Original Article

Cataract Surgery: Is it Time to Convert to Topical Anaesthesia?

Salahuddin Ahmed

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See end of article for authors affiliations

Correspondence to:
Salahuddin Ahmed
Armed Forces Postgraduate Medical Institute (AFPGMI) and CMH, Rawalpindi

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Purpose: To evaluate the efficacy and safety of topical anaesthesia for routine uncomplicated phacoemulsification with intraocular lens implantation surgery in Pakistani patients.

Material And Methods: 109 consecutive patients listed for routine cataract surgery were operated under topical anaethesia. Patients received four doses of 0.5% proparacaine eye drops. A 10 point visual analogue pain scoring system was used to score pain just after instillation of drops and pain score during operation was recorded just after completion of surgery. Intraoperative/ postopearive complications and surgeon's difficulties attributable to operating conditions were recorded as was the incidence of chemosis and subconjunctival haemorrhage.

Results: The pain scores reported by the patients on instillation of drops was zero in 83 patients (76%) and only 26 patients (24%) complained of slight stinging sensation (score 1) with mean score of 0.24 (Fig. 1). Pain score during surgery was zero to 1 in 85 patients (78%), 2 to 5 in 20 patients (18%) and 5 to 7 in 4 patients (4%) with mean score of 1.52 (Fig. 2). Eight patients in the last two groups required supplemental subconjunctival bupivacaine injection above superior limbus. When inquired about choice of anesthesia for another similar operation, 102 patients (93.5%) preferred same technique of anaethesia.

Conclusion: It is right time to convert to topical anaesthesia for small incision cataract surgery which is an efficient and safe anaesthetic technique.

Cataract surgery is one of the most common elective surgical procedure performed in UK[1] and the rest of the world. Local anaesthesia is the preferred anaesthetic technique for this procedure as is revealed in a survey conducted by the Royal College of Ophthalmologists[2]. There are several local anaesthetic techniques available for cataract surgery including retrobulbar (intraconal)[3], peribulbar (extraconal)[4], sub-tenon's[5,6], subconjunctival[7] and topical anaesthesia[8].

Peribulbar or retrobulbar anaesthesia, while providing excellent analgesia and akinesia, have been associated with rare but numerous ocular compli-cations[9] including diplopia[10], orbital haemorrhage[11], globe perforation[12], central retinal vein or artery occlusion[13], brainstem anaesthesia[14,15], optic nerve trauma[16], and ptosis[17]. The sub-tenon and subconjunctival anaesthesia do not cause above complications but are associated with high incidence of chemosis and subconjunctival haemorrhage[18]. In addition, preopera-

tive intravenous sedation is often required because patients find the injections painful and frightening.

Fichman[8] first described a novel technique, topical anesthesia, which is not only free from all of the above complications but is also well tolerated by the patients. Since its introduction, topical anesthesia has become increasingly popular, as indicated by the annual survey of the practice styles and preferences of members of the American Society of Cataract and Refractive Surgery. According to last year's survey, the use of topical anesthesia increased from 8% in 1995 to 63% in 1998 for high volume cataract surgeons[19]. There have been several reports of its safety and efficacy[18,20-22].

The topical anaesthesia has not been very popular in Pakistan. But, with the increasing frequency of clear corneal phacoemulsification surgery, the time is ripe to convert to topical anaesthesia which is safe, time saving, cost-effective and preferred by both patient and surgeon. This study aims at finding its feasibility in our population.

MATERIALS AND METHODS

From Feb 2007 to June 2007, 109 consecutive patients out of continuous cohort of 130 cataract patients (52 males, 57 females with a mean age of 64) attending Eye Department Combined Military Hospital Rawalpindi were eligible for cataract surgery (phacoemulsification with intraocular lens implantation) using topical anaesthesia. All patients gave written informed consent to participate in the study. Approval for the study was obtained from the Hospital Research Ethics Committee. The surgical procedure complied with the tenets of the Declaration of Helsinki. Inclusion criteria were willingness to participate in the trial. Exclusion criteria were dementia, deafness, eye-movement disorder, combination surgery, excessive anxiety, inability to understand the language of the surgeon, hypersensitivity to proparacaine and uncooperative patient. Other contraindications to participation in the study included complex anterior segment pathological features that might make the surgical procedure difficult including the extensive corneal opacification/ corneal thinning, small pupil not dilating with mydriatic drops, old glaucoma surgery, pseudo-exfoliation syndrome, and zonular dehiscence.

