

Pain control, visual sensation, and visual outcome for phacoemulsification using topical anesthesia without sedation

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Abstract

Aim: To study the analgesic effect, subjective visual experience, and visual outcome of phacoemulsification and posterior chamber intraocular lens implantation using topical anesthesia without systemic sedation for uncomplicated cataract.

Patients and methods: Eighty one eyes of 81 consecutive patients with uncomplicated cataract undergoing phacoemulsification and posterior chamber intraocular lens implantation were recruited. Xylocaine jelly 2% was used for topical anesthesia. No sedation was used. Analgesic effect was assessed by patients' pain score, eyelid squeezing, verbal expression of pain, intraoperative elevation of blood pressure and pulse, need for supplementary anesthetic, and postoperative analgesic. The patients were interviewed immediately after operation for their subjective visual experiences of the operated eyes during surgery. Their visual acuities 3 months after operation were recorded.

Results: Sixty one patients (75.3%) had pain scores of 0 (no pain). One patient (1.2%) verbally expressed discomfort during operation. Seventy eight patients (96.3%) had no eyelid squeezing. None of the patients had a significant increase in pulse rate and blood pressure. No

supplementary anesthetic or postoperative analgesic was needed for any of the patients. Five patients (6.2%) reported absence of visual sensation during the operation. For the remaining 76 patients, 8 (9.9%) saw moving objects or instruments, 2 (2.5%) saw shadow and 2 (2.5%) saw a line or lattice pattern. No patients reported the visual sensation as threatening. All except 2 patients had improved visual acuity 3 months after operation.

Conclusions: Xylocaine 2% jelly without the use of sedative provides satisfactory anesthesia with favorable visual outcome for phacoemulsification and posterior chamber intraocular lens implantation for uncomplicated cataract. Patients experience a variety of visual sensations during the operation that are non-threatening.

Key words: Anesthesia, Phacoemulsification, Xylocaine

Introduction

Topical anesthesia using xylocaine jelly has become popular for phacoemulsification.¹⁻³ Although intraoperative pain is greater with topical anesthesia than with retrobulbar block,^{4,5} topical anesthesia avoids the risks associated with retrobulbar injection such as globe perforation, retrobulbar hemorrhage, increased orbital pressure, and injection of anesthetic agents into the subarachnoid space.⁶⁻¹² However,

in most of the reports the topical anesthesia was combined with sedation.^{11,12} Commonly used sedatives include midazolam, propofol, rapifen, and chlorpheniramine.¹³⁻¹⁷ The benefits of sedation include decreased anxiety level, enhanced local anesthetic effect, and decreased recollection of an unpleasant experience. However, sedation can cause head movement, respiratory depression, and hemodynamic instability. Furthermore, sedation can affect postoperative evaluation of intraoperative pain and visual sensation as a result of amnesia. Intraoperative blood pressure (BP) and pulse may also be influenced by the sedatives.^{18,19} Therefore, the true anesthetic effect of topical xylocaine may not be adequately reflected.

Au Eong et al reported that patients undergoing cataract surgery with retrobulbar anesthesia experienced a variety of visual sensations that might be frightening.²⁰ Newman found that topical anesthesia did not result in greater visual awareness compared with retrobulbar anesthesia.²¹

In most studies of regional anesthesia for cataract surgery, only 1 outcome measure is usually studied. This study aimed at evaluating 3 outcome measures together:

- the analgesic effect of topical anesthesia
- the intraoperative visual experience
- the surgical outcome for patients undergoing phacoemulsification and posterior chamber intraocular lens (PCIOL) implantation.

The 3 parameters are related since inadequate pain control and frightening intraoperative visual sensation may affect the surgical outcome.

Patients and methods

Consecutive patients with first eye uncomplicated cataract were recruited from January to July 2001. Informed consent was obtained from all participating patients. Exclusion criteria included single eye, previous intraocular surgery of either the studied eye or the fellow eye, mental instability, and language barrier. All patients were Chinese. None of the patients was informed of the postoperative visual sensation assessment. Before surgery, visual acuity with Snellen chart, slit lamp examination, fundus examination with ophthalmoscopy, and baseline vital signs were recorded. The surgery was performed by one of two surgeons. The pupils were dilated with mydrin-P (tropicamide 0.5%, phenylephrine HCl 0.5%). No oral analgesic or topical anesthetic other than xylocaine jelly was given prior to surgery. Topical anesthesia with xylocaine jelly (2%) was applied to the surface of the eye 5 minutes before the operation. The eye was rinsed with 5% povidone antiseptic solution.

