

# Is intracameral lidocaine really effective in cataract surgery?

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**PURPOSE.** To evaluate the usefulness of intracameral lidocaine in cataract surgery under topical anesthesia and especially if the patient wanted intravenous sedation preoperatively.

**METHODS.** In this prospective study 96 patients were randomly assigned to receive 0.5 cc of balanced salt solution (Group 1) or 1% unpreserved lidocaine (Group 2). Patients who wanted sedation received intravenous midazolam hydrochloride. All surgery was done by one surgeon using a clear corneal technique.

**RESULTS.** Mean pain scores were 0.73 (of a maximum 3) in Group 1 and 0.54 in Group 2; the difference between groups was not statistically significant. Forty patients in Group 1 (83%) and 44 patients in Group 2 (92%) reported no discomfort or only mild discomfort. The two study groups were comparable in need for intravenous midazolam. Logistic regression analysis showed a significant relationship between pain scores and intravenous sedation ( $p=0.02$ ) but not with intracameral lidocaine or other tested variables. However, odds ratio for pain increased to 5.1 (95% CI; 1.29–20.41) in participants without intravenous sedation compared to those with sedation.

**CONCLUSIONS.** The results of the present study suggest that intravenous sedation preoperatively seems to be an important determinant to relieve the sensation of discomfort/pain during small incision cataract surgery, but intracameral lidocaine was shown not to have a clinically useful role. (*Eur J Ophthalmol* 2007; 17: 332-5)

**KEY WORDS.** Intracameral anesthesia, Intravenous sedation, Unpreserved lidocaine, Cataract

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## INTRODUCTION

Topical anesthesia alone does not eliminate all sensation of discomfort in every cataract surgery patient. Unpreserved intracameral lidocaine 1% has been reported to minimize or eliminate intraocular sensations during cataract surgery in patients who had preoperative sedation (1-3). Another study compared topical anesthesia with combined topical-intracameral anesthesia without any sedation and concluded that intracameral lidocaine provides no clinical benefit (4). The purpose of this study was to investigate the usefulness of intracameral anesthetic application in small incision cataract surgery under topical anesthesia and especially if the patient wanted sedation preoperatively.

## METHODS

This prospective, randomized, placebo-controlled clinical study involved 100 consecutive patients (100 eyes) having phacoemulsification with intraocular lens (IOL) implantation at the Tampere University Department of Ophthalmology between January and December 2000. Written permission was obtained from patients after the procedure had been explained thoroughly. The study had prior approval from the local ethical committee and was performed in accordance with the Declaration of Helsinki. Participation in the study was voluntary.

The study was limited to first-eye cataract surgery. Patients were excluded from the study if they had ad-

verse reaction to lidocaine, dementia, deafness, nystagmus, involuntary movement, excessive anxiety; a history of intraocular surgery in the same eye, or were not native speakers of the language used in the documentation of informed consent. Patients who had preoperative best-corrected visual acuity worse than 0.05 using the Snellen visual acuity test were also excluded.

Eligible patients were randomized into one of the two groups using a computer-generated random number table. Group 1 received intracameral injection of 0.5 cc balanced salt solution (placebo). Group 2 received intracameral injection of 0.5 cc unpreserved, epinephrine-free 1% lidocaine (Astra).

### *Anesthesia and sedation*

Topical anesthesia consisted of lidocaine hydrochloride 4% (unpreserved) administered four times 10 minutes prior to surgery, followed by several drops administered just prior to aseptic surgical preparation. No routine intravenous sedation was given to any patient. However, for patients who wanted sedation, intravenous midazolam hydrochloride 0.03 mg/kg (Dormicum, Roche) was administered intravenously before anesthetics were applied. No additional periocular or intraocular anesthetic was given. In all eyes, the intracameral placebo/lidocaine was administered immediately after the clear corneal incision. After a standard 15 seconds, the anterior chamber was filled with a viscoelastic substance.

### *Surgical technique*

All surgery was done by one surgeon (J.V.) using a standard technique: 2.75 mm temporal clear corneal incision, continuous curvilinear capsulorhexis, using a viscoelastic agent (Ophthalin Plus, Ciba Surgical), modified divide and conquer technique using the AMO Prestige series, and implantation of a 6.0-mm-diameter foldable silicone intraocular lens (IOL) (Model SI-40NB, AMO). No wound sutures were required in any case. Intracameral carbachol was not used to constrict the pupil in any patient.

The operating room nurse asked patients to rate the intraoperative pain immediately after surgery. A four-point pain scale was used to evaluate the patients' subjective experience of pain: 0 = no discomfort; 1 =

mild discomfort; 2 = moderate pain; 3 = severe pain (5). Patients were instructed to inform the investigators if they experienced anything more than mild pain at the any time. Patients were also asked whether they lost light perception during the surgery. Intraoperative complications were recorded.

The operating surgeon (J.V.) examined all patients on the first postoperative day. The presence of corneal edema and thickening was recorded according to the following scale: 0 = none; 1 = edema confined to the surgical wound; 2 = edema extending beyond the wound but not involving the central cornea; and 3 = edema of the central cornea. Data were also collected on average phacoemulsification power, use of supplementary anesthetic, and presence of inflammatory cells and flare in the anterior chamber (graded no cells/flare or as mild, moderate, or marked).

The chi-square test or Fisher exact test were applied to determine statistically significant differences between the Group 1 and Group 2 qualitative variables. The independent Student *t*-test was used to compare differences between quantitative variables. Logistic regression analyses were performed to determine whether there were any significant factors associated with surgical pain. Tested factors included intracameral lidocaine, age, eye (right/left), sex, and intravenous sedation.