Technique of topical anesthesia

Six doses (approximately 40 µl per dose) of proparacaine hydrochloride 0.5% were used in total. They were instilled on the ocular surface (two drops on the cornea, and one each in the superior and inferior conjunctival cul de sac) 10 min before surgery. Five minutes before surgery two further drops were instilled on the cornea and the eye was padded. The breakthrough pain during surgery allowed an additional 2 doses of 0.5% proparacaine drops. If this was not effective within 2 minutes, the patient received a subconjunctival injection, 0.1-0.2 ml of 0.75% bupivacaine.

Surgical technique

All surgical procedures were performed by one experienced surgeon who had performed cataract surgery using topical anesthesia since 2002, using a standardized phacoemulsification technique. A superotemporal (for right eye) or superonasal (for left eye) clear corneal phaco port was made using a 3-step incision with a 3.2mm diamond phaco knife. This was followed by another side port incision 90° to the left of phaco port which was to be used for second instrument. Routine phaco surgery was performed including viscoelastic injection, continuous curvilinear capsulorhexis, hydro-dissection, hydrodelineation, endocapsular phacoemulsification, aspiration of the remaining cortical lens material, in-the-bag implantation of foldable or 5.2mm PMMA IOL and, finally the visco-elastic substance was thoroughly cleared from the anterior chamber and capsular bag. The wound was secured by hydro tamponade and tested for leakage of fluid by gentle compression with a sponge, and only 15 patients required a suture to close the wound (13 of these patient had PMMA IOLs and 2 patients had Foldable IOLs). All patients received postoperative cefuroxime; intra-cameral 1mg/0.1ml and 100mg subconjunctival injection. During postoperative recovery, each patient received dexamethasone drops and moxifloxacin drops (both used at 6 hourly interval), the dosage of steroids being rapidly tapered off depending on the degree of postoperative inflammation.

The uncontrolled eye movements were minimized by keeping the brightness of the operating microscope to minimum possible and the patients were asked to look just below the light of microscope. The surgeon kept continuous verbal contact with the patient and also warned the patient before performing certain potentially irritating preoperative and intraoperative steps like instillation of eye drops, introduction of Phaco probe into the anterior chamber, iris

manipulation, hydro dissection, activation of the irrigation line, or IOL implantation.

Pain evaluation

Each patient was shown a visual analogue pain scale with numerical and descriptive ratings from 0-1 (no pain to slight stinging) to 9-10 (severe pain), as described by Stevens[7] to rate their pain. Patients were encouraged to use this pain scale to rate the level of pain felt preoperatively (on administration of anaesthetic drops), intraoperatively (verbal expression) and 30 minutes after operation. If patients were unable to read the printed numbers and descriptive text on the pain scale, a trained ophthalmic assistant read them to the patient. An independent observer (ophthalmologist) performed the pain score recording in all the patients.

In addition, the surgeon also graded difficulties encountered attributable to the operating conditions which were recorded as "not difficult (grade 0)," "slightly difficult (grade 1)," "moderately difficult (grade 2)," "difficult (grade 3)," and "extremely difficult (grade 4)". The surgeon was asked to complete the form immediately after surgery.

RESULTS

The pain scores reported by the patients on instillation of drops was zero in 83 patients (76%) and only 26 patients (24%) complained of slight stinging sensation (score 1) with mean score of 0.24 (Fig. 1). Pain score during surgery was zero to 1 in 85 patients (78%), 2 to 5 in 20 patients (18%) and 5 to 7 in 4 patients (4%) with mean score of 1.52 (Fig. 2). Eight of the patients in the last two groups required supplemental subconjunctival bupivacaine injection above superior limbus. Only four patients experienced anxiety before anesthesia administration. The patients most commonly complained of discomfort on manipulation of the iris, distention of the anterior chamber, insertion of phaco probe, insertion and rotation of the IOL. When inquired about choice of anesthesia for another similar operation, 102 patients (93.5%) wanted to have same anaethesia.

