



B.O.A.S.

Ophthalmic Anaesthesia News

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Ocular Explosion

A dreaded complication of Ophthalmic Regional Anaesthesia

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Previously unreported in the medical literature, starting in 1997 came two independent papers describing ocular explosion following ophthalmic regional anaesthesia blockade^{1,2}. Subsequent to these reports, to date (February, 2001), there has been a total of eight cases described¹⁻⁴. In the case described by Rathi and associates¹ the patient was a 75-year-old woman scheduled for elective cataract extraction with intraocular lens implantation of the left eye which had an axial length of 21.78 mm. The right eye was phthisical. An anaesthesiologist administered peribulbar anaesthesia using two 5 ml injections (equal parts lidocaine 2% and bupivacaine 0.5%; one 1 inch, 23 gauge needles) respectively inferotemporally (at the junction of the medial two-thirds and lateral one-third of the inferior orbit rim), and superiorly "just below the supraorbital notch." No mention is made in the paper as to whether intravenous drugs had been used. Firm continuous digital pressure was then exerted with the index fingers of both hands over the closed eyelids over the centre of the globe. As this was being performed, a sudden "give" was felt. Globe rupture was immediately suspected and exploration under general anaesthesia immediately performed. A scleral rupture at the limbus was found extending from 9:00 to 2:30 o'clock and the lens nucleus was found to have been extruded to lie subconjunctivally. The globe was surgically repaired, including anterior vitrectomy. The patient six months later had 20/160 visions and the retina was attached. Subsequent to this she was lost to follow-up. The authors comment that digital massage has the inherent disadvantage of not being quantifiable and suggest that devices allowing measurement of exerted pressures be used. In the case described by Magnante and colleagues² the patient was a 66-year-old woman scheduled for cataract surgery on the left eye (axial length 23.08). A nurse anaesthetist administered peribulbar anaesthesia using a mixture of 4 ml lidocaine 2% and 4 ml bupivacaine 0.75% with 120 units hyaluronidase in two locations "initially in the inferior orbit and subsequently in the superior orbit." Because the authors were not involved in the patient's care there was no knowledge of size or length of needle used, nor knowledge of the exact volume injected at each location. After the second injection a hyphaema, hypotony, and vitreous haemorrhage were noted in the left eye and cataract surgery was cancelled.

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On immediate referral to a vitreoretinal surgeon the globe was found to be extensively damaged, with an intraocular pressure (IOP) of 3 mm Hg, and the vision was light perception only.

At surgical exploration six days later a 10.5 mm jagged scleral rupture extending from 11:00 to 2:00 o'clock was found 2 mm posterior to the limbus. Posterior to this area of rupture, lying subconjunctivally was found the extruded crystalline lens. Appropriate repair of the globe including scleral buckling followed. Six months later visual acuity in that eye was light perception only, IOP was 12, and inoperable retinal detachment with proliferative vitreoretinopathy was present. The authors hypothesized that the scleral rupture had resulted from a direct intraocular injection with elevation of the IOP to the bursting point of the globe. They tested their hypothesis on twenty-three fresh human eye bank eyes with intraocular injections of saline using 23- and 25-gauge needles on a 5-mL syringe. Of these, twenty-one eyes ruptured. The hydrostatic pressure required for rupture was measured by three different techniques. An average of 1.9 ml of injectate was required to cause globe rupture, which in each case was clearly audible as a loud explosive noise. It was noted that in all cases as pressure rose within the globe that corneal whitening occurred and there was a marked resistance to further injection from the syringe. 48% of ruptures occurred at the globe equator, while 52% were perilimbal. Crystalline lens extrusion occurred with three perilimbal lacerations, but was never found with equatorial ruptures. Rupture pressures were found to be incredibly high, between 3,000 and 5,600 mm Hg. In the discussion the authors comment that two-needle orbital block techniques can be expected to increase the chances of globe penetration. They also comment that non-ophthalmologist practitioners are less likely to be aware of serious complications of this type than ophthalmologists.

The above two initial reports evoked four letters-to-the-editor⁵⁻⁸. The first of these letters suggests that with dual peribulbar blocks with the initial injection given inferiorly the globe is displaced towards the roof of the orbit to leave less room for the superior injection to follow due to the overhang of the superior orbital rim. Along with the second letter-to-the-editor, it

also suggests that in the case reported by Rathi et al¹ an unrecognised globe penetration occurred with the second peribulbar injection following which anaesthetic mixture was injected intraocularly to bring the IOP to a high level; the digital massage likely further increased the IOP to the point of globe rupture. The second letter points out that ocular explosion after peribulbar anaesthesia is a possible complication of penetration of the globe (solely entry puncture), whereas perforation of the globe (entry and exit punctures) would result in retrobulbar rather than intraocular injection. The letter also describes a method to check for correct and safe final needle placement prior to injecting anaesthetic solution: the syringe is "moved gently and slowly in an arcuate path along the circumference of the globe and then anteroposteriorly (in and out)." The third letter advocates alternative entry points for the two injections: a more lateral entry point for the first (inferior temporal) injection, and the medial orbital block to replace the superior orbital injection⁹. From the same department as reference number², a further letter-to-the-editor¹⁰ reports a case of ocular rupture occurring with pressure applied to the globe after suspected intraocular anaesthetic injection (a second peribulbar injection in the superonasal quadrant), this time with a Honan balloon. This backs up the suspicion that the case of Rathi et al. was indeed one of intraocular injection and not solely caused by post-block digital pressure. Bullock and associates, the group who carried out the earlier eye bank eye research², report five additional cases in detail and conduct further research on experimental rupturing of live anaesthetized rabbit eyes and human cadaveric eyes (in situ)³. Unlike the loud noise created when enucleated eye bank eyes rupture, the sounds of globe ruptures in the in-situ cadaver eyes and live rabbits were muffled by the surrounding periocular and orbital tissues. In addition they analyse the range of IOPs generated by digital massage carried out by four individual ophthalmologists (none resulted in as high an IOP as that measured in globes about to rupture with saline injected intraocularly) and report on the biophysical and mathematical laws that govern ocular explosions. Raising the IOP from 20 mm Hg to 60 mm Hg (injection of only 0.3 to 0.5 ml saline required) resulted in

corneal oedema. By the laws of physics it is easier to inject and therefore attain higher IOPs with small syringes (3- and 5-mL) rather than with larger syringes (10- and 20-mL) because the force required is proportional to the square of the syringe plunger diameter. The authors also note that in four of the seven cases under discussion, sharp needles were used; needle types in the other three cases were unknown. Globe rupture was not obvious in six of the seven cases discussed. In two of the cases the cataract surgery was completed without knowledge of the explosion injury; in fact an average of 11 days passed until the scleral rupture was recognized. The paper concludes that the explosion of an eyeball during the injection of local anaesthetics for ocular surgery is a devastating injury that may go unrecognised. The authors make the following recommendations when periocular injections are being given:

- 1) The use of a blunt needle and a 12-mL syringe (see concluding comments below)
- 2) Aspirating the plunger for detection of vitreous and wiggling the syringe before injection (see notes below from reference numbers 4 and 12)
- 3) Discontinuing the injection if corneal oedema or resistance to injection is noted
- 4) Inspecting the globe for evidence of intraocular injection before ocular massage or placement of a Honan balloon.
- 5) Peribulbar injections should not be given superotemporally since there is the least amount of space between the orbital bone and the globe in that area than in any other location around the orbit.
- 6) On recognition or suspicion of an ocular explosion, immediate referral to and intervention by a vitreoretinal surgeon is optimal. This paper evoked three further letters-to-the-editor^{4,11,12}. The authors of the first of these letters-to-the-editors describe the eighth case reported thus far in the medical literature⁴. This is the only one which comments that pain was reported by the patient at the start of the injection; trouble was suspected immediately; no second injection was given. Globe rupture was found in the superotemporal region and final visual acuity was light perception only. The letter points out that it is not possible to aspirate formed vitreous through a needle following globe

penetration as is claimed in the article by Bullock et al³. The author of the second of these letters-to-the-editor is critical of the use of live rabbits, implying that it is not a good animal model for studying scleral ruptures in human eyes. The author of the third letter-to-the-editor among other comments suggests that there is virtue in using sharp needles because of improved tactile discrimination as compared with dull or blunt needles. He also advocates watching the cornea for clouding that may be a sign of increased IOP during injection. Finally he is concerned that "wiggling of the needle" might provoke a retrobulbar haemorrhage.

Comments by this correspondent (RCH):

- There is poor commentary in the above reports on the use, if any, of intravenous medications. In many centres brief periods of loss of consciousness are produced during which blocks are carried out. At these times patients cease to be their own monitors and cannot report the important symptom of PAIN. Intraocular injection of any fluid is intensely painful in the smallest volume **IF THE PATIENT IS CONSCIOUS OR UNDER MILD SEDATION**. In some of the cases reported, of course, it was a second injection into an already anaesthetized globe.
- * I disagree totally with the conclusion that the optimum blocking equipment should include a blunt needle and 12 ml syringe. **TACTILE DISCRIMINATION** is the "name of the game" as far as I am concerned. I use a 5 ml syringe made by Terumo (plastic syringe with smooth-running plunger), a 27-gauge 31 mm sharp disposable needle all in the interests of fine tactile discrimination. I use this in ALL CASES for the initial inferotemporal injection and therefore become familiar with the regular forces required for its placement, and the normal degree of resistance to fluid injection. Rather than advance my needle tip in one single movement to its final injection position, I advance in small increments, injecting mini-doses of local anaesthetic mixture as I go. This achieves two things:

- 1) Patient comfort because the mini-doses produce a zone of anaesthesia around the needle tip
- 2) Provides immediate awareness of undue and undesirable resistance, and especially if the unplanned penetration of the globe should occur, will announce the occurrence of **GLOBE PENETRATION** by immediate complaint of pain by the patient. Early recognition of **GLOBE PENETRATION** followed by appropriate corrective measures, is many orders of magnitude better than late recognition of **GLOBE PERFORATION** (entry and exit wounds).

Conclusion

Of the eight cases reported in the literature, there was a dismal visual outcome in all but the case of Rasti et al. The overall thrust from reading these articles should be an emphasis on prevention.

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Sub-Tenon's Block with Muthusamy cannula

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Abstract

A modified sub-Tenon's cannula was manufactured from a standard disposable 24G needle. It is divided into a straight and a curved portion. The cannula has advantages over the existing cannulae. The straight portion of the cannula length 5 mm is tangentially angled to the curved portion. The junction off the two portions will help the surgeon to know when to stop the entry of the cannula into the sub-Tenon's space and where the tip of the cannula will be. The curved portion is designed to be congruous with the curvature of the eyeball so that this portion will always remain in the sub-Tenon's space and will precisely deliver the anaesthetic solution in the sub-Tenon's space. The length of the curved portion is 27mm long, so that it will be about 5mm away from the optic nerve, and will not damage the optic nerve. By virtue of its curvature, it will penetrate the sub-Tenon's space very smoothly.

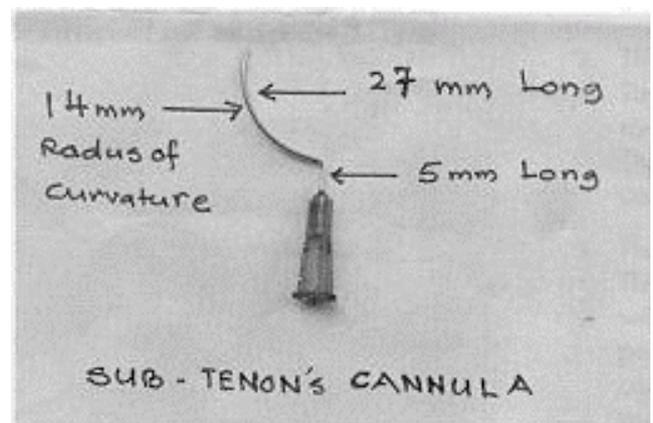
Introduction

Sub-Tenon's anaesthesia has a wide application in ophthalmic surgery and eliminates many risks and disadvantages of retrobulbar anaesthesia^{1,2}. More than a hundred years ago, sub-Tenon's anaesthesia was used by Turnbull³ to perform enucleation. Nevertheless, retrobulbar injection is still one of the preferred techniques of local anaesthesia for ocular surgery⁴. Though it is easy to learn and easy to perform, it has numerous unavoidable complications. The Report of the Joint Working Party on Anaesthesia in Ophthalmic Surgery by the Royal College of Ophthalmologists (March 1993)⁵ has shown that life-threatening complications occurred in 1:750 anaesthetics administered and serious complications occurred in 1:360 cases.

