORDS: Anesthesia, periocular, aesthetic, surgery, oculoplastics

The experiences before, during, and after any procedure are likely to strongly influence how a patient feels about both the final surgical outcome and their surgeon. Those who develop a positive impression are more likely to be patient during the healing process and accepting of the small imperfections of nature. Critical in this process is the actual surgical experience, which in itself is tightly interwoven with the attendant anesthesia.

PREOPERATIVE CONSIDERATIONS AND DIALOGUE

Patient anxiety may color the preoperative experience and certainly may require a higher level of anesthesia. Much anxiety can be relieved with effective communication directly between the patient and the surgeon. Although ancillary personnel may be a time-efficient way to provide preoperative and postoperative instruction, face-to-face time with the surgeon is essential. An important concept for surgeons to remember is that many patients, especially those who are highly successful in their own fields of endeavor, are distressed by the uncertainty and loss of control of both the process and the outcome.

The more control a patient is permitted, the more comfortable he or she will be. Permission for control, if desired, is very different from being given control. For

example, a sedative provided the night before surgery may be offered with any of the following instructions: (1) "Take this at ten o'clock," (2) "Take this, if you want it," or (3) "We usually recommend a tablet at bedtime, but you decide if you really think it would help you or not." The first example offers no control, the second demands the patient take control, and the third offers a controlled structure but allows the patient to take the reins if he or she wishes—a subtle but important distinction for most patients.

The three most anxiety-provoking questions in patients' minds are "Is there going to be pain?" "What happens next?" and "Will I achieve the goals I want, or be made to look like something else?" The first two questions are easily addressed. The third, however, can be more complicated. When discussing a potential endeavor, it is important to first ask patients what they want. Situations may arise in which the surgeon's aesthetic taste differs from that of the patient. Recognizing differences of opinion and openly discussing biases in personal preferences will ultimately allow patients to feel more confident in their surgical choices and more comfortable on the day of surgery.

Once a decision is made to proceed with surgery, obtaining an accurate medical history is essential. In addition to the usual questions about malignant hyperthermia, excessive nausea, prolonged sedation, increased

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bleeding, and frequent coughing, gentle inquiry should also be made into psychiatric history of anxiety, panic disorders, psychosis, and equally important, how the patient feels about prior cosmetic procedural experiences, both the process and the outcome.

Even with the best guidance and preparation, the days and moments prior to surgery can be very stressful. To simplify the process on the day of surgery, we advocate providing all prescriptions in advance. Early access to antibiotics, analgesics, antiemetics, and anxiolytics can eliminate a hurried search for a pharmacy on the way home. For those patients in whom significant anxiety is anticipated, diazepam 5 to 20 mg can be taken an hour prior to surgery. Some have suggested that lorazepam may provide greater amnesia, less pain upon injection of local anesthesia, and greater sedation.¹

The environment where the surgery takes place can profoundly impact patient comfort. We provide an option of soothing music and suggest patients bring their own if they wish. In our office-based surgeries, which account for the vast majority of our cosmetic procedures, we encourage patients to wear their most comfortable street clothes and to remove their shoes. We offer knee pillows, neck pillows, and blankets. To provide an additional measure of relaxation and sometimes to distract patients while performing injections, we frequently use a cordless massager and have even employed a foot and hand masseuse. During the procedure, our nurse may also engage in distracting dialogue. Nearly everyone likes to talk about their family, pets, hobbies, and recently experienced trips or entertainments. Such measures take minimal effort but can have a major impact on patient comfort.

USE OF LOCAL ANESTHESIA

Most periocular aesthetic procedures can be performed on healthy individuals in an office setting with local anesthesia alone. In fact, some procedures, like blepharoptosis repair, are best accomplished without any systemic sedation. It is useful to remember that amides and esters constitute the two major classes of local anesthesia, differing primarily in the chemical bond linking their hydrocarbon chains with a lipophilic segment. Ester anesthesia including cocaine and tetracaine are metabolized by plasma pseudocholinesterase into para-aminobenzoic acid, which may produce allergic reactions. Amide anesthetic agents, including lidocaine, mepivacaine, and bupivacaine, are metabolized in the liver and are rarely associated with allergic reactions. The lipid solubility of local anesthetic agents contributes to their relative potency, toxicity, and duration of action.² Most lipophilic anesthetic agents, such as bupivacaine and tetracaine, act the longest. In the same vein, alkalizing an anesthesia with sodium bicarbonate increases potency by increasing the nonionized form and results in a more

rapid onset. Conversely, local tissue acidosis, as can occur with hypoxia or infection, can delay onset and decrease potency by increasing the amount of ionized medication.