The operating time ranged from 10 minutes to 35 minutes (mean 15 minutes). We believe that the low level of patient discomfort in our patients receiving topical anesthesia may also be explained by the speed with which phacoemulsification was performed and the caution we exercised during intraocular manipulation. No patients scheduled for peribulbar were considered unsuitable for the topical anesthesia except for the exclusion criteria already mentioned. In no case was topical anaesthesia changed to peribulbar anaesthesia.

Intraoperative conditions as judged by the surgeon are shown in Fig. 3. In majority of the cases the surgeon did not have any significant difficulty (grade 0) to slight difficulty (grade 1). Only one of the cases was really difficult (grade 4) and so we had to supplement with subconjunctival anaesthesia which was also done in 7 other patients who were experiencing pain on iris manipulation.

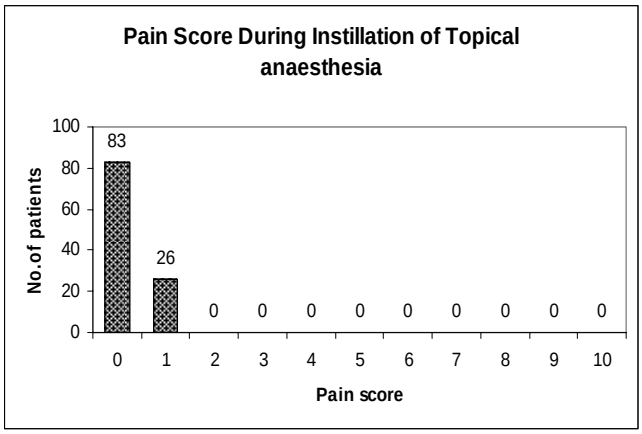

Fig. 1

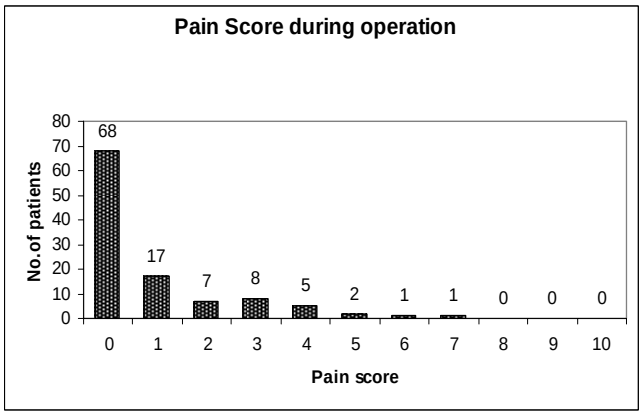

Fig. 2

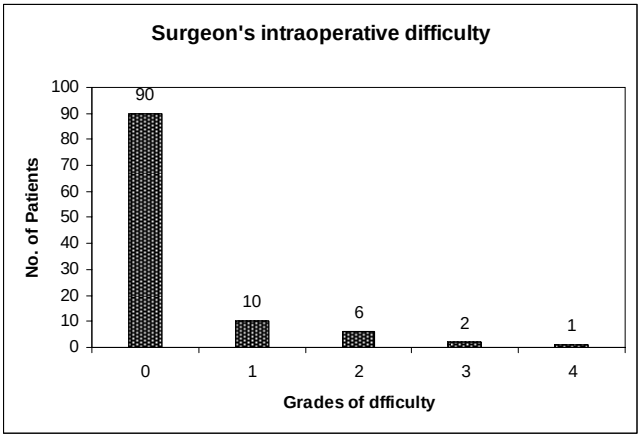

Fig. 3

Complications during surgery (one capsular rupture during phacoemulsification) were not related to the anaesthetic method. There were no severe complications observed in the first 24 hours. A transient pressure increase occurred most frequently (9 patients), fibrinous aqueous reaction was the second most frequent complication (6 patients) but was successfully treated by intensified topical corticosteroid application in each patient. Corneal edema (mostly localized) leading to a transient loss in best-corrected visual acuity occurred in 5 patients which resolved in a week's time. Retained cortex substance was observed in 1 patient which was not associated with any sustained pressure rise, and eventually got absorbed spontaneously without any surgical intervention.