Julian D Stevens introduced a curved sub-Tenon Cannula in 1993⁶ for placement of local anaesthesia in the sub-Tenon's space and other techniques of sub-Tenon's anaesthesia using various cannulae have been reported^{7,8,9}.

Muthusamy's Cannula

The bore of the cannula is 24G, which is sufficient to deliver the anaesthetic solution. The tip is blunt and slightly flattened so that it will not penetrate the eyeball. The flat tip facilitates the smooth entry of the cannula into the sub-Tenon's space. The straight portion is 5mm long so that it will be stiff and long enough to visualize this portion when the curved portion of the cannula is completely in the sub-Tenon's space.



The cannula.

Fig 1

The radius of curvature of the curved portion is 14mm (**Fig 1 & 2**). As the average radius of the eyeball is 12mm, it helps the cannula to almost hug the eyeball and remains precisely in the sub-Tenon's space. The curved portion is 27mm long. When it enters at a point 5mm from the limbus, in an average eye, the tip will be 5mm away from the optic nerve.



Fig 2

The junction between the straight and the curved portion indicates the exact point at which the penetration of the cannula should be stopped. When the straight portion of the cannula (and the syringe) is radial to the eyeball and is 5mm away from the limbus, it indicates that the curved portion of the cannula is in the right tissue plane (sub-Tenon's space) and the tip is in the sub-Tenon's space about 5mm away from the optic nerve.

Technique

A 3ml syringe is loaded with lidocaine 2% 1.5 ml bupivacaine 0.5%, 0.5 ml and 0.25ml of gentamycin (10mg). The cannula is fitted to the syringe and kept aside. The eye is prepared in the routine manner. The lid speculum is applied. Amethocaine 1% drop is applied every minute for 5 min into the conjunctival sac. The patient is instructed to look upwards and outwards. In the infra-nasal quadrant, 5mm away from the limbus, between four and five o'clock position, the conjunctiva is cauterised over an area of about 2mm in diameter. The cauterised conjunctiva is held with a corneal forceps, and a nick is made in the conjunctiva with a Wescott-style scissors. This exposes the pearly white Tenon's fascia. The Tenon's fascia is held with a toothed corneal forceps. A nick is made in the Tenon's fascia. The gap in the Tenon's fascia exposes the bare sclera. About 5mm of the tip of the scissors is introduced into the opening of the Tenon's space. This facilitates the introduction of the cannula into the sub-Tenon's space. The cannula is positioned in such a way that the curvature of the cannula conformed to curvature of the eyeball. The tip of the cannula is placed in the

opening. If the eye ball moves, the eye ball is stabilized by holding firmly with a toothed forceps, close to the limbus at either four or five o'clock position. The cannula is gently pushed making sure that the tip of the cannula is in closed proximity to eyeball as it is pushed behind the eyeball. When the cannula is pushed, there is resistance in some eyes, owing to scleral-Tenon bridging fibres near the equator of the globe. When there is any resistance, a small amount of the anaesthetic solution is pushed in. This hydro dissects the resisting tissue. Then the whole curved part of the cannula is pushed into the sub-Tenon's space. At this point, the remaining 0.5mm straight portion of the cannula is radial to the eyeball. It is made sure that the straight portion of the cannula and the syringe are radial to the eyeball. The anaesthetic solution is gently emptied into the sub-Tenon's space. In some eyes, the initial resistance is high. Once the solution enters, the resistance becomes less. The solution is pushed slowly and gently till the syringe is empty. The cannula is pulled out gently in the curved path it entered. The surgery can be performed after 10 minutes.

Fifty patients were administered sub-Tenon's anaesthesia for the following surgeries: extra capsular cataract extraction with IOL implant (45), trabeculectomy(four), evisceration(one). The administration of the anaesthesia was painless. The anaesthesia was excellent. At the beginning of surgery akinesia was incomplete in all the patients, especially the superior oblique muscle. In 22 cases, slight action of the superior oblique was noted even after the surgery was over. The residual ocular movement did not interfere with surgery. There were no complications due to anaesthesia.

Discussion

There are many sub-Tenon's cannulae available for use. The features and benefits of this cannula over others are:

It is curved (radius of curvature 14mm) in such a way that, when it is pushed into the sub-Tenon's space it will remain in the sub-Tenon's space. This will avoid damage the optic nerve, ocular muscles and the blood vessels.

The curved portion is 27mm long. When the cannula is inserted at 5mm from the limbus, it will be about 5mm away from the optic nerve. Even in relation to the smallest eyeball, the tip will be 5 mm away from the optic nerve and will not damage it. In longer eyeballs, the tip will be behind the equator so that it will not produce chemosis.

The straight portion, which is tangential to the curved position, indicates the point at which the penetration should stop. This enables the surgeon to know when to stop the penetration into the sub-Tenon's space.

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NO ANESTHESIA CATARACT SURGERY

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1. Introduction

Ophthalmic surgeons have witnessed a significant evolution in surgical techniques for cataract extraction in the 20th century.¹ The most remarkable advance is, of course, the considerable decrease in the size of the wound incision. Small-incision cataract surgery using phacoemulsification through clear corneal self-sealing incisions avoids cauterisation, suturing and intraocular pressure fluctuations. Moreover, this is faster, more controlled and less traumatic when compared with conventional large-incision extracapsular cataract extraction (ECCE). With the advent of the “phaconit” technique today it is possible to remove the cataract through a 0.9-mm incision.² The evolution in surgical techniques for cataract extraction is summarized in Figure 1.

Figure 1

| Evolution of Techniques for Cataract Surgery | | |
|--|------|---------------------|
| Technique | Year | Author/Surgeon |
| Conching | 800 | Susstra |
| ECCE* (inferior incision) | 1745 | David |
| ECCE (superior incision) | 1860 | von Graefe |
| ICCE** (tumbling) | 1880 | Smith |
| ECCE with PC-IOL*** | 1949 | Ridley |
| ECCE with AC-IOL**** | 1951 | Strampelli |
| Phacoemulsification | 1967 | Kelman |
| Foldable IOLs | 1984 | Mazzocco |
| Capsular Surgery | 1992 | Apple/Assia |
| Accommodating IOLs | 1997 | Cummings/Kamman |
| Phaconit | 1998 | Agarwal |
| Dye-enhanced Cataract Surgery | 2000 | Pandey/Werner/Apple |

*ECCE: extracapsular cataract extraction.
 **ICCE: intracapsular cataract extraction.
 ***PC-IOL: posterior chamber intraocular lens.
 ****AC-IOL: anterior chamber intraocular lens.

Figure 2

| Evolution of Anesthetic Techniques for Cataract Surgery | | |
|---|------|----------------------------------|
| Technique | Year | Author |
| General Anesthesia | 1846 | - |
| Topical Cocaine | 1884 | Koller |
| Injectable Cocaine | 1884 | Knapp |
| Orbicularis Akinesia | 1914 | -Van Lint, O'Briens -Atkinson |
| Hyaluronidase | 1948 | Atkinson |
| Retrobulbar (4% cocaine) | 1884 | Knapp |
| Posterior peribulbar | 1985 | Davis and Mandel |
| Limbic | 1990 | Furata and coworkers |
| Anterior peribulbar | 1991 | Bloomberg |
| Pinpoint anesthesia | 1992 | Fukasawa |
| Topical | 1992 | Fichman |
| Topical plus intracameral | 1995 | Gills |
| No anesthesia | 1998 | Agarwal |
| Cryoaesthesia | 1999 | Gutierrez-Carmona |
| Xytocaine jelly | 1999 | Koch, Assia |

Anaesthetic techniques for cataract surgery have also advanced significantly (Figure 2).^{3,4} General anaesthesia was preferred in past years, followed by various techniques of injectable anaesthesia including retrobulbar, peribulbar, sub-Tenon, and sub-conjunctival anaesthesia. Due to marked improvements in surgical techniques, it is no longer essential to

ensure complete akinesia of the eye and as a consequence, the technique of topical anaesthesia has been popularised as “phaco anaesthesia”.⁵⁻²² This includes eye drops application, sponge anaesthesia, eye drops plus intracameral injection, and most recently gel application.^{5,7,11-15,18-21,23,24} Topical anaesthesia is the preferred technique for cataract surgeons in the USA (37%; range 22%-63%) according to a survey conducted by David Leaming in 1998.²⁵ It revealed that as high as 76% respondents using topical anaesthesia preferred eye drops in association with intracameral injection of lidocaine. In a recent, prospective, randomised, double-masked clinical trial, Gillow and coworkers²⁶ evaluated the efficacy of supplementary intracameral lidocaine in routine phacoemulsification under topical anaesthesia. There was no significant relationship between the use of intracameral lidocaine and either intraoperative or postoperative pain scores. The authors concluded that the routine use of intracameral lidocaine as a supplement to topical anaesthesia did not have any clinically useful role.

Clear corneal phacoemulsification has the advantage of avoiding touching any superficial sensitive ocular tissue (other than the peripheral cornea) during the surgery. Preserved ocular motility can be used to improve the operating conditions by optimising the red reflex and wound access. Compared to regional anaesthetic techniques such as peribulbar anaesthesia, the topical approach does not increase the vitreous pressure, and there is no effect on the optic nerve blood flow. Postoperative recovery is quicker, postoperative pain is reduced, and the patient may prefer this technique. Recently, various authors reported their experience concerning topical anaesthesia.^{11-13,15,18,19-21}

However, neither injectable nor topical anaesthetics are completely safe. Injectable techniques of these agents can lead to various complications which can be non-sight-threatening, sight-threatening and very rarely, life-threatening.^{3,4,6,8,26} Topical anaesthesia prevents these complications but it can lead to corneal epithelial, corneal endothelial, and/or retinal toxicity, mostly due to the preservatives in the anaesthetic solutions.²⁸⁻³² Moreover, topical anaesthetic agent and its vehicle may

serve as reservoir of microbial contamination with the potential for causing an infection. Some of these agents (e.g. proparcaine) can lead to allergic and idiosyncratic reactions. Manifestations of such reactions include periocular swelling, erythema, and the typical rash of contact dermatitis. Further, preoperative instillation of some of the topical anaesthetics (e.g. lidocaine) may cause burning and stinging sensations and multiple applications sometimes lead to mild haziness of the cornea during the surgical procedure. There is a potential for cumulative toxicity on account of need for administration of several doses. Recent reports suggested that cataract surgeons should be aware of the potential for endothelial injury if anaesthetic agents are injected into the eye.³⁰⁻³² This is not surprising because the intraocular concentration of the anaesthetic agent after intracameral injection can be 250 times higher than the concentration after topical application.³³ Complications which can be associated with topical anaesthesia are summarized in Figure 3.

Figure 3

| <u>Side Effects and Complications of Topical Ocular Anaesthetics</u> |
|--|
| 1. Alteration of the stability of lachrymal and tear films. |
| 2. Delayed healing of the epithelium in presence of epithelial defects. |
| 3. Toxicity to corneal endothelium secondary to preservative benzalkonium. |
| 4. Surface keratopathy. |
| 5. Retinal and macular toxicity. |

The clear corneal phacoemulsification and intraocular lens (IOL) implantation without the use of anaesthetic agent was recently performed in India (Agarwal A, MD, FRCS, Agarwal A, MD, Agarwal S, MD, Comparison of Cataract Surgery with No, Topical, or Intracameral Anaesthesia, Presented at the ASCRS Symposium on Cataract, IOL and Refractive Surgery, Boston, MA, USA, April 2000), Germany (T. Neuhann, MD, No Anaesthesia Cataract Surgery can be an option, Ocular Surgery News; September 2000) and Spain (F. J. Gutierrez-Carmona, MD, PhD, Personal communication, February 2000).

We recently completed a collaborative study on no anaesthesia cataract surgery in comparison to topical and topical plus intracameral anaesthesia.^{35,36} The aim of the study was to avoid the use of topical anaesthesia during cataract surgery and to evaluate the efficacy of this technique. We also compared the comfort of the patient and the stress for the surgeon during the surgery in the 3 groups.

