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Perioperative Anesthetics and Adjuvant Anxiolytic Approaches for Cataract Surgery Patients: Exploring Options

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Abstract

Cataract surgery is one of the most common surgeries performed worldwide. It has high rates of success and minimal adverse outcomes. In spite of the surgery's effectiveness, patients frequently report perioperative anxiety. This anxiety is often treated with pharmacologic sedation; however, evidence suggests that this is unnecessary and can lead to poorer patient outcomes. There is evidence that other adjuvant therapies exist which can decrease perioperative anxiety and therefore the need for higher levels of pharmacologic sedation. This paper explores some of these adjuvant therapies, as well as current anesthetic technique used in cataract surgery.

Introduction

Cataracts are a leading cause of blindness worldwide, and cataract surgery remains one of the most common surgeries performed in the USA[1]. Routine cataract surgery is generally performed in an outpatient ambulatory setting. Ophthalmologists may normalize routine cataract surgery, but for some patients, it may represent a first exposure to eye surgery. Understandably this first exposure can create anxiety surrounding the perioperative period. Studies have demonstrated that increased levels of patient anxiety lead to increased need for sedation, which in turn decreases the level of patient cooperativeness and increases the risk of operative complications[2]. Currently, sedatives are frequently used as a means of anxiolysis in the US. However, there is a paucity of evidence that sedation improves patient experiences or outcomes [3]. To the contrary, increased doses of sedatives increase the rate of adverse outcomes, especially when multiple sedatives are used [3, 4]. Additionally, the population that requires cataract surgery tends to be elderly patients who may not respond well to sedatives. There has

been evidence of this population responding paradoxically to sedatives. Furthermore, the effects of sedatives often continue long after surgery is over [4]. For these reasons, the decreased use of pharmacologic sedation in cataract surgery is a worthy goal. Evidence suggests that anesthetic approaches and adjuvant anxiolytic therapies exist which can decrease perioperative anxiety which should in turn decrease the need for pharmacologic anxiolysis. This paper will explore several types of local anesthetic techniques, as well as adjuvant therapies, including, patient education, Music Therapy, hypnosis, acupuncture, and handholding.

Anesthetic Technique

Cataract surgery is typically performed in a 15-minute outpatient setting. Different anesthetic techniques can be used during cataract surgery to temporarily decrease patients' sensation or awareness in order to optimize surgical outcomes. The goals of anesthesia during cataract surgery are to ensure patient safety as well as to provide analgesia, akinesia, control of intraocular pressure, and to prevent post-operative coughing, nausea or vomiting [5]. Generally, one of four anesthetic techniques is utilized in cataract surgery: retrobulbar blocks (RB), peribulbar blocks(PB), Sub-Tenon anesthetic (ST), or topical anesthesia (TA). The benefits and drawbacks of each are described below with a summary available in table 1.

The most recent data for the United States shows that ophthalmologists prefer RB (46%), TA (23%), and PB (23%) as their anesthetic of choice for cataract surgery [3]. RB involve the injection of an analgesic into the area surrounding the optic nerve via a rigid needle and provides the most effective analgesia and intraoperative anxiolysis. The most significant disadvantage associated with RB block is the risk of orbital perforation and hemorrhage [6]. However, this complication is rare, occurring only once per 1000-10000 [3]. In spite of its advantages, one study found that 40% of cataract surgery patients who underwent RB would not have it done again in the future, compared to 19% and 16% for TA and ST, respectively [6]. Discomfort associated with the application of RB appeared to be the primary driving factor among those patients [6]. PB involves the injection of local anesthetic around the glove of the eye, in a location more proximal than in RBs. ST involves the placement of a curved cannula through an incision in the Tenon's capsule [7]. Because of this, there is theoretically no risk of globe perforation or optic nerve injury, but some rare cases of perforation have been reported [8]. TA is a less invasive technique involving the application of an anesthetic agent onto the external surface of the eye. Although TA is easily applied, patients oftentimes requires higher levels of pharmacologic sedation- compared to ST, PB and RB- to achieve adequate intraoperative pain management and anxiolysis. However, there is evidence that this sedative use is unnecessary [6, 9]. There is no gold standard when determining which anesthetic technique to use. The determination should be made based on evidence and agreed upon by both the ophthalmology and anesthesiology teams.