Lidocaine with a highly predictable onset, duration of action, and low toxicity is a common favorite. The maximum recommended dose for subcutaneous infiltration is 3 to 4 mg/kg and 7 mg/kg if epinephrine is added. A 1% solution without epinephrine lasts ~1.5 hours, but adding epinephrine can increase the anesthetic effect for up to 3.5 hours.³ Lidocaine, with a pH of 5 to 6, can be quite uncomfortable; thus, some surgeons add a buffering agent such as sodium bicarbonate, which has the added benefit of producing a more rapid onset while increasing potency and duration.³

Mindful of the rare but real potential for hypopigmentation with sodium bicarbonate, we take another approach. For periocular analgesia, we first administer a drop of proparacaine to the eye. A cotton pledget soaked in 4% plain lidocaine is then tucked into the fornix for 5 minutes. Then, we inject 1 to 2% lidocaine (with epinephrine) diluted 1 to 10 with normal saline through the already numb conjunctiva. The dilute injection is essentially painless and perhaps works mostly by gently stretching tissues to create a mechanical analgesia. Thereafter, we inject with a combination of "undiluted" lidocaine mixed volume per volume with a longer-acting anesthesia such as bupivacaine, which may last up to 8 hours due to active metabolites. The maximum recommended dose for bupivacaine without epinephrine is 1 to 2 mg/kg, increasing to 2 to 3 mg/kg when epinephrine is added. Once the transconjunctival injections are completed, if desired, transcutaneous injections can then be performed painlessly. This technique is especially useful in the lower eyelid and canthi. Vibrational distraction at another site and pinching the skin beneath the point of needle penetration are both helpful for transcutaneous injections.

Adding a vasoconstrictor such as epinephrine to the anesthetic mixture promotes hemostasis and decreases the rate of systemic absorption by one third, thus reducing the likelihood of systemic side effects and increasing analgesia duration by up to 50%.³ Importantly, vasoconstrictors should never be used where they can track into the midorbit or in proximity to the optic nerve with its end-arterial blood supply. When used for hemostasis, allow at least 7 minutes for the vasoconstriction to take effect, and it has been suggested that placing epinephrine-containing solutions in metal containers will decrease the vasoconstrictor's efficacy.⁴ Epinephrine at dilutions more concentrated than 1:100,000 are believed to provide no significant increase in hemostasis.⁴ For patients with significant cardiovascular risk, phenylephrine, a pure α agonist without impact on the cardiac β receptors, may prove an acceptable substitute at a 1:20,000 to 1:50,000 dilution if injected 20 minutes before surgery.

Although most adverse responses to local anesthesia are related to systemic toxicity, true allergic reactions do occur but account for less than 1% of problems encountered.³ If an allergic reaction develops, epinephrine 0.1 mg to 0.5 mg can be administered subcutaneously along with diphenhydramine 1 mg/kg given intramuscularly if there is no intravenous access. An allergic response to one ester anesthetic agent precludes use of others, whereas cross-sensitivity between esters and amides does not occur. Yet, reactions to common anesthetic preservatives, such as methylparaben, propylparaben, or sodium bisulfate, can be problematic.

PERIOCCULAR CONSIDERATIONS

Anesthetic administrations around the eye require special precautions. The most common complication from periocular anesthetic injection is retrobulbar and periocular hemorrhage.⁵ If a retrobulbar hemorrhage is suspected due to rapid orbital proptosis, chemosis, and ecchymosis, immediate lateral canthotomy with cantholysis should be performed, and emergent orbital decompression may be required if the optic nerve is compromised as evidenced by a decrease in the perception of the color red. Other possible complications from injections include globe perforation, extraocular muscle injury, optic nerve injury, and central nervous system depression.

Ocular injuries due to needle expulsion may occur with alarming frequency.⁶ Nonlocking syringes depend on friction to keep the needle hub in place, and needles may be forcefully launched from syringes when the friction is overcome by the force applied to the syringe plunger with sometimes devastating injury.⁶ If a nonlocking syringe must be used, be sure the needle is secured firmly to a dry syringe tip; be wary of high resistance to flow, as this may indicate occlusion of the needle tip in the dermis or scar tissue; consider use of a rigid plastic corneal protector; always inject away from the eye with the needle introduced as parallel to the skin as possible; and avoid asking patients to look away from the injection site. Rotating the eye away from the needle brings the posterior globe into potential peril. Needle perforations toward the front of the eye, through the cornea or pars plana, are generally much better tolerated and more easily managed than retinal injuries.