The Ketena lid speculum was used to retract the eyelids. Standard phacoemulsification using a 3.2 mm corneal wound at the superior quadrant was performed, followed by implantation of a foldable PCIOL (Acrysof MA30BA, Alcon Laboratory Inc., Fort Worth, USA). An ophthalmic microscope (Leica M840; Leica AG, CH-9435, Heerbrugg,

Germany), set at 56% main light intensity and 30% ottoflex, was used. During the operation, the pulse rate and BP were monitored by a bedside multifunction modula (90385-IBEF MQX; SpaceLabs. Medical, Redmond, USA) with a preset audible alarm, which would be activated when either the pulse rate increased by more than 20 beats/minute or the BP increased by more than 20/10 (systolic/diastolic) mm Hg from baseline. Supplementary sub-Tenon anesthesia and/or sedation was given as required. Postoperatively, garasone eye ointment was administered to the operated eye, which was covered overnight.

Immediately after surgery, patients were presented with a 10-point visual analog pain scale. The scale ranged from 0 (no pain) to 10 (unbearable pain). The surgeon who performed the operation graded the level of the most severe pain experienced by the patients and their visual sensation during the operation. The surgeon also completed an assessment form immediately after surgery recording the duration of surgery, lid squeezing, complications, significant increase in the pulse rate or BP, supplementary sedation, and/or sub-Tenon anesthesia during the surgery.

The patients were examined on the first postoperative day. The cornea was carefully assessed for edema and thickening. The anterior chamber reaction was recorded. The visual acuity and intraocular pressure (IOP) were measured and recorded. Postoperative analgesic required was recorded.

Results

Eighty one eyes of 81 consecutive patients (39 male and 42 female) with first eye uncomplicated cataract were included in the study. The mean age was 73.4 ± 7.6 years.

The mean phacotime was 36.0 ± 6.0 seconds. All the operations except the one requiring anterior vitrectomy were completed within 30 minutes. The mean operation time was 17.3 ± 4.5 minutes.

The mean pain score assessed using the visual analogue score chart was 0.3 ± 0.6 . Sixty one patients (75.3%) had a score of 0 (**Figure 1**). One patient verbally expressed mild discomfort during phacoemulsification. The discomfort was transient and supplementary anesthesia was not required. No patient developed a significant rise in the BP or pulse rate. None of the patients reported postoperative pain requiring oral analgesia.

The majority of patients had no eyelid squeezing during the operation, with only 3 patients (3.7%) occasionally squeezing their eyelids during the surgery.

The most common visual sensation experienced by the patients during the operation was diffuse light (76 patients, 93.8%), often in red color. Among this group of patients, instruments or objects (8 patients, 9.9%), shadow (2 patients, 2.5%), or lines or a lattice pattern (2 patients, 2.5%) were perceived. Five patients (6.2%) had transient

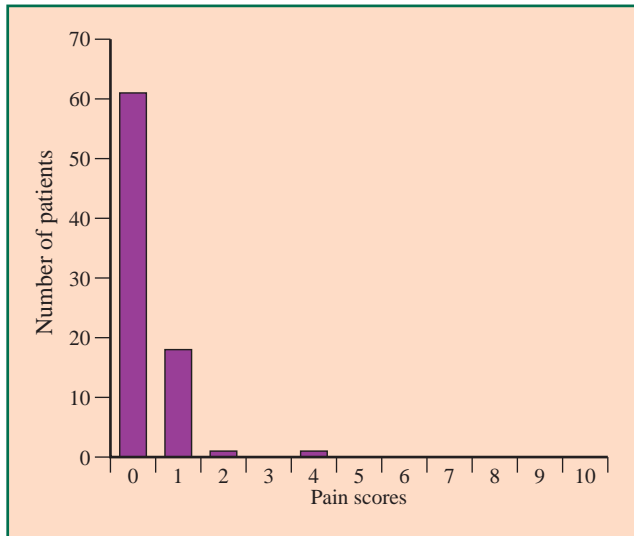


Figure 1. Distribution of pain scores among the patients.

loss of light perception during the operation (**Table 1**). None of the patients reported an unpleasant or threatening visual experience.

Concerning the intraoperative and postoperative complications, 2 patients had posterior capsule tear intraoperatively. One of these patients required anterior vitrectomy and intraocular lens (IOL) implantation in the sulcus. One patient had the iris accidentally traumatized by a dislodged syringe cannula. Four patients had an increase in IOP (up to 33 mm Hg) on postoperative day 1.

Regarding the visual acuity changes 3 months after operation, 3 patients were excluded for analysis because 1 of them had died and 2 others defaulted follow-up. All except 2 patients had improved visual acuity (**Figure 2**). These 2 patients had branched retinal vein occlusion and diabetic retinopathy, respectively.