Anesthetic approach	Benefits/Actions	Drawbacks
Retrobulbar block (RB)	• Most effective analgesia • Greatest reduction in intraoperative anxiety	• Higher relative risk of serious complications, including globe perforation (especially in

	• Decreases photosensitivity • Best surgeon reported operative conditions • Best for starting surgeons (get akinesia, mydriasis, and proptosis) • Best for longer cases (>45 minutes)	patients with long eyes), retrobulbar hemorrhage, extraocular muscle damage, intradural administration of anesthetic (secondary respiratory arrest and possibly death), or damage to optic nerve • Discomfort with administration • Requires postoperative patch for protection • Conjunctival chemosis
Peribulbar block (PB)	• Analgesia • Variable mydriasis, akinesia, and decrease in photosensitivity • No risk of optic nerve injury	• Less relative risk of serious complications listed above for RB • Discomfort with administration • Requires postoperative patch for protection • Conjunctival chemosis
Sub-Tenon block (ST)	• Analgesia • Decreases photosensitivity • Variable mydriasis, akinesia • Akinesia • Easily administered after intraoperative drape placement • Best for patients on blood thinners to limit risk of retrobulbar injection	• Risk of serious complications, including globe perforation or retrobulbar hemorrhage (significantly lower risk relative to RB) • Discomfort with administration • Requires postoperative patch for protection • Conjunctival chemosis • Conjunctival injection • Reported postoperative discomfort (foreign body sensation)[10, 11]
Topical Anesthesia (TA)	• Less risk of retrobulbar bleeding (no needle-tip procedure required) • Less invasive thus quicker rehabilitation (no patch required postoperatively) • Mydriasis (preferred in topical intracameral approaches) • Minimal discomfort during application • Rapid postoperative visual recovery • Best for cooperative patients whose pupils dilate well and can tolerate microscope light • Best for patients with long eyes • Best for experienced, efficient surgeons	• Less effective analgesia • Increased intra-operative anxiety • Highest rate of sedative use • Surgical case becomes technically more difficult because akinesia is not achieved • Corneal epithelial toxicity (requiring intraoperative use of ophthalmic viscosurgical devices) • Cannot use in patients with nystagmus • Reported postoperative nausea/vomiting [12] and anxiety[13]

Table 1: Summarized considerations for anesthetic approaches used in cataract surgery, as adapted from "Surgery for Greenhorns" textbook by Dr. Thomas A. Oetting [14]

Sedation

In addition to the goals of anesthesia listed above, it is also important to address perioperative. In the United States and Canada, sedatives are routinely used in cataract surgery to address this anxiety [2]. Sedatives are pharmacologic agents which induce relaxation on a scale from calm awake state to unresponsiveness and are used in nearly all invasive procedures. Sedatives can be administered intraoperatively as an adjunctive anxiolytic therapy in conjunction with the primary anesthetic approaches described above. Sedatives can be administered intravenously (IV), orally (PO), and sublingually (SL) depending upon various surgeon and patient factors, but studies have not shown improved patient satisfaction between these three methods regarding intraoperative cooperation, pain, or anxiety [15, 16]. IV benzodiazepines and IV propofol are the most commonly used sedatives but can have undesired effects on cardiovascular health [17]. Limiting sedative use is worthwhile as pharmacologic sedation requires careful monitoring and dedicated personnel during the perioperative

period. Additionally, this increased sedative use typically results in prolonged time to discharge following cataract surgery and slower recovery.

General Anesthesia is a medically induced state of complete unconsciousness and is the highest level of sedation. It is not commonly used for cataract surgery. However, there are some specific indications for its use including pediatric patients, those who are experiencing severe anxiety, or patients who are unable to sit still during the procedure. It is less desirable, as it requires a preauthorization by a primary care physician, longer recovery time, and has potential for rare serious complications (e.g. increased intraocular pressure and death).

While there has not been shown to be significant improvements in patient satisfaction with their use, there has been a trend towards less invasive agents. SL sedative options provide some benefit in that they allow for a more rapid onset of action and can be administered to patients who are unable to swallow a pill. Due to their benefits, SL sedatives are an active area of research. One example is the MKO Melt (Imprimis Pharmaceuticals, Inc., San Diego, CA), which is a SL combination of midazolam, ketamine, and ondansetron that has been anecdotally reported to reduce surgical times and improve patient satisfaction [18].

Another sedating agent that is gaining popularity is PO melatonin. In one randomized controlled study, patients' anxiety levels were significantly reduced using of sublingual melatonin taken 60 minutes prior to cataract surgery, resulting in improved intraoperative conditions [19]. Another similar study found that pain levels and intraoperative intraocular pressure were also lower in the melatonin group [20].

Adjuvant Approaches

Several adjuvant approaches have been shown to decrease perioperative anxiety and should be considered in conjunction with, or as an alternative to, traditional anesthetics and sedatives.

Patient Education and Communication

The bedrock of addressing perioperative anxiety for the cataract surgery patient is patient education and improved patient provider communication[21]. Education means providing patients with information in an accessible way, which may entail approaches that differ between patients. Examples include written materials, spoken word, and multi-media [21]. Each ophthalmology practice approaches patient education with their own nuanced strategies, and each patient's educational needs must be assessed individually. Nevertheless, education remains a common focus across practices and often is considered a necessary adjuvant approach to every cataract surgery case.