## RESULTS

Ninety-six patients (48 lidocaine, 48 placebo) completed the study and were evaluated. Four patients were excluded from analysis after consenting to the trial: two whose questionnaires were lost and two who had an intraoperative ischemic heart or brain attack and did not complete the study. Patient data are listed in Table I.

Mean pain scores were 0.73 (of a maximum 3) in Group 1 and 0.54 in Group 2; the difference between groups was not statistically significant ( $p=0.21$ ). Forty patients in Group 1 (83%) and 44 patients in Group 2 (92%) reported no discomfort or only mild discomfort. Logistic regression analysis showed a significant relationship between pain scores and intravenous sedation ( $p=0.02$ ) but not with intracameral lidocaine or other tested variables. Odds ratio for pain increased to 5.1 (95% CI; 1.29–20.41) in participants without intra-

**TABLE I - PATIENT DATA**

	Group 1: intracameral placebo	Group 2: intracameral lidocaine	p
No.	48	48	NS
Mean age (range), yr	73 (54–87)	70 (36–87)	NS
Female	34	38	NS
Male	14	10	
Intravenous sedation	16	24	NS
Phaco energy (J), mean ± SD	2764 ± 1615	2688 ± 1528	NS
Preoperative IOP (mm Hg), mean ± SD	17.8 ± 3.9	18.0 ± 4.0	NS
Postoperative IOP (mm Hg), mean ± SD	19.4 ± 6.4	19.4 ± 6.2	NS

NS = Not significant; IOP = Intraocular pressure; SD = Standard deviation

**TABLE II - POSTOPERATIVE CORNEAL AND ANTERIOR CHAMBER FINDINGS**

	Group 1: intracameral placebo	Group 2: intracameral lidocaine	p
No.	48	48	NS
Corneal edema			
None	20	30	
1+	18	14	
2+	10	4	
3+	–	–	
Flare			NS
None	–	–	
Mild	46	48	
Moderate	2	–	
Marked	–	–	
Cells			NS
None	1	1	
Mild	44	46	
Moderate	3	1	
Marked	–	–	

NS = Not significant; 1+ = Edema confined to the surgical wound; 2+ = Edema extending beyond the wound but not involving the central cornea; 3+ = Edema of the central cornea

venous sedation compared to those with sedation. Preoperatively, there were no inflammatory cells or flare in the anterior chamber in any study eyes. Postoperative corneal and anterior chamber findings are presented in Table II. On the first postoperative day, 42% of Group 1 patients and 63% of Group 2 patients were free from corneal edema. There was not a significantly greater number of cases of corneal edema in Group 2 (p=0.07).

No intraoperative complications or loss of light perception were detected in any study patient.

## DISCUSSION

The present study attempted to determine whether intracameral lidocaine actually increased patient comfort. Study patients reported very little pain in either group. During surgery, 17% of patients in Group 1 and 8% in Group 2 reported pain, usually due to manipulation of iris and sudden stretching of the zonules. Such pain usually lasted only for a few seconds.

One study did not report any clinical benefit from the routine use of intracameral lidocaine in small incision cataract surgery (4). They used viscoelastic material before injection of the lidocaine into the anterior chamber. This might reduce the intracameral lidocaine anesthetic effect to the ciliary body. However, in the present study the intracameral lidocaine was administered before filling the anterior chamber with viscoelastic material. The efficacy of lidocaine eye drops as a sole agent in this study was at least comparable to the topical-intracameral anesthesia.

Cataract surgery provokes various degrees of anxiety for patients. Forty of 96 (42%) study patients asked for intravenous midazolam because of preoperative anxiety. The two study groups were comparable in need for intravenous midazolam for anxiety. Intravenous sedation seems to be an important determinant to relieve pain among study patients. It could be possible that the study patients not getting the intravenous sedation preoperatively might be more sensitive to the sensa-

tion of discomfort under cataract surgery. However, because midazolam may induce retrograde amnesia in some patients, the actual pain relieving effect might be in question.

According to previous reports, where preoperative sedation was used in all study patients concomitantly with intracameral anesthesia, the positive net effect of the intracameral lidocaine might be difficult to interpret (1-3). In the present study the dose of midazolam was double compared to the study that reported that midazolam did not seem to reduce pain significantly during cataract surgery under topical anesthesia (6).

As the intracameral lidocaine diffuses into the corneal stroma, the endothelial cells are directly exposed to the lidocaine. There is a report recommending using intravenous sedation instead of intracameral lidocaine in glaucoma and diabetic patients to minimize surgical stress to the endothelium in topical anesthesia (7). The risk for corneal endothelium damage from the intracameral lidocaine is possible if lidocaine is not used at optimal concentration (8). In the present study no corneal damage was noted after 0.5 cc unpreserved lidocaine 1% was injected into anterior chamber.

No significant difference in corneal edema or flare and cells in anterior chamber were found between the two study groups. Subjective measurement of presence of inflammatory cells and flare on the first postoperative day did not show any significant differences between the two study groups. Similar results have been reported previously if a laser flare meter was used to mea-

sure flare intensity between the control and intracameral lidocaine groups on the first postoperative day (1). None of the present study patients reported loss of light perception during the surgery and no clinical evidence of retinal toxicity of intracameral lidocaine was detected.

The results of the present study suggest that intravenous sedation preoperatively seems to be an important determinant to relieve the sensation of discomfort/pain during small incision cataract surgery, but intracameral lidocaine was shown not to have a clinically useful role.

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