2. Randomised study

2.1. Patients

Seventy-five patients were enrolled in this prospective, randomised, double blind study.³⁵ Informed consent was obtained from the patients after explaining in detail the outline of the study, which was reviewed and approved by the ethics committee of the hospital. All patients were randomised to one of the three groups: group I - no anaesthesia, 25 patients; group II - topical anaesthesia, 25 patients; group III - topical plus intracameral anaesthesia, 25 patients. The patients included in the study were between 38 and 79 years of age. The density of the cataracts varied from grade 2 to 4 (Emery-Little classification).³⁷ Excluded were patients with barrier to communication or cooperation during surgery (extreme anxiety, language and/or hearing impairment, mental retardation, dementia, Parkinson's disease, very young, etc). Monocular patients and those with hard, mature cataracts (grade 5 Emery-Little classification), shallow anterior chamber(s), pupil(s) less than 5mm in diameter (when fully dilated), and inability to understand a visual analogue pain scale were also excluded. The patients were prepared for cataract surgery without preoperative (or intraoperative) sedation. The pupils were preoperatively dilated using phenylephrine (5%), cyclopentolate (0.5%) and tropicamide (1%) eye drops. Non-steroidal anti-inflammatory drugs (NSAIDs) were not used.

2.2. Anaesthetic techniques

Patients in group I received, while still in the preoperative area, two drops of balanced salt solution (BSS® Alcon, Fort Worth, TX) every 5 minutes three times, beginning 10-15 minutes before the procedure. After the corneal endothelium was coated with viscoelastic,

before performing the capsulorhexis, an intracameral injection of BSS® via a 25-gauge Rycroft cannula (Beaver and Visitec Products, Bedford on Avon, England) was performed. Patients randomised to group II received lidocaine (4%) eye drops preoperatively, and an intracameral injection of BSS®, as described above. Patients in group III received both preoperative 4% lidocaine eye drops and intracameral injection of preservative-free lidocaine (1%), using the same methods as in the other 2 groups. The protocol established for supplemental anaesthesia for breakthrough pain during the surgery, if it should occur, was as follows: if the patient were in pain, two additional drops of lidocaine (4%) would be placed in the eye. If the pain persisted, a peribulbar or retrobulbar block would be used.

2.3. Surgical technique

All cataract surgical procedures in this study were performed in a referral institute of South India by the same surgeon (AA). A solid speculum with a screwing mechanism was placed. No superior rectus sutures were used in any group. Patients were informed that they would be aware of the sensation of touch and would be able to move their eyes. First of all, viscoelastic was injected into the anterior chamber using a needle through the area where the second (paracentesis) site was made. This was important in order to distend the eye to create a good self-sealing corneal valve. A straight rod was then used to enter within the anterior chamber through the same opening of the needle to stabilize the eye. With the right hand, a 3.2-mm groove was made in clear temporal cornea using a diamond knife (Figures 4). During the entire surgical procedure care was taken to avoid grasping of the conjunctiva or sclera by tooth forceps. The globe was stabilized by the straight blunt rod during the entire surgery. A 5.0-5.5-mm wide capsulorhexis (Figure 5) was performed using a 26-gauge bent needle cystotome. Hydro dissection was performed with BSS®. Nuclear emulsification (Alcon, Universal 2, Fort Worth, TX) was performed using the Karate chop technique using less ultrasound power. Cortical aspiration was then done. The capsular bag was filled with viscoelastic. Foldable one-piece plate lenses were then implanted (STAAR Surgical Co, Monrovia, CA).

Intracameral miotics were not used in any of the patients. The viscoelastic was removed from the anterior chamber and the capsular bag by irrigation. The corneal incisions were secured by performing stromal hydration.

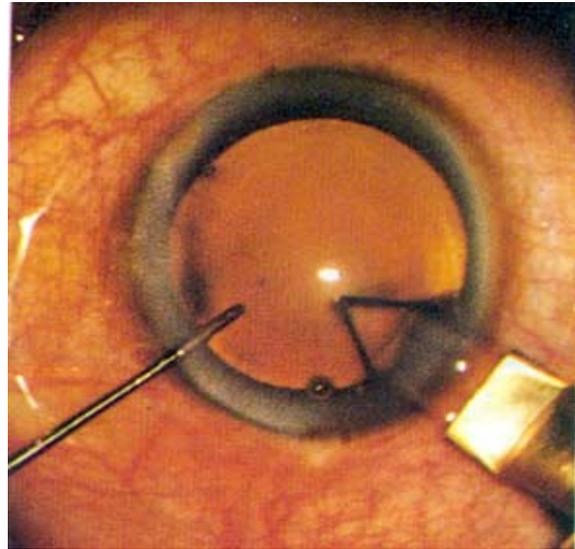


Fig 4

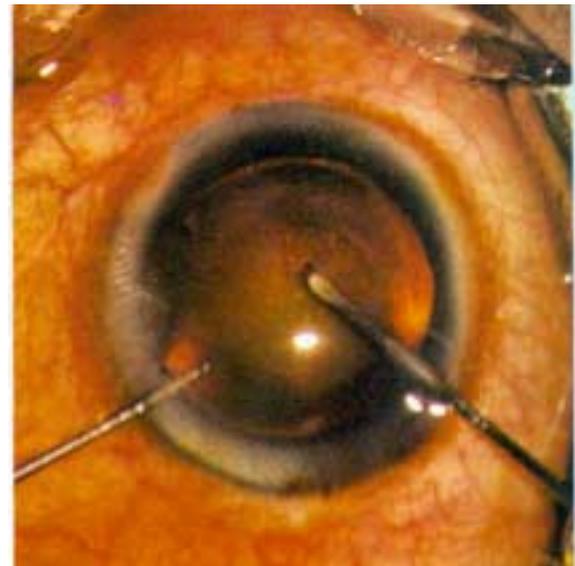


Fig 5

The operating microscope light was kept at its lowest level and gradually increased in intensity. The level was up to the usual operating levels after hydro dissection and the patient was encouraged to fix the eye toward the microscope light during the surgery. All of the patients neither received subconjunctival injections nor an eye pad at the completion of the surgery.

2.4. Parameters assessed

After the surgery, the patients were taken to the postoperative area where vital signs were obtained. There, one constant observer also collected patient assessment responses. Questions were presented to the patients in a standardized written form. Each patient was shown a 10-point visual analogue graphic pain scale with numeric and descriptive ratings where 0 represented no pain and 10 represented severe, “unbearable” pain.³⁸ They were asked to grade the level of discomfort or pain during the surgery and postoperatively, on separate scales. If the patient was unable to see the scale or read the accompanying text, the scale was described and a verbal score was obtained. They were also asked to differentiate “pain” or “discomfort” from “touch” or “movement” sensation. The degree to which the patients were bothered due to ability to move their eyes, sense of touching their eyes and by the operating microscope light was also assessed. This was graded as “not at all” (0), “not very much” (1) and “very much” (2). If the surgeon was bothered by the patients’ eye movement, it was also graded as “not at all” (0), “not very much” (1) and “very much” (2). Stress for the surgeon during the surgery (from 0-2) and total surgical time (minutes) were also noted. The patients were kept in the recovery area for a minimum of 30 minutes. The surgeon also completed a questionnaire on the surgical conditions, complications and need for supplemental anaesthesia.

Comparison of various parameters between the aforementioned three groups was performed using analysis of variance (ANOVA). A P value inferior to 0.05 was considered statistically significant.

2.5. Results

| Table 1. Characteristics of the patients included in each group | | | |
|---|--------------|--------------|---------------|
| | *Group I | **Group II | ***Group III |
| Number of cases | 25 | 25 | 25 |
| Average age | 59.66+/-9.54 | 56.80+/-9.35 | 60.00+/-10.17 |
| Males/Females | 18/7 | 15/10 | 14/10 |
| Nuclear density | 2.50+/-1.10 | 2.64+/-0.90 | 2.28+/-0.79 |
| Operating time (min.) | 8.25+/-1.78 | 8.88+/-2.24 | 8.38+/-1.70 |
| Race (% non white) | 100 | 100 | 100 |

*:No Anesthesia.
 **:Topical Anesthesia.
 ***:Topical + Intracameral Anesthesia.

A total of 75 patients were recruited into the study. No patient refused to take part. Patient’s data are listed in Table 1. There was no significant difference in age (Figure 6) and density of cataracts (Figure 7) of the patients from the three groups. Therefore, the patients included in the study were comparable. The average surgical time (Figure 8) was 8.25 ± 1.78 minutes for the no anaesthesia group (group I), 8.88 ± 2.24 minutes in the topical anaesthesia group (group II) and 8.38 ± 1.70 minutes in the topical plus intracameral anaesthesia group (group III). The surgical time was slightly higher in the topical anaesthesia group when compared to the no anaesthesia or topical plus intracameral anaesthesia groups, but this difference was not significant ($P=0.3562$).

Fig. 6

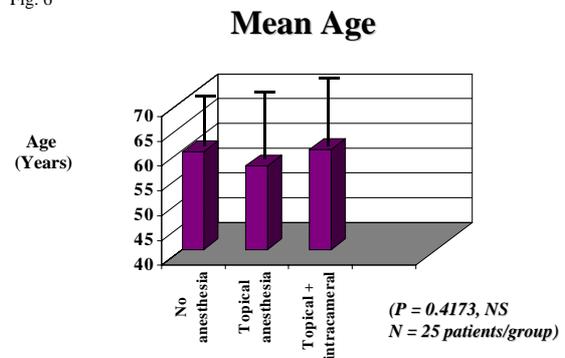


Fig. 7

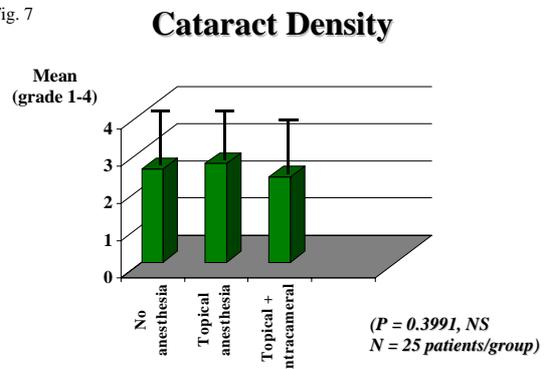
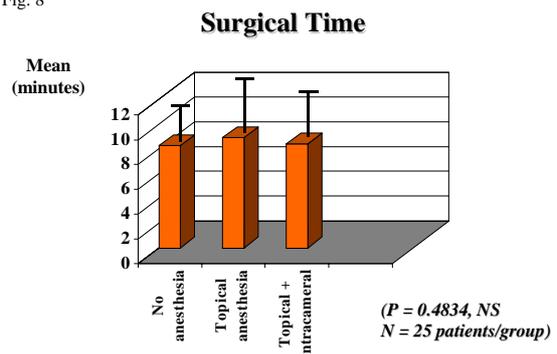


Fig. 8



this difference was again (Figure 10) not statistically significant ($P=0.2115$). Patient discomfort due to ability to move the eyes had a significantly higher mean score in the no anaesthesia group ($P=0.0235$) when compared (Figure 11) to the two other groups. Regarding patient discomfort due to sense of touching the eyes the mean score was higher in the no anaesthesia group (Figure 12). However this difference was not statistically significant ($P=0.0629$). Concerning surgeon discomfort due to the ability of the patients to move the eyes, the difference between the three groups (Figure 13) was also not statistically significant ($P=0.1580$). However, the stress for the surgeon during the surgery was significantly greater in the no anaesthesia group (Figure 14) when compared to the topical or topical plus intracameral group ($P=0.0206$).

In summary, the only two parameters that differed significantly in the 3 groups were patient discomfort due to ability to move the eyes and stress for the surgeon during the entire surgical procedure.

3. Current study/Experience of other surgeons

This is the first randomised, double-masked, controlled trial comparing three techniques, namely no anaesthesia, topical anaesthesia and topical plus intracameral anaesthesia. The use of either topical anaesthesia or topical anaesthesia combined with intracameral lidocaine was not associated with significantly lower intraoperative and early postoperative pain scores.