When injecting anesthesia around the eyelids, surgeons should be aware of the potential for muscle toxicity with the use of lidocaine, mepivacaine, procaine, bupivacaine, and tetracaine.⁷⁻⁹ Concentration-dependent mitochondrial depolarization has been reported to lead to a sequence of events resulting in myocyte degeneration.^{10,11} Usually, there is also eventual activation of myogenic stem cells with muscle reparation, but permanent weakness of orbicularis oculi may occur following

eyelid injections with resultant devastating lagophthalmos.⁷ Use of epinephrine or hyaluronidase with local anesthesia is believed to exacerbate the myotoxicity.⁸ Several steps may be taken, however, to minimize orbicularis toxicity during eyelid surgery. First, anesthetic injections should be placed high in the upper eyelid and low in the lower eyelid, in attempt to avoid damage to the 3 to 5 mm of eyelid margin pretarsal orbicularis, which is essential for normal blinking and eyelid closure. Second, injecting anesthesia subcutaneously can avoid direct injury to muscle tissue. Third, using the least volume and concentration of anesthesia necessary to achieve the desired effect is suggested, as the myotoxicity may be dose-related. Finally, patients should be informed of this potential risk prior to surgery.

While operating under local anesthesia alone, surgeons must remain vigilant for any untoward physiological signs. One study has purported stimulation of the oculocardiac reflex in 25% of patients undergoing blepharoplasty.¹⁰ Although this has certainly not been our experience, vasovagal responses are not uncommon, occurring in some 2 to 3% of patients, particularly in anxious patients. Even during seemingly minimal procedures, patients can experience dizziness, nausea, diaphoresis, and even loss of consciousness.

SYSTEMIC SEDATION

Although local agents alone can provide adequate analgesia for many periocular aesthetic procedures, there are situations in which either the patient or the surgeon may feel additional sedation would prove beneficial. Surgery that surpasses the limits of local anesthesia alone can often still be performed in the office with conscious sedation. Advantages of office-based surgery include cost containment, ease of scheduling, more personalized attention, and avoidance of hospital-based infections.¹¹

Several intravenous medications may be used if necessary in selected patients to supplement local anesthesia. Such medications include benzodiazepines, barbiturates, propofol, and ketamine. Narcotics can also be helpful. Although opioids can lead to respiratory depression, their effect can be reversed with naloxone. Care must be used however, as the half-life of naloxone is less than most opioids, so patients should be well observed in recovery prior to discharge if such medications are given. Barbiturates can be particularly problematic, as they have a steep dose-response curve, making it easier to overdose, especially as they have a prolonged half-life.⁸

In situations where intravenous sedation cannot provide adequate comfort, working conditions, or airway safety, general anesthesia may be considered. Procedures under general anesthesia on medically compromised patients should probably be performed at a hospital or deferred. Typically, office surgery should be reserved for The American Society of Anesthesiologists class I

(healthy; elective procedure) or class II (mild to moderate systemic disease) patients.¹² Despite the additional risks associated with general anesthesia, advantages include improved airway protection, greater patient comfort, and less movement to distract the surgeon.

Safety considerations for office-based surgery should take into account the overall health of the patient and the duration, invasiveness, and complexity of the procedures planned. Surgeons planning office-based procedures would do well to review recommendations issued by the American Society of Plastic Surgeons task force in 2002.¹³

POSTOPERATIVE CONSIDERATIONS

Attention to the postoperative period is also important. For patients who receive intravenous medication, caution should be provided against driving or operating machinery for at least a day. Morphine and fentanyl can have a biphasic effect. Morphine, for example, is metabolized by the liver and then excreted into the bile, where it is reabsorbed from the gut and may produce a secondary sedation.¹⁴ Additionally, all local anesthetics administered into the eyelids frequently cause orbicularis paresis, making eyelid closure difficult and incomplete. Patients should be advised to apply an ophthalmic ointment or viscous lubricant directly on the surface of the eye for the first 12 to 24 hours following surgery.

As periocular aesthetic procedures move more and more out of the hospital and surgery center and into the office setting, we must be mindful to maintain patient comfort and safety. Regardless of the specific type of anesthesia or technique of administration, ultimately it is the trust patients place in their surgeons that provides the greatest reassurance. Honest dialogues with patients prior to surgery about what they will likely experience can alleviate much of the anxiety surrounding any procedure. Maintaining a safe and supportive work environment with a capable and caring staff requires ongoing effort. Only then can all the knowledge, skills,

and medications at the surgeon's disposal synergize into a positive patient experience.

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