Discussion

Topical anesthesia is now widely used for cataract surgery. However, in most of the data available, anesthesia is combined with the use of a sedative. Although sedation may decrease the anxiety and increase the comfort of patients during operation, it may be associated with adverse effects. Sedation may cause respiratory depression and hemodynamic instability and is therefore relatively contraindicated for patients with respiratory and cardiovascular

Types of visual sensation	Number (n = 81*)	%
Diffuse light	76	93.8
Instruments, objects	8	9.9
Shadow	2	2.5
Lines	2	2.5
Transient loss of light perception	5	6.2

* Some patients experienced more than 1 visual sensation.

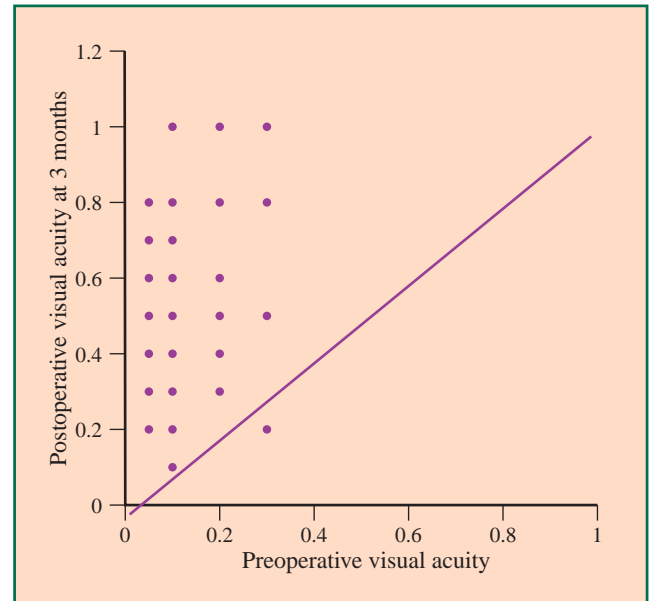


Figure 2. Scattergram showing changes in visual acuities before and 3 months after operation.

diseases. In situations in which cardiopulmonary diseases are prevalent such as among elderly people sedation may not be advisable. Sedated patients may occasionally make involuntary head or body movements, which may result in serious intraoperative complications. Moreover, the use of sedation may require the presence of an anesthetist, which may not be cost-effective or achievable in areas where high volumes of cataract surgeries are performed.

Most of the published data on topical anesthesia in cataract surgery evaluated the pain experience and visual sensation immediately after surgery when the effect of sedative had not worn off. This could affect the pain score and the visual sensation recalled by the patients. Intraoperative elevation of pulse rate and BP used to monitor a pain response might also be suppressed by the sedatives to a certain extent. This study employs topical anesthetic without sedation so as to minimize the possible influence on patients' mental and hemodynamic states by sedatives. The pain sensation and the intraoperative visual experience can therefore be more accurately assessed.

The intraoperative pain control in this study was satisfactory with a mean pain score of 0.3. None of the patients required supplementary anesthetic and none had significant increases in pulse rate and BP. The patients were also free from pain in the immediate postoperative period as none of them required postoperative oral analgesic.

Unlike retrobulbar or peribulbar anesthesia, where visual acuity has been shown to decrease,^{22,23} topical anesthesia is known not to affect optic nerve function. Patients are expected to see more clearly during phacoemulsification using topical anesthesia. If the sensation appears frightening, it may affect patients' cooperation during the operation. A wide variety of subjective visual sensations were noted in this study ranging from no light perception to visualization

of instruments. This spectrum of visual sensations is similar to the visual experience during extracapsular cataract extraction and IOL implantation using retrobulbar anesthesia.²⁰ This knowledge of the visual spectrum is useful so that patients are better informed before operation and their fears about cataract extraction using topical anesthesia can be reduced.

The postoperative visual acuity at 3 months was satisfactory. The 2 patients with unimproved visual acuity had ocular pathology. The intraoperative complications were minimal and were not related to the type of anesthesia.

This study evaluated the pain sensation, visual experience, and visual outcome in the same selected group of patients. Although there is a lack of a comparative group, this information on the use of xylocaine gel without sedation should be considered when choosing anesthesia for phacoemulsification.

To conclude, xylocaine 2% jelly in phacoemulsification and posterior chamber IOL implantation for uncomplicated cataract without the use of a sedative provides a satisfactory anesthetic effect, non-threatening intraoperative visual experience, and a favorable surgical outcome.

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