Assessments of other parameters in the 3 groups besides the pain scores revealed that only patient discomfort due to ability to move the eyes and stress for the surgeon during the procedure were significantly different.

Other surgeons in various countries have currently performed no anaesthesia cataract surgery. Dr. Francisco J. Gutierrez-Carmona performed no anaesthesia cataract surgery on 50 patients in Spain.³⁹ He used cooled balanced salt solution in the operating eye and termed this technique as “cryoanalgesia”. The experience of Dr. Tobias Neuhann from Germany concerning no anaesthesia cataract surgery performed on a few cases is also interesting (Neuhann T, MD, personal communication). He performed it mostly on

patients over 50 years, but interestingly some of the patients less than 50 years of age also asked for the no anaesthesia technique. This is due to a trend of “no medical treatment”, which is common in very selective groups of people in Germany. The use of 2% hydroxypropyl methyl cellulose (HPMC) to cover the cornea, helped in avoiding corneal dryness during the surgery. Although motivation is important, according to Dr. Neuhann’s experience no anaesthesia cataract surgery works better in older patients. Dr. Keiki R. Mehta from India also performed more than 450 cases using this technique (Mehta KR, MD, personal communication). The need for supplemental anaesthesia in his series was about 10-12%. He believes that the limbus is a watershed area for tactile sensations and therefore the corneal sensitivity in the peripheral cornea is significantly lower than the central cornea (see below: anatomical factors). Other surgeons currently performing this technique include Drs. Heidi Fischer, Cordelia N. Uddoh and Eli-Marcovici (USA), Virgilio Centurion (Brazil) and Mohan Rajan (India).

4. No anaesthesia cataract surgery: Why does it work?

It seems surprising that cataract surgery can be performed through one of the most sensitive structures (cornea) without using any anaesthesia. The precise explanation(s) for this fact is still unknown to us. However, we can advance some hypotheses related to surgical factors and anatomical factors.

4.1. Surgical factors

The skill and experience of the surgeon is one of the most important factors for the no anaesthesia cataract surgery. While using this technique, it is important to avoid grasping the conjunctiva or sclera with tooth forceps. The surgeon should use a straight and relatively blunt rod to stabilize the eye during the entire procedure. Also, the use of a clear corneal incision avoids the use of cautery, necessary to achieve haemostasis with scleral tunnel incisions. In addition, gradual increase in the microscope luminance, minimization of the iris-lens diaphragm movement and iris manipulations are important factors for topical as well as no anaesthesia techniques. The phaco power should be used minimally to

avoid excessive heating of the phaco tip, which in turn can produce pain.

4.2. Anatomical factors

The cornea is supplied by the medial and lateral long ciliary nerves, which are branches of the trigeminal nerve. It is sensitive to touch, pain and temperature.⁴⁰ However, there are marked topographical variations in the corneal sensitivity. Besides the diurnal variations, corneal sensitivity also varies according to age, sex and race.⁴⁰⁻⁴² The central part of the cornea is the most sensitive. There is an overall reduction in the corneal sensitivity from the centre to the periphery. The superior part of the cornea is the least sensitive, probably because of a decreased concentration of acetylcholine.

Concerning the diurnal variations, corneal sensitivity is the lowest in the morning and highest in the evening. This decreased sensitivity in the morning must be attributed to the reduction in oxygen tension at the epithelium surface when the eye is closed.⁴¹

Corneal sensitivity remains practically unchanged from 10 to about 50 years of age. Beyond that age, the decline is significant reaching a half beyond 65 years of age. The precise mechanism is not clear, however, some authors relate it to the formation of arcus senilis and to a decreased concentration of acetylcholine. In females, corneal sensitivity decreases during the premenstrual and menstrual periods.

The role of racial factors should not be underestimated.⁴² It was documented during contact lens fitting and many studies confirmed that corneal sensitivity in non-white (dark-brown eyed: Indians, Chinese, and Negroes) peoples is 4 times less than in white (blue-eyed: Caucasians) peoples. As reported by Michel Millodot in 1975, this phenomenon is obviously relevant to the wearing of contact lenses.⁴² It may also have some bearing on problems of anaesthesia as it is possible that different quantities of anaesthetics may be needed according to eye colour. This is similar to the clinical fact that more ocular drugs are needed for people with dark rather than light-pigmented irises to obtain the same effect (for example cycloplegia). The reason for this is not known, although it may be related to the amount of melanin pigment present in the iris. Since the cornea does not contain any pigment, however, it is not easy to explain the

diminution of corneal sensitivity with darker pigmentation of the iris. It is not known whether the thickness of the cornea varies with eye colour. It has been shown that thicker corneas, as a result of oedema, are less sensitive than normal corneas. It is also unknown whether nerve supply density varies widely among these different peoples. Another possibility is that the difference in sensitivity arises in the central nervous system and not at the periphery. The difference in tactile sensitivity may also be relevant to understand that the practice of acupuncture may be more acceptable in China than it is in countries inhabited by blue-eyed people.

Finally, recent studies have documented that frequent exposure to ultraviolet rays (between 280 and 310 nm) may give rise to a loss in corneal sensitivity, as high as 73%.⁴⁰ Also, decrease in temperature can lead to reduction in corneal sensitivity, which has been documented up to ninefold.⁴⁰

Thus, no anaesthesia cataract surgery works due to atraumatic surgical techniques in suitable patients by a very experienced and confident surgeon. The speed and dexterity of the surgeon are paramount to the successful use of this technique, as is proper patient selection. Incision and manipulations through the least sensitive (superior) part of the cornea are probably the most important factors. Further decrease in corneal sensation due to the dark iris of patients in India, and aged patients exposed to ultraviolet rays probably accounted for the results obtained in our study.

As mentioned earlier, the reasons for the racial variations are still unknown. However, the differences may be important in adapting the technique for more sensitive corneas in white patients, as did Dr. Francisco Gutierrez-Carmona in Spain by using cooled balanced salt solution ("cryoanalgesia") for corneal desensitization.³⁹

5. Conclusion

In conclusion, we demonstrated that clear corneal phacoemulsification surgery could be performed without the use of anaesthetic agents. The advantage is that it avoids any toxicity associated with topical and/or intracameral anaesthetic solutions. However, it is certainly not suitable for every cataract surgeon or every patient and its real benefits

have to be measured carefully, in a case-by-case basis.

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The evolution of anaesthesia for cataract surgery: back to square one?

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Cataract surgery has come a long way in the last few millennia. This piece summarises the major developments in cataract surgery and anaesthesia, over the last 26 centuries.

Couching of cataracts has been performed since ancient times. A thorn or similar sharp object was passed through the sclera to engage the lens and work it free of its zonular attachments, thus clearing the visual axis. In the 6th century BC, the Indian surgeon Sus'ruta described an aseptic technique for couching, and outlined the use of inhalational anaesthesia. Later, surgeons in northeast Africa used carotid compression to induce transient cerebral ischaemia prior to couching. In the first century AD, the Greek physician Dioscorides used a soporific sponge, containing an extract of mandrake boiled in wine. The use of narcotic "sleep-sponges" (*spongia somnifera*) continued through the Middle Ages, though their use was limited by the small difference between an effective dose and a life-threatening overdose. Thus it is likely that the majority of couching was (and, in some parts of the world, still is) performed without any anaesthesia at all.

There were few developments in cataract surgery until the 18th century. Extracapsular cataract extraction was described by Daviel in 1748, and five years later Sharp described a planned intracapsular extraction. These procedures used a large corneal section, and little was available for anaesthesia, except for soporific drugs. Surgeons needed strong assistants to restrain their patients, and had to perform the surgery in as little time as possible. Not surprisingly, most cataract surgery continued to be performed by couching, and many patients preferred to avoid surgery altogether.

The discovery of general anaesthesia (GA) was to transform surgery. Around the turn of the 18th/19th century, several anaesthetic agents were discovered, including nitrous oxide, ether

and chloroform. However, it was not until 1846 that GA, using ether, was successfully demonstrated. Almost immediately, the first cataract extractions were performed under chloroform or ether GA. General anaesthesia solved the problem of intra-operative pain, but it brought its own problems. GA involved some risk to life, and postoperative coughing or vomiting could damage the operated eye.

The age of local anaesthesia (LA) began in the second half of the 19th century. The hollow needle was invented in 1853, and cocaine was isolated in 1860. Cocaine anaesthesia for cataract surgery was first described in 1884, using retrobulbar, sub-Tenon's and topical techniques. Soon afterwards, cocaine's potential for systemic toxicity was realized, with reports of syncope, hyperstimulation, hallucinations, and even death. An additional problem was corneal epithelial toxicity, drying, and prolonged anaesthesia leading to exposure keratopathy and ulceration. These problems limited the usefulness of cocaine LA for intraocular surgery.

Cocaine continued as the only available LA agent until the early part of the 20th century, when safer alternative LA agents were developed. Procain (Novocaine, a synthetic derivative of cocaine) was the first synthetic LA to be described, in 1905. Adrenaline, isolated in 1901, was found to enhance the efficacy of an LA injection, and reduce the risk of systemic toxicity. The use of the new, safer LA agents, given in conjunction with adrenaline, led to revival of interest in LA.

For most of the 20th century, the commonest method of giving LA for intraocular surgery was the retrobulbar injection. Peribulbar injections were introduced in the early 1970's, in the hope of eliminating the risk of needle perforation of the eyeball, or inadvertent subdural injection giving brainstem anaesthesia. When these hopes were shown to be unfounded, new and safer methods were

sought. Sub-Tenon's anaesthesia, originally described in the 19th century, was revived in the 1990's. Sub-conjunctival anaesthesia was also re-introduced around this time. These 'new' methods were more acceptable because of advances in surgical technique. The development of small-incision cataract surgery gave a more controlled operating environment, so that surgeons were more tolerant of eye movements. The next logical step was topical anaesthesia, in some cases with the addition of intracameral anaesthetic. Using less and less LA has prompted some to question the need for any form of anaesthesia: Dr Agarwal in India has recently described small-incision phacoemulsification without any anaesthesia or sedation at all.

The refinement of LA techniques has been paralleled by improvements in GA and surgical techniques. For the earlier part of the 20th century, LA was used for the majority of intraocular surgeries, mainly because GA caused ocular problems due to postoperative retching, straining etc. With improvements in drugs and techniques, use of GA became more widespread, and a 1975 British textbook stated that, for intraocular surgery, "standard techniques of balanced general anaesthesia are now used in the vast majority of cases". Use of GA has gradually declined since then, and a 1996 British survey found that GA was used for 33% of "conventional" extracapsular surgery, and 13% of phacoemulsification, and less than 10% of LA cases had any form of sedation. This return toward LA is due to a

variety of factors: LA has been shown to be safe, is highly acceptable to patients and hospital staff, and promotes efficient use of theatre time. Improvements in surgical technique, particularly the development of small-incision surgery, afford a more controlled operating environment and therefore allow the use of minimal anaesthesia.

This brief overview has shown how cataract surgery has developed from a small-incision technique (couching) using little or no anaesthesia, through large-incision techniques using orbital blocks, sedation or general anaesthesia, and is now returning to minimally invasive surgery with minimal local anaesthesia. The apparent success of Dr Agarwal's "no anaesthesia" technique may prompt cynics to question whether we have made any progress at all!

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Topical Anaesthesia and reimbursement

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In Coventry, local anaesthesia for cataract surgery has undergone several evolutions in the last 6 years, coinciding with my return to being an ophthalmic anaesthetist. At first, most cataract extractions were done under general anaesthesia, with the occasional traditional retrobulbar block, often performed by the surgeon. Then peribulbar blocks became the norm, with the number gradually building up to about 80% of procedures. A few initial mishaps resulted in a total rethink of our training & all ophthalmic anaesthetists were required to undergo updating at Worcester & Middlesbrough, with supervision & certification for all trainees. Most people used 3% prilocaine with octapressin quite satisfactorily until the manufacturer withdrew it, necessitating a return to 2% lidocaine with or without bupivacaine mixtures.

After the first BOAS meeting, it became apparent that sub-Tenon's blocks were becoming the gold standard for British anaesthesia. Most practitioners have upgraded to this method either as their routine local anaesthetic block or for the big eye or

warfarinised case etc. It is interesting that trainees seem to find starting off with sub-Tenon's blocks easier than sharp needle techniques. However, the recent change to topical/intracameral anaesthesia initiated by our surgeons is causing concerns among anaesthetists. It cannot be denied that it works quite satisfactorily in the right hands, but it could also put us out of a job!

