Comparison of Retrobulbar Anesthesia and Intracameral Anesthesia using Preservative Free Bupivacaine Hydrochloride 0.5% in Phacoemulsification with Posterior Chamber Intraocular Lens Implantation

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Abstract

Objective: To compare the retrobulbar anesthesia and intracameral anesthesia using preservative-free bupivacaine hydrochloride 0.5% in terms of effectiveness, complications and comfort to the patient during phacoemulsification with posterior chamber intraocular lens implantation.

Methods: This was a hospital based comparative study of two methods of anesthesia, conducted at LRBT Free Eye and Cancer Hospital, Lahore from January to July 2000. Study included 200 patients with uncomplicated age-related cataract, equally divided in two groups on simple random basis. Group A (100 patients) received the retrobulbar anesthesia and Group B (100 patients) received the intracameral anesthesia with bupivacaine hydrochloride 0.5% for phacoemulsification with posterior chamber intraocular lens implantation. Outcome measures like pain, visual acuity, intraocular pressure and anterior chamber reaction were compared.

Results: On day 1, 79% of the patients in group A and 82% patients in group B had unaided visual acuity ranging between 6/6-6/18. On day 7, this was 88% in group A and 89% group B. On day 1, 99% in group A and 98% in group B had <1+ cells in the anterior chamber while on day 7 this increased up to 100%. On day 1, 97% in group A and 98% group B had intraocular pressure less than 20 mmHg. On day 7, it increased up to 100% in both groups. 97% patients in group A and 96% patients in group B had painless surgery. Results were analysed using computer software SPSS version 10.0. Results showed no significant statistical difference between two groups in terms of pain, visual acuity, intraocular pressure, anterior chamber reaction and patient comfort.

Conclusion: In the hands of expert surgeons and in selected patients, intracameral anesthesia with preservative-free bupivacaine hydrochloride 0.5% is a safe and effective technique of ocular anesthesia for phacoemulsification with posterior chamber intraocular lens implantation (JPMA 53:463;2003).

Introduction

Retrobulbar anesthesia with an associated facial nerve block has been the "Gold standard" for local ophthalmic surgical anesthesia for more than 60 years.[1] Retrobulbar anesthesia is a blind procedure and is associated with a number of potentially serious complications even in most experienced hands. Complications of retrobulbar anesthesia include minor complications like nausea and vomiting to serious ones like retrobulbar hemorrhage, globe perforation, damage to extraocular muscles, diplopia, central retinal artery and vein occlusion, optic nerve damage, respiratory depression, even brain stem anesthesia and cardiac arrest.[2-4]

To prevent these complications other methods of local anesthesia like peribulbar anesthesia, sub-Tenon's or subconjunctival injection, topical eye drop application, sponge anesthesia, intracameral anesthesia, xylocaine gel application have proved to be of interest to the cataract surgeons.[5] Intracameral anesthesia in which preservative free anesthetic is injected directly in the anterior chamber is one of newer modes of ocular anesthesia.[6-8]

In this study, we evaluated whether the intracameral anesthesia with bupivacaine hydrochloride 0.5% would be an effective and safe alternative to retrobulbar anesthesia.

Patients and Methods

The study was conducted at LRBT Free Eye and Cancer Hospital, Lahore. All patients included in the study presented with the uncomplicated age related cataract in the outpatients department of this hospital.

Patients having any other ocular pathology except cataract, past history of ocular trauma, past history of ocular surgery or other problems like deafness, dysarthria, language barrier, hysteria, dementia, mental retardation were excluded.

Two hundred patients were selected on simple random basis from the hospital outdoor and these were divided into two groups. . There were 58 female and 42 male patients in group A and 62 female and 38 male patients is group B. Mean age of patients in both groups was 60 years (50-70 years). All patients underwent phacoemulsification with posterior chamber intraocular lens (PMMA, Acrylic or Silicone lens) implantation. Group A(one hundred patients each were included in groups A and B) received the retrobulbar anesthesia with facial block and group B, the intracameral anesthesia (with preservative-free bupivacaine

hydrochloride 0.5% diluted 1:1 with Balanced Salt Solution). A single surgeon performed all the surgeries. Postoperative evaluation was done on day 1 and day 7.