DISCUSSION

Topical anaesthesia alone for cataract removal and intraocular lens implantation was first described by Fichman. Since its introduction, topical anesthesia has become increasingly popular, as indicated by the annual survey of the practice styles and preferences of members of the American society of cataract and refractive surgery. According to this survey, the use of topical anesthesia increased from 8% in 1995 to 63% for high volume cataract surgeons in 1998 and is on the increase due to patient's demand[19].

Although there are several reports establishing safety and efficacy of topical anasthesia[18,20-22]. Fukasaku and Marror[23], comparing topical and peribulbar anaesthesia, and Patel and colleagues[24], comparing topical and retrobulbar anaesthesia, reported more intraoperative pain in patients receiving topical anaesthesia for cataract surgery. In recent years, topical anesthesia for cataract surgery has gained popularity as safe and atraumatic technique[25]. The benefits of topical anaesthesia over peribulbar or retrobulbar anaesthesia are: no risks of the needle techniques, the analgesia is immediate, no rise in ocular pressure[21, 26, 27], no need for globe compression and no preoperative sedation is necessary. The main advantages of topical over sub-tenon's anaesthesia are the absence of chemosis and subconjunctival haemorrhage and a quicker visual recovery[20].

Analgesia

The administration of topical anesthesia was painless for all the patients (Fig. 1); only 26 patients (23.8%) experienced mild stinging sensation on installation of the first dose only. Roman et al[20] conducted a double-blind randomized placebo controlled trial comparing topical and sub-tenon's anaesthesia for routine cataract surgery. Although he documented that pain score was higher in the topical group compared to the sub-tenon group, none of the patients in topical group required supplemental anaesthesia during surgery and topical anaesthesia was well tolerated by patients. Chittenden and colleagues[28] and Manners and Burton[29] recommended topical anaesthesia only if the cataract surgery was performed through a clear incision, as we did in all of our patients.

People have tried different methods to improve the pain scores. Lignocaine gel instead of drops gives low pain score due to prolonged contact time and better penetration[30-33]. Although many surgeon use intra-cameral anaesthetic along with topical anesthesia there is no significant benefit documented[34-36].

The topical anaesthesia in our study was very effective; 78% of the patients reported no pain during surgery, 18% reported slight sensation to mild discomfort and only 4% reported mild to moderate pain which was relieved with supplemental subconjunctival anaethesia without resorting to peribulbar anaesthesia. The low level of discomfort in our patients receiving topical anesthesia is also explained by the speed with which phacoemulsification was performed and the caution we exercised during intraocular manipulation. Although we recommend topical anaesthesia for standard cataract surgery but in cases of very anxious and uncooperative patients or patients whose pupillary dilatation is not sufficient (risk of iris chafing), or in very dense cataracts we favour peribulbar anaesthesia. During topical anaes-

thesia, if the patients feel any discomfort, we perform a supplementary sub-conjunctival anaesthesia.

Akinesia

The lack of akinesia is the only drawback of the topical anesthesia but this is not only with topical but also with other anaesthetic technique including sub-tenon, peribulbar and retrobulbar. None of the patients had complete akinesia after sub-tenon anesthesia and complete eye movements remained after surgery in 37.6% as reported by Roman et al[20] and Tsuneoka et al[37].

Some surgeons find difficult to work without akinesia; however, as reported by many authors[37,38] lack of akinesia does not cause intraoperative difficulties to experienced surgeons. Stabilization of the globe is adequate during a two handed procedure (as during phacoemulsification). Most of the time the patients did not have eye movement. If necessary, unwanted movements can be controlled by forceps fixation. Lack of akinesia can even be helpful to the surgeon when asking the patient to look in a particular direction to expose a desired area. No complications have occurred during surgery because of ocular motility in our study. Nevertheless, in cases of patients completely unable to cooperate (patients suffering from dementia or unable to understand the language), we would rather use peribulbar or retrobulbar anesthesia. The uncontrolled eye movements were minimized by keeping the brightness of the operating microscope to minimum possible and constant verbal contact with the patient.

Chemosis and subconjunctival haemorrhage

Chemosis was infrequent in our study seen in only 6% of patients and there was no patient with subconjunctival haemorrhage using the topical technique whereas there can be frequent chemosis and subconjunctival haemorrhage in sub-tenon anesthesia 39.4 % and 56% respectably[20] whereas another study reports inevitable subconjunctival haemorrhage[18].