Talking to our Ophthalmic Clinical Director, I was reassured to hear that he regards an anaesthetic presence as essential, even with topical anaesthesia. He is in possession of statistics, which show that quality of care deteriorates when an anaesthetist is absent, with a consequent increase in complications & litigation. With the frail & elderly patient base now dealt with, our resuscitative skills are an essential pre-requisite for a safe, effective cataract service.

I wonder whether colleagues in other NHS hospitals find similar problems & concerns? How does this affect private practice too?

BOAS 2001

JUNE 28-29, LONDON, UK

Provisional Programme

Thursday 28th June 2001

10.30 - 11.30 Workshops

1. Sub-Tenon's Block
Dr Nick Pritchard, MEH London, UK
Dr Chris Dodds, Middlesbrough, UK
2. High Volume Cataract Surgery
Mr Ken Barber and Dr Monica Hardwick, Worcester, UK
3. Anatomy relevant to ophthalmic blocks
Dr Gary Fanning, Sycamore, IL USA
Dr Robert Johnson, Bristol, UK
4. Total Intravenous Anaesthesia
Dr Alison Budd, MEH London, UK

13.00 - 13.45 Registration and coffee

13.45 Welcome: *Dr Caroline Carr, MEH, London, UK*

14.00 - 15.45 SESSION I Adnexal surgery

Chairman: Dr Bob Johnson

- 14.00 An overview of current techniques of Adnexal surgery
Mr Geoffrey Rose, MEH, London, UK
- 14.30 Hypotensive anaesthesia and cerebral blood flow in oculoplastic surgery
Dr Bernard Logan, MEH, London, UK
- 15.00 Local Anaesthesia for DCR
Dr Gary Fanning, Sycamore, IL USA
- 15.30 General Discussion

15.45 Tea, Trade Exhibition and Posters

16.15 - 17.15 SESSION II The current status of anaesthesia for cataract surgery

Chairman: Dr Anthony Rubin

- 16.15 What are the Colleges' Guidelines?
Dr Monica Hardwick, Worcester, UK
- 16.30 I do need an anaesthetist
Mr Bruce Allan, MEH, London, UK
- 16.45 I don't need an anaesthetist
Mr R L Burton, Norwich, UK
- 17.00 General Discussion

17.15 Meeting Close

Friday 29th June 2001

09.00 - 10.45 SESSION III Paediatric Ophthalmic Surgery and Anaesthesia

Chairman: Dr Chris Dodds, Middlesbrough, UK

Dr Susan Bailey, MEH, London, UK

09.00 Syndromes and Paediatric Ophthalmology

Dr Alison Budd, MEH, London, UK

09.30 Managing the Child with Glaucoma

Prof Peng Khaw, MEH, London, UK

10.00 Anaesthetising the Child with Glaucoma

Dr Jonathan Lord, MEH, London, UK

10.30 General Discussion

10.45 - 11.15 Coffee, Trade Exhibition and Posters

11.15 - 13.00 SESSION III (cont.) Paediatric Ophthalmic Surgery and Anaesthesia

Chairman: Dr Chris Dodds, Middlesbrough, UK

Dr Susan Bailey, MEH, London, UK

11.15 Paediatric Ophthalmic Oncology

Mr John Hungerford, Barts and MEH, London, UK

11.45 Anaesthetic management of children with retinoblastomas

Dr Barts, London, UK

12.15 Paediatric Ophthalmology at GOS

Miss Isabelle Russell-Eggett

12.45 General Discussion

13.00 - 14.15 Lunch, Trade Exhibition and Posters

14.15 - 14.30 BOAS AGM

14.30 - 15.30 SESSION IV Free Papers

Chairman: Dr Chandra Kumar, Middlesbrough, UK

Dr Nick Pritchard, MEH, London, UK

15.30 Eponymous Lecture TIVA Professor Mirakhur

16.00 - 17.00 SESSION V World Anaesthesia

Chairman: Mr Ken Barber, Worcester, UK

17.00 General Discussion

17.15 Close: Dr Caroline Carr, MEH, London, UK followed by Tea and Finish

Application form, abstract and other details from

Dr Caroline Carr

BOAS Meeting Organiser

Consultant Anaesthetist

Moorfields Eye Hospital

City Road, London, EC1V 2PD, UK

Tel : 0207 5662222

Fax : 0207 5662223

Email: caroline.carr@cwcom.net

OPHTHALMIC ANESTHESIA SOCIETY

15TH ANNUAL SCIENTIFIC MEETING
October 5-7, 2001 • Omni Hotel Chicago

PROGRAM CO-CHAIRS

Gary D. Cass MD, Marc Allan Feldman MD, Scott Greenbaum MD

FRIDAY, OCTOBER 5

1:20 Welcome Remarks

Gary D. Cass MD, President
Scott Greenbaum MD, Vice President

1:30 History of Ophthalmic Anesthesia

Warren E. Hill MD

2:15 ACLS Update

Len Romanowski CRNA

3:00 Array Multifocal IOL

Kenneth J. Rosenthal MD

3:30 Questions and Answers

3:45 Break

4:00 Coagulopathy and Ophthalmic Anesthesia

Marc Allan Feldman MD

4:45 Orbital Tumors

Steven Gayer MD

5:30 Questions and Answers

6:00 Adjourn

6:00 Reception

SATURDAY, OCTOBER 6

7:50 President's Welcome Remarks

Gary D. Cass MD

8:00 Agency for Health Care Research and Quality Evidence Report on Ophthalmic Anesthesia

David S. Friedman MD MPH

8:45 Diplopia After Periocular Anesthesia Without Hyaluronidase

Sandra M. Brown MD

9:30 Questions and Answers

9:45 Break

10:15 Pediatric Ophthalmic Anesthesia

Caroline Carr MD

11:00 Anesthetic Considerations in Vitreo-Retinal Surgery

Steven T. Charles MD

11:45 Questions and Answers
 12:00 Lunch Break
 1:30 Intracameral Anesthesia

Debra Jacobs MD

2:00 General Anesthesia for Ophthalmic Surgery

Chris Dodds MD

2:45 **Workshops** (Participants may attend two of three workshops:
 A. Peribulbar Blocks and Anatomy

Gary L. Fanning MD

B. Subtenon's Technique

Scott Greenbaum MD

C. Blocks for Oculoplastic Surgery

Kenneth J. Rosenthal MD

3:45 Workshops Repeat
 5:00 Adjourn

SUNDAY, OCTOBER 7

8:00 Annual Meeting of the Membership

Gary D. Cass MD

8:30 Allergic Reactions

Jonathan Moss MD PhD

9:15 External Agency Requirements: How Do They Affect Patient Care?

Carol Harbin RN

10:00 Questions and Answers
 10:15 Break
 10:30 Case Discussion Panel

Gary L. Fanning MD, Chris Dodds MD

12:00 Adjourn

FOR INFORMATION CONTACT:

OPHTHALMIC ANESTHESIA SOCIETY, INC.

793-A Foothill Blvd., #119
 San Luis Obispo CA 93405
 877.220.3585 phone
 877.220.2793 phone
oas@amainc.com

amainc.com/oas_ophthalmic_anesthesia.html

This meeting will offer continuing education credit for physicians and for nurse anesthetists. The Ophthalmic Anesthesia Society is an organization of anesthesiologists, ophthalmologists and CRNAs committed to sharing education and information which will enable them to provide the highest level of anesthesia services during ophthalmic surgery.

News and information

International Ophthalmic Anaesthesia Society (IOAS)

Efforts are continuing to establish the International Ophthalmic Anaesthesia Society.

Progress on the Joint Colleges Working Party Report

The working party of the Royal Colleges of Anaesthesia and Ophthalmology will be published soon. BOAS members are advised to follow 1993 guidelines until the new guidelines are published.

No subscription for retired members

Retired members do not need to pay the annual subscription fee.

Income Tax Rebate to Society Members

BOAS is registered with Her Majesty's Inland Revenue for the purposes of Corporation Tax. Members can claim income tax allowance against the BOAS subscription.

Charity status to BOAS

The application process has already started to make BOAS a charity organisation.

Contribution for the 5th Newsletter

The next Newsletter will be published in October 2001. Please send your articles or any contributions for inclusion in the Newsletter by the end of August 2001 to Dr Chandra Kumar, Secretary BOAS, South Cleveland Hospital, Middlesbrough TS4 3BW or email secretary@boas.org

Subscription to Journal of Cataract and Refractive Surgery

Anaesthetist members of BOAS can receive the journal at a discounted rate of £65 by writing to Andre Welsh, ENTER, North Riding Infirmary, Newport Road, Middlesbrough.

Acknowledgement

BOAS office is grateful to Mr Stephen Moore, Information Officer and Mrs Pat McSorley (School of Anaesthesia), South Cleveland Hospital, Middlesbrough for valuable help in the production of the Newsletter.

Reasons for joining BOAS

BOAS was formed in 1998 to provide a forum for anaesthetists, ophthalmologists and other professionals with an interest in ophthalmic anaesthesia to facilitate co-operation on all matters concerned with the safety, efficacy and efficiency of anaesthesia for ophthalmic surgery. It is concerned with education, achievement of high standards, audit and research. BOAS will organise annual scientific meetings, produce a newsletter and maintain a web page.

Membership

Member of BOAS includes anaesthetists, ophthalmologists and other professionals with an interest in ophthalmic anaesthesia.

Membership subscription

Membership runs from January each year. The current subscription is £25.00 payable by banker's standing order.

Liaison and specialist professional advice

With the Association of Anaesthetists of Great Britain and Ireland and the Ophthalmic Anesthesia Society of the USA.

Benefits of Membership

- Opportunity to participate in BOAS annual scientific meetings
- Reduced registration fee for BOAS annual scientific meetings
- Reduced registration fee for other ophthalmic anaesthesia meetings and courses in UK
- Free advice from experts on matters related to ophthalmic anaesthesia
- BOAS newsletter and Directory of Members
- Opportunity to contribute towards development and improvement of ophthalmic anaesthesia
- Access to BOAS web page and scientific literature database
- Eligibility for election to Council of BOAS

Administrative Office and Membership information from

Dr Chandra M. Kumar

Secretary, BOAS

South Cleveland Hospital

Middlesbrough

TS4 3BW UK

Tel 01642 854601

Fax 01642 854246

Email cmkumar@globalnet.co.uk

Web address <http://www.users.globalnet.co.uk>

Change of address

Members are advised to inform the secretary if there is a change of email or postal address.

BOAS Executive Committee***President***

Dr. Robert W Johnson

Vice President

Dr. Chris Dodds

Secretary

Dr. Chandra M Kumar

Treasurer

Mr Tim C Dowd

Council Members

Mr. Ken Barber

Dr. Caroline Carr

Mr. Louis Clearkin

Mr. Stuart Cook

Dr. David Greaves

Dr. Monica Hardwick

Dr. Anthony P Rubin

Mr. David Smerdon

Dr. Sean Tighe

BOAS Website Address

www.boas.org

British Ophthalmic Anaesthesia Society Member Registration Form

To The Branch Manager Midland Bank

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Address.....

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City/County/.....Post code.....

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If you would like to become a member of the British Ophthalmic Anaesthesia Society, please complete the bank standing order and your personal details.

Completed form should be sent to:-

Dr. Chandra M Kumar
 Secretary, BOAS
 Dept. of Anaesthesia
 South Cleveland Hospital
 Middlesbrough TS4 3BW

Important Journal Review

Visual-evoked potentials: Assessment of retrobulbar and peribulbar anesthesia.

Journal of Cataract & Refractive Surgery. Vol 26(10) (pp 1529-1532), 2000.

Lavinsky J. Gus PI. Ehlers JA. Roehe D. Nora DB.

Rua Luzitana 900/203, CEP 90520-080, Porto Alegre, RS; Brazil.