Preoperative recording of visual acuity using Snellen test type, intraocular pressure with Goldmann Applanation tonometery, anterior chamber reaction with the Haag-Streit BQ-900 slit lamp biomicroscope, fundus examination with the 90 D lens and indirect ophthalmoscope (especially of the sound eye) and biometry was done.

Patients in each group received the same preoperative medication and all patients were briefed about the procedure to minimize the anxiety.

Topical broad-spectrum antibiotic drops were instilled in both eyes four times a day starting one day before surgery. Acetazolamide tablets (Tab. Diamox) 2x250 mg were given as a premedication on the night before surgery and early in the morning on the day of surgery. Pupil was dilated with 1% Tropicamide (Mydriacyl) eye drops and 10% Phenylephrine (Isonephrine) eye drops. One drop every fifteen minutes, beginning an hour before the surgery, was instilled.

In group A, 1:1 mixture of 2% Xylocaine (Barrett-Hodgson, Pakistan) and preservative-free 0.5% bupivacaine hydrochloride (Abocaine, Abbott Laboratories, Pakistan) was used for retrobulbar anesthesia. A 25-gauge needle attached to 5 ml syringe containing 2.5 ml of local anesthetic solution was used for injection. 2.5 ml of anesthetic solution was deposited within the cone of extra ocular muscles through the transconjunctival route. Intermittent digital ocular massage was done at least for 5 minutes and then the eye was checked for akinesia in all four quadrants. If required, supplementary injection was given to provide fully effective anesthesia for surgery. Facial nerve block was achieved with the O'Brien technique. Similar anesthetic solution (1:1 mixture of 2% Xylocaine and 0.5% Abocaine) was used for facial nerve block as for the retrobulbar block.

In group B, no retrobulbar or facial nerve block were given instead after pupillary dilatation, two drops of 1:1 mixture of 2% Xylocaine and 0.5% Abocaine were instilled in the eye, one drop 10 minutes and other drop just before start of surgery, to anesthetize the conjunctiva and cornea (two drops were used just to ensure that topical application of anesthetic alone was not sufficient enough for anaesthetizing the intraocular structures).

A 3.2 mm sclerocorneal tunnel incision was performed with the keratome. A 1.0 mm stab incision was made in the cornea with Feather knife No. 11. Through this incision, anterior chamber was irrigated with 0.2-0.5 ml of preservative-free bupivacaine hydrochloride 0.5% diluted in 1:1 ratio with balance salt solution. This was followed by 2% hydroxypropyle methyl cellulose (HPMC) injection 8-10 seconds later, followed by capsulorrhexis, hydrodissection and in the bag phacoemulsification. After posterior capsule polishing, an intraocular lens (PMMA, Acrylic or Silicone) was implanted within the bag.[9]

Patients reported the pain felt during surgery on a five-point scale (0 = no pain, 1 = very mild pain, 2 = mild pain, 3 = moderated pain and 4 = severe pain) 30 minutes after surgery.

Dressing was removed the next morning and Snellen visual acuity for distance (unaided and with pinhole) was tested. The surgeon measured the intraocular pressure with Goldmann Applanation tonometer and anterior chamber reaction by means of slit lamp examination.

Postoperative treatment regimen in both groups consisted of 1% Dexamethasone (Maxidex) eye drops and Chloramphenicol (Econochlor) eye drops (Alcon Laboratories), both in qid doses.

Analysing the difference between two groups in various parameters, paired-sample t test was used. Statistical analyses were performed using the SPSS package (SPSS Inc., Chicago, IL).

Results

Ninety seven percent of the patients in group A and 96% of the patients in group B had painless surgery. However, 8 patients in group A and 10 patients in group B felt discomfort and pressure on the globe during surgery. Two percent of patients in group A felt very mild to mild pain during surgery while one patient complained of moderate pain. In group B, 4% of the patients complained of very mild pain and none of the patients complained of grade 3 or 4 pain (Table 1).