CONCLUSION

Topical anaesthesia is a simple, safe, atraumatic technique. Its benefits are numerous. The speed and ease of administering topical anesthesia coupled with the rapid visual recovery after surgery makes this method a suitable and safe choice. It can be proposed as a good alternative to peribulbar or retrobulbar anaesthesia and is likely to become the preferred type of anesthesia in phacoemulsification. Surgical training and patient selection is the key to safe use of topical anaesthesia. Patient preference for topical anesthesia is increasing steadily and warrants all efforts to move away from more invasive forms of anesthesia so that cataract surgery can genuinely be described as "minimally invasive".

Author's affiliation

Dr. Salahuddin Ahmed
Assistant Professor
H. # 225, St. # 4 Askari XI
Near Qasim Market
Rawalpindi Cantt

REFERENCE

1. Report of the Joint Working Party on Local Anaesthesia for Intraocular Surgery. London: Royal College of Anaesthetists and College of Ophthalmologists, 2001.
2. **Eke T, Thompson JR.** National Survey of Local Anaesthesia for Ocular Surgery in the United Kingdom. Ophthalmology. 2000; 107: 817.
3. **Ellis PP.** Retrobulbar injections. Surv Ophthalmol. 1974; 18: 425–30.
4. **Davis DB II, Mandel MR.** Peribulbar anaesthesia: a review of technique and complications. Ophthalmic Clin North Am. 1990; 3: 101-10.
5. **Hansen EA, Mein CE, Mazzoli R.** Ocular anaesthesia for cataract surgery: a direct sub-Tenon's approach. Ophthalmic Surg. 1990; 21: 696-9.
6. **Stevens JD.** A new local anaesthetic technique for cataract surgery by one quadrant sub-Tenon's infiltration. Br J Ophthalmol. 1992; 76: 670-4.
7. **Smith R.** Cataract extraction without retrobulbar anaesthetic injection. Br J Ophthalmol. 1990; 74: 205-7.
8. **Fichman RA.** Use of topical anaesthesia alone in cataract surgery. J Cataract Refract Surg. 1996; 22: 612-4.
9. **Davis DB, Mandel MR.** Efficacy and complication rate of 16224 consecutive peribulbar blocks, a prospective multicenter study. J Cataract Surg. 1994; 20: 327-37.
10. **Wylie J, Henderson M, Doyle M, et al.** Persistent binocular diplopia following cataract surgery: aetiology and management. Eye 1994; 8: 543-6.
11. **Puustjarvi T, Purhonen S**. Permanent blindness following retrobulbar haemorrhage after peribulbar anaesthesia for cataract surgery. Ophthalmic Surg. 1992; 23: 450-2.
12. **Duker JS, Belmont JB, Benson WB.** Inadvertent globe perforation during retrobulbar and peri bulbar anaesthesia. Ophthalmology 1991; 98: 519-26.
13. **Klein ML, Jampol LM, Condon PI, et al.** Central retinal artery occlusion after retrobulbar blockade. Am J Ophthalmol. 1982; 93: 573-7.
14. **Hamilton RC.** Brainstem anaesthesia as a complication of regional anaesthesia for ophthalmic surgery. Can J Ophthalmol. 1993; 27: 323-5.
15. **Javitt JC, Addiego R, Friedberg HL, et al.** Brain stem anaesthesia following after retrobulbar block. Ophthalmology 1987; 94: 718-24.