Purpose: To assess the effects of retrobulbar and peribulbar anesthesia on nerve function as detected by visual-evoked potentials (VEPs). **Setting:** University hospital in southern Brazil. **Methods:** In a prospective study, 7 patients had peribulbar anesthesia and 9 had retrobulbar anesthesia for extracapsular cataract extraction. Visual-evoked potentials with pattern reversal and flash stimulation were performed at least 1 month before and 1 month after surgery. Study participants did not have ocular pathology other than cataract. The Lens Classification System III was used to grade the opacities before surgery. **Results:** No significant difference was found between preoperative and postoperative evaluations in VEP flash and pattern-reversal amplitude and latency in either group ($P > .05$). Postoperative amplitude and latency was not significantly different between the peribulbar and retrobulbar groups. Two cases in the peribulbar group had altered wave morphology without clinical manifestation postoperatively. All patients had a final best spectacle-corrected visual acuity of 20/20. **Conclusion:** Block anesthetic procedures were safely used in cataract surgery, with no clinical sequelae to the optic nerve.

Haemorrhage and risk factors associated with retrobulbar/peribulbar block: A prospective study in 1383 patients.

British Journal of Anaesthesia. Vol 85(5) (pp 708-711), 2000.

Kallio H. Paloheimo M. Maunuksela E-L.

Department of Anaesthesia, Helsinki University Central Hospital, Helsinki University Eye Hospital, PO Box 220, FIN-00029 Helsinki; Finland.

Patients undergoing intraocular surgery are elderly and may have disease or be receiving medication which increases the risk of haemorrhage. We interviewed 1383 consecutive patients scheduled for eye surgery requiring retrobulbar/peribulbar block about their use of non-steroidal anti-inflammatory drugs, oral steroids and warfarin. A history of diabetes mellitus and globe axial length was noted. Medial peribulbar and inferolateral retrobulbar blocks were performed by three specialists and six doctors in training. The ensuing haemorrhages were graded as follows: 1=spot ecchymosis; 2=lid ecchymosis involving half of the lid surface area or less; 3=lid ecchymosis all around the eye, no increase in intraocular pressure; 4=retrobulbar haemorrhage with increased intraocular pressure. Acetylsalicylic acid was taken by 482 (35%) patients, non-steroidal anti-inflammatory drugs by 260 (19%) and warfarin by 76 (5.5%). Lid haemorrhages (grades 1-3) were observed in 55 patients (4.0%); in 33 of these patients the haemorrhages were spotlike (grade 1). No grade 4 haemorrhages occurred. The preoperative use of acetylsalicylic acid, non-steroidal anti-inflammatory drugs or warfarin, whether or not they had been discontinued, did not predispose to haemorrhage associated with retrobulbar/peribulbar block.

Effects of peribulbar bupivacaine as an adjunct to general anaesthesia on peri-operative outcome following retinal detachment surgery.

Anaesthesia. Vol 55(10) (pp 970-975), 2000.

Shende D. Sadhasivam S. Madan R. Dept. of Anaesthesiol./Intens. Care, Rajendra Prasad Ctr. Ophthal. Sci., All India Inst. of Medical Sciences, New Delhi 110 029; India.

Sixty premedicated, ASA physical status I or II patients weighing > 25 kg scheduled for elective retinal detachment repair were randomly assigned to receive either peribulbar block with 10 ml of 0.25% bupivacaine (block group) or intravenous morphine 150 ug/kg-1 (morphine group), prior to the induction of general anaesthesia (n = 30 in each group). Patients were evaluated for intra-operative oculocardiac reflex, peri-operative pain relief, recovery from anaesthesia and postoperative nausea and vomiting. Apart from significantly reducing the incidence of oculocardiac reflex (30% vs. 70%, p = 0.0019), peribulbar bupivacaine also attenuated the severity of the reflex. Postoperative pain relief was superior in the block group. More block group patients had the maximum recovery score in the immediate postoperative period (80% vs. 27%, p < 0.0001) and they achieved complete recovery significantly faster than the morphine group (17.3 (14.7) min vs. 66.7 (29.7) min, p < 0.0001). The incidence (40% vs. 77%, p = 0.004) and severity of postoperative nausea and vomiting were significantly less in the block group. In summary, peribulbar bupivacaine, when administered together with general anaesthesia, attenuated oculocardiac reflex, provided comparable intra-operative and superior postoperative analgesia, resulted in significantly earlier and better recovery from anaesthesia, and significantly reduced the incidence and severity of postoperative nausea and vomiting

Low-dose oral clonidine as premedication before intraocular surgery in retrobulbar anesthesia.

European Journal of Ophthalmology. Vol 10(3) (pp 248-256), 2000.

Weindler J. Kiefer RT. Rippha A. Wiech K. Ruprecht KW.

Department of Anesthesiology, Eberhard-Karls University Tuebingen, Hoppe-Seyler-Strasse 3, D-72076 Tuebingen; Germany.

Purpose. We investigated whether low-dosed oral clonidine premedication before elective intraocular surgery in retrobulbar anesthesia is

effective in terms of anxiolysis, sedation, stable hemodynamics, lower intraocular pressure and perioperative endocrine stress response. Methods. In a prospective, randomised, double-blind study, 44 patients scheduled for elective intraocular surgery received either 0.15 mg clonidine (n=22) or a matched placebo (n=22) orally 60 minutes before retrobulbar anesthesia. The main study parameters were sedation, anxiolysis, hemodynamics and intraocular pressure. Additionally, mediators of endocrine stress responses were measured five times, in 13 patients after clonidine and 12 after placebo. Results. After clonidine 86% of the patients showed sedation and after placebo 90.9% showed no sedation (p<0.01). Clonidine produced effective anxiolysis (Erlanger-Anxiety-Scale: 31.6 +/- 2.6 points vs. 38.1 +/- 8.5 points) before the operation (p<0.01). Systolic blood pressure was significantly lower after clonidine. Effects on mean and diastolic blood pressure were small but statistically significant. Norepinephrine and cortisol plasma concentrations were significantly lower after clonidine. Intraocular pressure was significantly lower too (p<0.05). No clinically relevant adverse effects were observed e.g. inappropriate sedation, hypotension (<100 mmHg), bradycardia (<50 bpm) or hypoxemia (SpO2<90%). Conclusions. Oral low-dose clonidine produces light sedation, significant anxiolysis and stable hemodynamics, and attenuates the endocrine response to perioperative stress. Thus, clonidine seems sufficient to increase patient comfort for intraocular surgery and might even offer clinically worthwhile benefits such as stable hemodynamics and a reduced response to perioperative stress.

Hyaluronidase as an adjuvant in bupivacaine-lidocaine mixture for retrobulbar/peribulbar block.

Anesthesia & Analgesia. Vol 91(4) (pp 934-937), 2000.

Kallio H. Paloheimo M. Maunuksela E-L.

Helsinki University, Central Hospital, Helsinki University Eye Hospital, PO Box 220, FIN-

00029 Huch; Finland.

Hyaluronidase 7.5 IU/mL added to the local anesthetic improves peribulbar block, but smaller concentrations have not been shown to be effective. In this prospective, double-blinded study, 714 consecutive ocular surgery patients were randomized into three groups: no hyaluronidase (n = 241), hyaluronidase 3.75 IU/mL (n = 244), and hyaluronidase 7.5 IU/mL (n = 229). Retrobulbar/peribulbar block was performed with two injections of a 1:1 mixture of bupivacaine 0.75% and lidocaine 2%, 6-8 mL. Patient data were collected on demographics, initial volume of local anesthetic, need for supplementary block, and akinesia of the anesthetized eye. When hyaluronidase was used (3.75 or 7.5 IU/mL), the initial block was sufficient and the anesthetized eye was akinetic significantly more often than in the group without hyaluronidase. The hyaluronidase groups (3.75 and 7.5 IU/mL) did not differ significantly in any respect. We conclude that the addition of hyaluronidase 3.75 or 7.5 IU/mL improved the success of the initial retrobulbar/peribulbar block and akinesia and reduced the need for supplementary block

Peribulbar anaesthesia with 1% ropivacaine and hyaluronidase 300 IU ml⁻¹: Comparison with 0.5% bupivacaine / 2% lidocaine and hyaluronidase 50 IU ml⁻¹.

British Journal of Anaesthesia. Vol 85(4) (pp 618-620), 2000.

Woodward DK. Leung ATS. Tse MWI. Law RWK. Lam DSC. Ngan Kee WD.
Dept. Anaesthesia Intensive Care, The Chinese University Hong Kong, Prince of Wales Hospital

The low toxicity of ropivacaine makes it attractive for peribulbar anaesthesia. However, its motor-sparing properties are undesirable when akinesia is important. Hyaluronidase (300 IU ml⁻¹) promotes the onset and quality of peribulbar blockade when used with other agents. We investigated the onset and quality

of ocular akinesia in 80 patients randomized to receive 1% ropivacaine plus hyaluronidase 300 IU ml⁻¹ (group I), or bupivacaine 0.5% and Lidocaine 2% plus 50 IU ml⁻¹ hyaluronidase (group 2). Ocular akinesia was scored from 0 (no movement) to 8 (full movement) every 2 min for 20 min. The groups showed no difference in the rate of onset or degree of akinesia achieved (analysis of variance with repeated measures; P=0.34). Sixty per cent of patients in group I and 55% in group 2 achieved akinesia scores of ≤4 by 6 min (chi² test; P=0.5). We conclude that both peribulbar solutions produce equivalent onset and quality of ocular akinesia

Arteriovenous fistula induced by a peribulbar nerve block.

Journal of Cataract & Refractive Surgery. Vol 26(8) (pp 1253-1255), 2000.

To EWH. Chan DTM.

Chinese University of Hong Kong, Prince of Wales Hospital, Shatin; Hong Kong

Arteriovenous fistula (AVF) of the head and neck region is an uncommon clinical condition that can be congenital or acquired etiology. We report a case of AVF of the left supraorbital vessels that developed after a peribulbar nerve block was given for cataract surgery.

Intraocular pressure during peribulbar block with ropivacaine or bupivacaine: A comparative study.

Revista Brasileira de Anestesiologia. Vol 50(5) (pp 341-344), 2000.

Serzedo PSM. Nociti JR. Zuccolotto EB. Bento DC. Ferreira SB.

Caixa Postal 707, 14100-000-Ribeirao Preto - SP; Brazil.

Background and Objectives: 0.75% bupivacaine and 1% ropivacaine have been used for ophthalmic block. The aim of this study was to compare the effects on intraocular

pressure (IOP) of 0.75% bupivacaine and 1% ropivacaine during peribulbar block. Methods - The study involved 40 patients physical status ASA I, II or III undergoing outpatient cataract surgery under peribulbar block and double injection technique. Patients were allocated in two groups according to the local anaesthetics used: Group R (n=20), 1% ropivacaine; and Group B (n=20) 0.75% bupivacaine, both associated with 50 IU. ml⁻¹ hyaluronidase and oculopression for 10 min. IOP was measured with an applanation tonometer in four moments: M0 = before blockade (control); M1 = 1 min after blockade; M2 = 5 min after blockade; M3 = 15 min after blockade. Results - Mean values of IOP (mmHg) after blockade were significantly lower in Group R as compared to Group B: M1 = 13.4 +/- 3.2 vs. 20.8 +/- 4.7; M2 = 10.9 +/- 3.7 vs. 14.4 +/- 3.8; M3 = 7.7 +/- 4.0 vs. 10.5 +/- 3.1. Intra-group behavior of each anaesthetic drug was also different. In Group R, mean IOP values obtained in the three moments after blockade were significantly lower as compared to control; in Group B, mean IOP values significantly increased 1 min after blockade and were only lower than control in moment 3. Conclusions - Peribulbar block with 1% ropivacaine associated to hyaluronidase and oculopression is better than 0.75% bupivacaine under the same conditions for lowering IOP in intraocular surgery. It is possible that, in addition to extraocular muscles relaxation, ropivacaine's vasoconstrictor properties may have contributed to such effect on IOP, resulting in a decrease of choroidal blood flow.

Pain perception with pH buffered peribulbar anaesthesia: A pilot study.

British Journal of Ophthalmology. Vol 84(9) (pp 1041-1044), 2000.

Minasian MC. Ionides AC. Fernanco R. Davey CC.

The Royal Eye Unit, Kingston Hospital NHS Trust, Kingston upon Thames, Surrey KT2 7QB; United Kingdom.