The distribution of visual acuity did not differ statistically ($p = 1$). On the first postoperative day, majority of the patients had visual acuity in the range between 6/18 and 6/9 (79% in group A and 82% in group B) and it increased up to 88% in group A and 89% in group B on postoperative day 7. Only 2% of the patients in group A and group B had unaided visual acuity of less than 6/60 on day 1 (Table 2).

The distribution of anterior chamber reaction on postoperative day 1 and 7 did not differ statistically ($p = 1.0$) (Table 3).

Patients in group A had intraocular pressure slightly higher than group B although it was not statistically significant ($p = 1.0$). None of the patient in both groups had intraocular pressure >25 mmHg on postoperative day 1 (Table 4).

The average duration of surgery was slightly higher in group B (11.5 minutes in group A and 13 minutes in group B).

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Various complications of retrobulbar anesthesia occurred in patients during the study. These included the conjunctival chemosis in 1% patients and poor akinesia in 3% of the patients, in whom the surgeon had to repeat the retrobulbar block.

Few per-operative complications also occurred. One patient in group B had improper scleral tunnel incision and iris kept on intruding through the incision and had to be repositioned. One patient in group A had posterior capsular rupture during the surgery. Anterior vitrectomy was done and posterior chamber intraocular lens was successfully implanted.

Discussion

Our study showed that both the retrobulbar and intracameral anesthesia are effective in achieving anesthesia during phacoemulsification with posterior chamber intraocular lens implantation. Results of our study showed no statistical difference between the retrobulbar anesthesia with facial nerve block and the intracameral anesthesia using preservative-free 0.5% bupivacaine hydrochloride (Abocaine) in all aspects monitored in the study. Only 4% patients in group B reported very mild to mild pain as compared to 2% patients in group A. Patients in group B were given only 2 drops of topical anesthetic agent prior to surgery as the topical anesthetic alone is not sufficient enough to anesthetize the intraocular structures. No pain (98%)[10] to mild to moderate pain (3%-12%)[11,12] has been reported in other studies. Improved results in this study can be explained by the better selection of patients. All the As no facial nerve block is given, blink reflex remains intact and this rules out the chances of exposure keratitis due to blockage of the nerve supply to orbicularis oculi muscle.

There is early visual rehabilitation after intracameral anesthesia as compared to the retrobulbar anesthesia due to lack of amaurosis and is one of its great attractions.

Despite all the above-mentioned facts, careful patient selection is pivotal for intracameral anesthesia. Anxious and uncooperative patients are poor candidates. In addition, patients having deafness, dysarthria, dysfunctional communication and dysfunctional extraocular motility are not suitable for intracameral anesthesia.[15] as this method requires a degree of surgeon-patients interaction not required by the conventional injectional methods. This has been termed as vocal-local and represents a surgical skill that has to be acquired. In this aspect, our experience differs from others who believe that all patients suitable for injectional techniques are suitable for intracameral anesthesia.[16]

Like topical anesthesia, surgeon experience is a primary prerequisite for intracameral anesthesia. Beginners can face difficulties during surgery and in handling the complication.

Conclusion

To avoid the complications of retrobulbar anesthesia, intracameral anesthesia with preservative free bupivacaine hydrochloride 0.5% is an effective and easy to administer mode of ocular anesthesia for phacoemulsification with posterior chamber intraocular lens implantation. Patients in whom other forms of needle delivered local anesthesia have relatively contraindications, intracameral anesthesia can be considered during phacoemulsification.

Surgeon experience and patient selection are the keys to success. Only experienced surgeons should convert from injectional to intracameral technique.

Because of the properties of bupivacaine hydrochloride like lipid solubility, it has a potential to cause corneal endothelial cell damage. This potential can be overcome when it is diluted 1:1 with the balanced salt intraocular irrigating solution.[17,18]

Intracameral anesthesia is a new mode of anesthesia. To date, no long-term complications have been reported. Those who use this technique have a duty to observe and report long-term follow up. In addition, it is their responsibility to ensure that only preservative free anesthetics are used for intracameral use.

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