16. **Peterson WC, Yanoff M.** Complications of local ocular anaesthesia. Int Ophthalmol Clin 1992; 32: 23-30.
17. **Alpar JJ.** Acquired ptosis following cataract and glaucoma surgery. Glaucoma 1982; 4: 66-8.
18. **Kershner RM.** Topical anaesthesia for small incision self-sealing cataract surgery. A prospective evaluation of the first 100 patients. J Cataract Refract Surg. 1993; 19: 290-2.
19. **Leaming DV.** Practice styles and preferences of ASCRS members: 1998 survey. J Cataract Refract Surg.1999; 25: 851-9.
20. **Roman S, Sit DAC, Boureau CM, et al.** Sub-Tenon anaesthesia: an efficient and safe technique. Br J Ophthalmol. 1997; 81: 673-6.
21. **Rocha G, Turner C.** Safety of cataract surgery under topical anesthesia with oral sedation without anesthetic monitoring. Can J Ophthalmol. 2007; 42: 288-94.
22. **Ugur B, Dundar SO, Ogurlu M, et al.** Ropivacain versus lidocaine for deep topical, nerve-block anaethesia in cataract surgery: a double-blind randomised clinical trial. Clin Experiment Ophthalmol. 2007; 35: 148-51.
23. **Fukasaku H, Marror JA.** Pinpoint anaesthesia: a new approach to local ocular anaesthesia. J Cataract Refract Surg. 1994; 20: 468-71.
24. **Patel BCK, Burns TA, Crandall A, et al.** A comparison of topical and retrobulbar anaesthesia for cataract surgery. Ophthalmology 1996; 103: 1196–1203.
25. **Jacobi PC, Dietlein TS, Jacobi FK.** A comparative study of topical vs retrobulbar anesthesia in complicated cataract surgery. Arch Ophthalmol. 2000; 118: 1037-43.
26. **Grabow HB.** Topical anaesthesia for cataract surgery. Eur J Implant Refract Surg. 1993; 5: 20-4.
27. **Fichman RA.** Topical eyedrops replace injection for anaesthesia. Ocular Surgery News March. 1992; 20-1.
28. **Chittenden HB, Meacock WR, Govan JAA.** Topical anaesthesia with oxybuprocaine versus sub-Tenon's infiltration with 2% lignocaine for small incision cataract surgery. Br J Ophthalmol. 1997; 81: 288-90.
29. **Manners TD, Burton RL.** Randomised trial of topical versus sub-Tenon's local anaesthesia for small-incision cataract surgery. Eye 1996; 10: 367–70.
30. **Bardocci A, Lofoco G, Perdicaro S, et al.** Lidocaine 2% gel versus lidocaine 4% unpreserved drops for topical anaesthesia in cataract surgery. Ophthalmology 2003; 110: 144-9.
31. **Barequet IS, Soriano ES, Green WR et al.** Provision of anaesthesia with single application of lidocaine 2% gel. J Cataract Refract Surg. 1999; 25: 626-31.
32. **Koch PS.** Efficacy of lidocaine 2% jelly as a topical agent in cataract surgery. J Cataract Refract Surg. 1999; 25: 632-4.
33. **Assia EI, Pras E, Yehezkel M et al.** Topical anesthesia using lidocaine gel for cataract surgery. J Cataract Refract Surg. 1999; 25: 635-9.
34. **Tan JHY, Burton RL.** Does preservative-free lignocaine 1% for hydro dissection reduce pain during phacoemulsification? J Cataract Refract Surg. 2000; 26: 733-5.
35. **Crandall AS, Zabriskie AS, Patel BCK, et al.** A comparison of patient comfort during cataract surgery with topical anesthesia versus topical anesthesia and intracameral lidocaine. Ophthalmology. 1999; 106: 60-6.
36. **Gillow T, Scotcher SM, Deutsch J et al.** Efficacy of supplementary intracameral lidocaine in routine phacoemulsification under topical anesthesia. Ophthalmology. 1999; 106: 2173-7.
37. **Tsuneoka H, Ohki K, Taniuchi O, et al.** Tenon's capsule anaesthesia for cataract surgery with IOL implantation. Eur J Implant Ref Surg. 1993; 5: 29-34.
38. **Anderson CJ.** Subconjunctival anaesthesia in cataract surgery. J Cataract Refract Surg. 1995; 21: 103-5.

ERRATUM

Read the following on page 12 of Pak J. Ophthalmol 2008, Vol. 24, No.1: as

Frequency of Diabetes Mellitus, Impaired Oral Glucose Tolerance Test, Hepatitis B Surface Antigen (HBSAg) and Hepatitis C Virus Antibody (HCV Ab) in Saudis Undergoing Cataract Surgery

Instead of

Frequency of Diabetes Mellitus, Impaired Oral Glucose Tolerance Test, Hepatitis B Surface Antibody

(HCV Ab) in Saudis Undergoing Cataract Surgery

Editor