Aims - To determine the relation between pH

of anaesthetic solutions and patient perception of pain with peribulbar injection of local anaesthesia. Methods - This prospective randomised controlled double blind pilot study involved 60 consecutive patients who received a peribulbar block with either a standard acidic local anaesthetic of 5 ml 2% lignocaine and 5 ml of 0.5% bupivacaine (solution A), or an alkalinised solution composed of the same anaesthetic agents but with a pH of 7.44 (solution B). Before surgery patients were asked to grade the pain of both the preoperative dilating drops and the peribulbar injection using a visual analogue scale. Results - The mean pain scores were similar in the two treatment groups- slightly higher (4.97) in group B who received the buffered solution, compared with group A (4.84) who received the plain solution. The small difference (-0.13, 95% confidence limits -1.6 and +1.3) was not significant. There was, however, a highly significant association between pain threshold and injection pain levels (p<0.0001).

Conclusion - This study showed no difference in the reduction in the pain experienced by patients undergoing peribulbar anaesthesia with pH buffered local anaesthetic. The study suggests the importance of pain threshold as a confounder and also showed the considerable pain felt by some patients on instillation of the preoperative dilating drops.

Brainstem anaesthesia with respiratory arrest after retrobulbar block - Case report and review of literature.

Klinische Monatsblätter für Augenheilkunde. Vol 217(2) (pp 130-132), 2000.

Schonfeld C-L. Brinkschmidt T.

Universitäts-Augenklinik, Ludwig Maximilians-Univ. München, Mathildenstr. 8, 80336 München; Germany.

Background: This case shows the time course and typical clinical features of brain stem anaesthesia. It is presumed that it follows accidental injection of local anaesthetic into the subarachnoidal space via the optic nerve sheaths. History and signs: We report the case of a 70-year-old man, who became

unconscious shortly after retrobulbar anaesthesia. The first symptoms developed after an interval of several minutes following the injection of the local anaesthetic. After the appearance of cranial nerve deficits the patient complained of difficulty breathing and became unconscious and apnoeic. Therapy and outcome: It was decided to intubate the patient. Heart rate and systolic blood pressure dropped, therefore, a central line was placed and intravenous fluids were given. The patient was brought to the intensive care unit where he was extubated uneventfully the same day. Conclusions: The quick clinical recovery of the patient without any sequelae and the unremarkable results of internal and neurological examination support the diagnosis of brain stem anaesthesia

Combined cataract extraction and submacular blood clot evacuation for globe perforation caused by retrobulbar injection.

Journal of Cataract & Refractive Surgery. Vol 26(7) (pp 1089-1091), 2000.

Hemmerling TM. Budde WM. Koppert W. Jonas JB.

Department of Anesthesiology, University of Erlangen-Nuremberg, Krankerhausstr. 12, D-91054 Erlangen; Germany.

A 45-year-old woman, originally scheduled for cataract surgery in the left eye, was referred for management of a globe perforation noticed after the retrobulbar injection of an anesthetic solution. There was a moderate degree of vitreous hemorrhage, and initial visual acuity was hand movement. A submacular blood clot of about 4-disc diameter was detected when the vitreous hemorrhage gradually cleared. One week after the incident, combined phacoemulsification, intraocular lens implantation, pars plana vitrectomy, and submacular clot removal using tissue plasminogen activator (tPA) as an adjunct were performed. Recovery was uneventful. At the last follow-up 6 months after surgery, best corrected visual acuity was 20/30.

Patient-controlled sedation for cataract surgery.

Turk Anesteziyoloji Ve Reanimasyon. Vol 28(6) (pp 322-326), 2000.

Kuvaki B. Atila S. Ozkut F. Iyilikci L. Durak I. Soylev M. Gokel E.

Anesteziyoloji Anabilim Dalı, Tıp Fakültesi, Dokuz Eylül Üniversitesi, İzmir; Turkey.

The purpose of this study was to evaluate the feasibility and advantages or disadvantages of patient-controlled sedation (PCS) compared with sedation administered by the anaesthesiologist during cataract surgery using retrobulbar block. Forty-five patients were divided randomly into three equal groups. Patients in group PCS(Mid-Fen) received a self-administered mixture of midazolam (0.5 mg) and fentanyl (25 ug) in increments using PCA infusion pump, patients in group PCS(Prop) received with a similar pump propofol (0.3 mg/kg) and patients in the anaesthesiologists group received 0.5-1.0 mg IV midazolam and 25-50 ug IV fentanyl in increments administered by the anaesthesiologists to achieve intraoperative sedation. Demographics of the patients, duration of surgery, doses of midazolam and fentanyl administered in a given period of time, and the level of preoperative anxiety were similar in all groups. Patients in the self-administered group, however, were more satisfied than those in the anaesthesiologist-controlled sedation group. This could be to a positive psychological effect produced by allowing patients to feel themselves some control over their situation. The findings of this study indicate that patient-controlled sedation using a combination of midazolam and fentanyl or propofol is a safe and effective technique that provides intraoperative sedation ranked better by patients than that provided by anaesthesiologists.

Comparative study of topical vs retrobulbar anesthesia in complicated cataract surgery.

Archives of Ophthalmology. Vol 118(8) (pp 1037-1043), 2000.

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Objectives: To evaluate and compare levels of patient discomfort and perioperative complications during phacoemulsification and implantation of a foldable intraocular lens under topical lidocaine hydrochloride and retrobulbar anesthesia in patients with cataract who also had exfoliation syndrome, uveitis, posterior synechia, phacodonesis, or previous intraocular surgery. **Design:** A prospective, randomized, controlled trial was carried out at 2 institutions. **Participants:** A total of 476 eyes of 476 patients with various well-established risk factors fulfilled the inclusion criteria. In 238 eyes, phacoemulsification was performed under retrobulbar anesthesia, while the other 238 eyes received topical anesthesia. **Interventions:** All patients underwent temporal clear corneal phacoemulsification and implantation of a foldable intraocular lens. Patients under retrobulbar anesthesia received a single injection (3.5-5.5 mL) of a combination of 0.75% bupivacaine hydrochloride, 2% lidocaine, and hyaluronidase into the retrobulbar space. Patients in the topical anesthesia group received a minimum of 5 doses (approximately 40 μ L per dose) of 2% topical lidocaine. No intracameral injection of any anaesthetic was given. **Main Outcome Measures:** The number of complications and adverse events. The intraoperative conditions were judged by the surgeon (P.C.J. or F.K.J.), and a 10-point visual analog scale was used immediately after surgery to assess each patient's overall severity of intraoperative pain. **Results:** The overall intraoperative complication rate was 1.9% for capsular tear, 3.8% for zonular tear, 1.5% for vitreous loss, and 1.0% for iris prolapse. Apart from the incidence of vitreous loss, which was significantly ($P=.041$) lower in the topical anesthesia group, no statistically significant differences in intraoperative and early postoperative complications were found between the groups. A supplemental posterior

sub-Tenon space injection was required in 1.3% of the topical anaesthesia group and in 0.8% of the retrobulbar anesthesia group. Chemosis (2.5%), subconjunctival hemorrhage (1.7%), and periorbital hematoma (0.8%) were seen only in the retrobulbar anesthesia group. The mean \pm SE pain scores estimated by the patients were 0.84 \pm 1.30 in the topical anesthesia group and 0.73 \pm 1.50 in the retrobulbar anesthesia group ($P=.41$). Patient preference for topical anesthesia (91%) appeared to be significantly ($P=.01$) higher than for retrobulbar anesthesia (62%). The surgeons found anesthesia-related intraoperative difficulty to be slightly lower in the retrobulbar anesthesia group (8%) than in the topical anesthesia group (14%). **Conclusions:** Surgery-related complications and patient discomfort were similar for the 2 methods of anesthesia. Topical anesthesia is justified as a means of improving safety without causing discomfort to the patient even in complicated cases of cataract surgery.

Single injection peribulbar anaesthesia: Total upper eyelid drop as an end-point marker.

Anaesthesia. Vol 55(8) (pp 750-756), 2000.

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A prospective, observer blinded study on 51 patients undergoing cataract surgery was conducted to assess Total Upper Eyelid Drop as a new end-point marker to single injection peribulbar block. At present, no such clinical marker exists to stop clinicians injecting more than necessary volumes of local anaesthetic and therefore to prevent dangerous increases in intra-ocular pressure. Using this technique, satisfactory ocular akinesia was achieved in 90% of eyes 10 min after injection. Operating conditions were satisfactory in 98% of cases. The mean (range) volume injected was 9.1 (4-15) ml. The mean increase in intra-ocular pressure immediately after injection was 6.9 mmHg, decreasing to 0.7 mmHg after 5 min without the application of ocular compression.

We found a negative correlation between the increase in intra-ocular pressure and the volume of injection ($p < 0.002$), which has never previously been reported. We conclude that Total Upper Eyelid Drop is a reliable endpoint marker for producing satisfactory operating conditions for cataract surgery while minimising increases in intra-ocular pressure and its use may therefore avoid the risks associated with ocular compression.

Anticoagulation and cataract surgery: a review of the current literature.

Anaesth Intensive Care 2001 Feb;29(1):11-8

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The anticoagulated patient presenting for cataract surgery presents many dilemmas for anaesthetist and surgeon alike. Current evidence suggests that warfarin therapy significantly improves prognosis in patients with atrial fibrillation with coexisting cerebrovascular disease, and those with non-tissue prosthetic heart valves. Inadequate anticoagulation in these groups exposes them to higher risk of systemic embolic complications, which are frequently devastating. Warfarin is an extremely complex drug. Attempted cessation and recommencement of warfarin therapy may not only reverse anticoagulation for unpredictable periods of time but may also expose patients to a transient yet dangerous hypercoagulable state. In most instances this state represents an additive risk to the untreated disease for which warfarin is being prescribed. It is difficult to accurately measure risks of local anaesthetic blockade in anticoagulated patients as techniques are not standardized. Smaller needles and single injections appear safer with deep eye blocks, while sub-Tenon's block and topical techniques appear safer still, and acceptable provided patients and surgeons are happy with the conditions so created. Retrobulbar haemorrhage appears to occur more frequently in anticoagulated patients who have their anticoagulation continued up to the

time of cataract surgery. Retrobulbar haemorrhage is also more frequent in this same group even when anticoagulation is ceased prior to surgery when compared to non-anticoagulated patients. Prognosis for visual acuity with retrobulbar haemorrhage is generally good, given an experienced surgeon is present to rapidly decompress the eye.

Synthesis of the literature on the effectiveness of regional anesthesia for cataract surgery.

Ophthalmology 2001 Mar;108(3):519-29

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OBJECTIVE: To synthesize the findings of the randomized trials of regional anesthesia management strategies for cataract surgery. **DESIGN:** Literature review and analysis. **METHOD:** The authors performed a systematic search of the literature to identify all articles pertaining to regional anesthesia during cataract surgery on adults. One investigator abstracted the content of each article onto a custom-designed form. A second investigator corroborated the findings. The evidence supporting the anesthesia approaches was graded by consensus as good, fair, poor, or insufficient.

MAIN OUTCOME MEASURES: Evidence supporting the effectiveness of different forms of regional anesthesia.

RESULTS: There was good evidence that retrobulbar and peribulbar blocks provide equivalent akinesia and pain control during cataract surgery. Additionally, sub-Tenon's blocks were at least as effective as retrobulbar and peribulbar blocks. There was good evidence that retrobulbar block provides better pain control during surgery than topical anesthesia, and there was fair evidence that peribulbar block provides better pain control than topical anesthesia.

CONCLUSIONS: This synthesis of the literature demonstrates that currently used approaches to anesthesia management provide adequate pain control for successful cataract surgery, but there is some variation in the effectiveness of the most commonly used techniques. Data are needed on patient preferences to determine the optimal strategies for anesthesia management during cataract surgery.

Alkalinized lidocaine and bupivacaine with hyaluronidase for sub-tenon's ophthalmic block.

Reg Anesth Pain Med 2000 Sep-Oct;25(5):514-7

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BACKGROUND AND OBJECTIVES: Alkalinization of local anesthetics has been shown to decrease the onset and prolong the duration of block for extraconal and intraconal application in ocular surgery. The objective of this study is to determine if alkalinization is also effective in sub-Tenon's block when hyaluronidase is added to the drug mixture.