Patient education is a process that begins pre-operatively and continues beyond the final post-op appointment. Pre-operative education revolves around the informed consent. The informed consent entails eliciting consent for cataract surgery following clear communication of the risks, benefits, and alternatives of the procedure while anticipating common patient concerns [22]. Sharing information has been reported as one of the healthcare team's most powerful tools to address patient anxiety related to their surgical procedure [23]. Patient education in the week leading up to surgery decreased levels of perioperative anxiety, increased levels of satisfaction with the overall surgical experience, and improved cooperation with the surgeon intraoperatively [24].

Intraoperatively, patients need a means of expressing any concerns that is conducive to operating room staff. A patient-controlled alert device has been found to be an effective direct-to-surgeon means of

expressing concerns during cataract surgery [25]. Postoperatively, patient education continues with formalized follow up appointments and maintaining open lines of communication between ophthalmology practices and their patients [26]. Spending time educating at each step along the journey of cataract surgery should be an emphasis of every surgical team.

Music Therapy

As an adjuvant approach to anxiolysis in cataract surgery patients, listening to music has been shown to significantly decrease the levels of intraoperative anxiety [27], increase patient satisfaction [28], and decrease systolic and diastolic blood pressures intraoperatively [29]. Other studies have shown that the subjective experience of the patient and ophthalmologist were improved in groups treated with music therapy, as compared to the control who listened to prerecorded OR sounds [28]. Several studies on perioperative use of music during various forms of surgery emphasized the importance of patient music selection [30-32]. Of these, only one study specifically addressed cataract surgery patients. However, the methodological rigor of the other two strongly suggests a path forward for research in this area employing patient led music selection and focusing on the preoperative phase. As both Wang and Marwick have emphasized, adequate sample sizes and objective outcomes data will be essential for validating the efficacy of perioperative music therapy in any context [33].

Hypnosis

Hypnotherapy is a technique, performed by a licensed hypnotherapist, to induce a patient into a state of increased focus and suggestibility. This allows the patient to enter a tranced state in which their "skeptical nature" is bypassed [34]. One double blinded study demonstrated significantly less pain and perioperative anxiety in patients treated preoperatively with hypnosis, as compared to a control group which received the standard of care without hypnosis therapy [35]. Additional corroborating studies have shown intraoperative anxiety to be lower for the patient, requiring decreased levels of intraoperative sedation and thus surgeons' operating conditions were improved [4]. One study of conscious sedation in plastic surgery has shown that there was significantly decreased need for pharmacologic sedation when hypnosis was employed[36]. While there seems to be an application for hypnosis in cataract surgery, the logistics would be determined on a clinic-by-clinic basis.

Acupuncture

Acupuncture therapy is a traditional Chinese approach to pain relief (and other therapeutic interventions) utilizing the pricking of strategic body tissues with thin needles to achieve a "balance of body energies." The World Health Organization has recognized acupuncture's benefit in some medical conditions [37]. One prospective, Italian, double-blind controlled trial studying 75 patients (equally subdivided into three groups: "no acupuncture," "true acupuncture starting 20 minutes before surgery," and "sham acupuncture starting 20 minutes before surgery") concluded that acupuncture was effective in reducing anxiety related to cataract surgery under topical anesthesia [17]. Additionally, there are relatively few contraindications and minimal side effects to acupuncture therapy [17]. The acupuncture technique is one that can be performed by a physician, so the technique would theoretically not require an additional personnel [17]. Acupuncture should be considered as an adjuvant therapy as it can reduce perioperative anxiety without requiring additional personnel.

Handholding

Handholding is an approach in which a nurse or other professional holds the hand of a patient during diagnostic or therapeutic intervention. This handholding has been shown to decrease intraoperative anxiety [38]. In one study, norepinephrine and epinephrine levels were used as markers for patient stress responses. This study showed levels of epinephrine were significantly lower in the handholding group compared to the control group. In spite of this chemical response, statistically significant differences in physiologic indicators of anxiety, such as blood pressure and heart rate, were not observed between the two groups [38]. Several down sides to this technique exist. Most notably this technique would require additional personnel intraoperatively, however, use of family and friends has been suggested as an alternative. Additionally, not all patients are comfortable holding the hand of a stranger. These preferences will likely depend on the cultural background of the patient. There is also the potential for long term shifts in societal norms regarding handholding following the recent COVID-19 pandemic. Despite this, handholding could be a viable adjuvant therapeutic option.

Conclusion

Cataract surgery is a safe and effective solution to the most common cause of blindness worldwide. Patient anxiety is natural and deserves personalized attention. While patient concern may arise from a variety of sources, addressing perioperative anxiety remains atop providers' priorities. Carefully chosen anesthetics coupled with the appropriate adjuvant therapy can help alleviate this anxiety while at the same time improving intraoperative conditions.

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