METHODS: Twenty-nine patients were randomly assigned to 2 groups in a double-blind, prospective fashion to receive 5.125 mL of either a plain mixture LBH (2.5 mL lidocaine 2%, 2.5 mL bupivacaine 0.5%, 5 IU/mL hyaluronidase, and 0.125 mL isotonic saline) or pH-adjusted mixture LBH-PH (2.5 mL lidocaine 2%, 2.5 mL bupivacaine 0.5%, 5 IU/mL hyaluronidase, and 0.125 mL sodium bicarbonate 8.4%) of local anesthetics in a 1-quadrant sub-Tenon's block. Time to onset and time to full akinesia were determined every 30 seconds.

RESULTS: No difference was found between the study groups.

CONCLUSION: pH adjustment of the local anesthetic mixture of lidocaine, bupivacaine, and hyaluronidase offered no additional benefit in sub-Tenon's technique in ocular procedures.

6 between those who found the experience frightening and patient sex or age, length of surgery, or history of cataract surgery in the fellow eye. **Conclusions:** Many patients having phacoemulsification and IOL implantation under retrobulbar anesthesia experienced a variety of visual sensations that were frightening in a small proportion of cases.

Indwelling temporary retrobulbar catheter for long-lasting titratable local anesthesia.

Archives of Ophthalmology. Vol 118(7) (pp 996-1000), 2000.

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Objective: To evaluate an indwelling temporary retrobulbar catheter for repeatable injections of local anesthetics for long-lasting and titratable retrobulbar anesthesia in intraocular surgery. **Participants:** The prospective clinic-based study included 153 patients who underwent vitreoretinal surgery (n = 111) or buckling procedures with cryocoagulation (n = 34). The mean duration of surgery was 84.7 +/- 49.5 minutes (range, 25-310 minutes). Using commercially available retrobulbar needles with a diameter of 0.60 or 0.80 mm and a length of 38 mm, 5 mL of 2% mepivacaine hydrochloride was injected. Through the same needle, a 28-gauge commercially available flexible catheter was introduced into the retrobulbar space. The needle was withdrawn and the catheter was fixed. When the patients started to feel pain during surgery, 2 mL of mepivacaine hydrochloride was reinjected through the catheter. **Results:** Ten to 240 minutes after the start of the operation, 96 patients needed an intraoperative reinjection of mepivacaine after which they felt comfortable again. Forty-two patients needed a second reinjection of mepivacaine 30 to 270 minutes after the start of the operation, and 13 patients needed a third reinjection 45 to 145 minutes after the start of surgery. Removal of the catheter after surgery was unremarkable. No infections were

observed. Microbiologic examination results of the catheter tip were negative for organisms. Diplopia or other motility problems were not detected. Introduction and fixation of the catheter took less than 5 minutes in all patients. Conclusions: An indwelling temporary retrobulbar catheter for repeatable intraoperative injections of local anesthetics is simple, effective, and useful, and in comparison with general anesthesia, it is a time-saver for long-lasting and titratable local anesthesia in intraocular surgery.

Anaesthesia for eye enucleation or evisceration.

Cahiers D'Anesthesiologie. Vol 48(3) (pp 189-192), 2000.

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Eye enucleation or evisceration is most often effected under general anaesthesia. This study aimed to assess the effects of peribulbar block combined with general anaesthesia on intraoperative and postoperative course. Forty patients 19-80 year-old were anaesthetized by propofol (or etomidate), fentanyl or sufentanil and vecuronium, then received a peribulbar block (10 mL). Intraoperative period was marked by minimal general anaesthetics requirements and good haemodynamic stability; only one patient developed a transient oculocardiac reflex. Early postoperative period (2 hours) was characterized by rapid recovery, absent or moderate pain and infrequent nausea and vomiting (2/40). Immediate postoperative analgesia from peribulbar block facilitated the taking over by oral or parenteral analgesics. Therefore combined peribulbar block and light general anaesthesia appear to be highly advisable for this type of ophthalmic surgery.

Topical anesthesia versus retrobulbar block for cataract surgery: The patients' perspective.

Journal of Clinical Anesthesia. Vol 12(1) (pp 58-60), 2000.

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Study Objectives: To compare patients' perception of topical anesthesia (TA) with combined peribulbar and retrobulbar block (PRBB) for cataract surgery. Design: Prospective, randomized, controlled, cross-over observational study. Setting: Private clinic. Patients: 98 ASA physical status I and II patients presenting for bilateral cataract surgery 1 week apart. Interventions: Patients were prospectively randomized to receive either TA for surgery to one eye, followed by PRBB for surgery to the other eye 1 week later, or to receive PRBB first, followed by TA for the second operation the following week. Surgery, PRBB, and TA were standard for all cases. Interviews were conducted the day following surgery by an unbiased observer unaware of the technique used. Surgical pain was estimated on a visual analog scale of 0 to 10, and the surgeon judged the difficulty of surgery based on patient compliance and cooperation on a scale of 0 to 5. Means and variance of results were compared with analysis of variance. Measurements and Main Results: Mean age was 71.45 +/- 9.76 years (mean +/- SD). Seventy patients (71.43%) preferred PRBB while 10 patients (10.20%) preferred TA (p = 0.0001). Eighteen patients (18.37%) reported no difference between the two techniques. Ninety-six patients (97.96%) were not aware of the PRBB being injected. Duration of surgery was similar for TA (11.92 +/- 3.43 min) and PRBB (10.78 +/- 3.00 min; p = 0.06). Surgery was more difficult during TA (p = 0.0004). Pain was worse during TA (p = 0.0001). Surgical and anaesthetic complications were unremarkable for both techniques. Conclusions: Patients who experienced both TA and PRBB preferred PRBB. Copyright (C) 2000 Elsevier Science

Peribulbar anesthesia and subtenon injection for vitreoretinal surgery: 300 cases.

Acta Ophthalmologica Scandinavica. Vol 78(2) (pp 196-199), 2000.

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Background and objectives: We carried out a prospective study in order to evaluate the efficacy and safety of peribulbar anaesthesia supplemented by a sub-Tenon injection in case of inadequate analgesia during vitreoretinal surgery. **Methods:** We performed 300 consecutive vitreoretinal procedures. Patients received a mean volume of 17+/-4.5 ml of a mixture of etidocaine 1%, bupivacaine 0.50% and hyaluronidase (25 UI/ml). Supplementation was represented by a sub-Tenon infiltration of lidocaine 2% (2 or 3 ml). This volume was not included in the mean volume. **Results:** Analgesia was adequate throughout surgery without any supplementation in 85% of cases and with a sub-Tenon infiltration in 99%. Akinesia was complete in 82%, mild in 15% and absent in 3% of cases. The sub-Tenon injection was performed immediately before starting the procedure in 58% of cases and during the surgery with a delay of 80+/-21 min in 42%. Eleven patients (3.66%) were agitated during surgery and two of them needed general anaesthesia to allow for the procedure. Generalised epilepsy was encountered in two patients (0.66%) immediately after the peribulbar injection in one patient and 15 min later in the other. The systolic blood pressure severely decreased between 60 to 70 mm Hg 40 min after the accomplishment of the peribulbar in 2 patients and at 90 min in 2 others. **Conclusion:** Our results demonstrate that peribulbar anaesthesia alone offers excellent analgesia in 85% of patients and supplemented by a sub-Tenon injection in 99%.

Comparison of analgesia and akinesia after retrobulbar injections at different speeds.

European Journal of Ophthalmology. Vol 10(1) (pp 66-70), 2000.

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PURPOSE. TO assess how the speed of injection of local anesthetic solutions affected pain of injection, bulbar akinesia and analgesia with retrobulbar anesthesia (RBA). **METHODS.** 70 patients undergoing RBA for cataract surgery were enrolled in a prospective masked trial. They were allocated randomly to receive 5 ml anesthetic solution injected either within 20 seconds (group A) or within 60 seconds (group B). Additionally, akinesia of the orbicularis muscle was created according to O'Brien's technique. The pain of injection was registered on an ordinal analogue scale immediately before and after RBA. The following data were collected before and 20 minutes after retrobulbar injection: eye motility (Kestenbaum test), and corneal sensitivity (0: no sensitivity; 1: sensitivity remaining). Data were also collected on age, sex, and bulbar length, and any side effects of the intervention. **RESULTS.** Injection pain did not differ in the two groups. After RBA horizontal and vertical eye motility was slightly lower in group A than group B. Persistent motility was found in 18 patients in group A and 16 in group B. Median horizontal and vertical motility was 0 mm in both groups. Four patients in group A and five in group B had corneal sensitivity persisting after RBA. **CONCLUSIONS.** This comparison of different injection velocities brought to light no significant differences regarding bulbar analgesia and akinesia after RBA.

Perioperative myocardial ischaemia in cataract surgery patients: general versus local anesthesia.

Anesth Analg 2000 Dec; 91(6): 1415-19
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BACKGROUND: Patients having cataract surgery are usually elderly, with risk factors for ischaemic heart disease. Little is known about the incidence of cardiac ischaemia in ophthalmic surgery and there have been no comparisons between general and local anaesthetic techniques in this respect.

METHODS: 81 patients undergoing cataract surgery with at least 2 risk factors for ischaemic heart disease were monitored continuously for 24 hours using ECG leads 11 and V5 and a Holter recorder. Patients were randomly allocated to two groups, either LA (n = 39) or GA (n = 42). In the LA group, a peribulbar block was performed, whereas a similar block was performed in the GA group after tracheal intubation. GA was with thiopental, fentanyl, vecuronium, nitrous oxide, oxygen and isoflurane.

RESULTS: There was a 31% incidence of perioperative myocardial ischaemia, with no overall difference in the patient incidence rate between the two groups; 12 of 39 patients in the LA group and 13 of 42 in the GA group (NS). The number of ischaemic episodes was significantly increased in the GA group (18 vs 13 in the LA group, $P < 0.05$), and there were significantly more intraoperatively in the GA group (8 vs 1, $P < 0.01$). All intraoperative ischaemic events were associated with tachycardia, whereas postoperative ischaemic changes were mostly independent of heart rate. One patient in the GA group was admitted because of intractable chest pain.

CONCLUSION: LA may be safer than GA because of fewer intraoperative ischaemic events. However, there were still a significant number of late ischaemic events postoperatively, occurring approximately nine hours after surgery and related to pain resulting from offset of the block

Aspirin and warfarin therapy in oculo-plastic surgery.

Br J Ophthalmol 2000; 84: 1426-7

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BACKGROUND/AIMS: There are no nationally agreed guidelines on preoperative management of patients who are on aspirin or warfarin therapy. There is considerable evidence that complication rates in anticoagulated patients are low whereas there are higher rates of thromboembolic complications in those whose therapy is manipulated. This survey aimed to establish oculo-plastic specialist and non-specialist ophthalmic surgeons' current management practice of patients before oculo-plastic surgery who are taking aspirin or warfarin and to assess the rate of complications in these patients.

METHOD: An anonymous postal questionnaire survey of all ophthalmic consultants and specialist registrars in the Wessex region along with oculo-plastic specialists in the Southern region.

RESULTS: The overall response rate was 92%. Preoperative management was influenced both by type of operation and type of surgeon. A statistically significant higher proportion of surgeons would consider altering warfarin compared with aspirin treatment. For all procedures, non-specialists are unlikely to stop aspirin therapy, are less likely to stop warfarin before all procedures apart from dacrocystorhinostomy. A significant proportion of surgeons (18%) would allow insufficient time for the coagulation status of the patient to change after altering treatment. A considerable proportion of surgeons (54%) reported that they had seen complications as a result of either stopping or continuing anticoagulation therapy.

CONCLUSIONS: In this survey, at least half the surgeons questioned would consider stopping warfarin before oculo-plastic procedures. Over half of all surgeons have seen complications related to aspirin or warfarin, some of which were serious. A suggested approach to minimising patient risk is given.

Myopexy (Faden) results in more postoperative vomiting after strabismus surgery in children.

Acta Anaesthesiol Scand 2001; 45: 59-64

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BACKGROUND: Strabismus correction in children is associated with a high incidence of postoperative nausea and vomiting. The purpose of this prospective double blind study was to examine the influence of the surgical method for correction of squint on the incidence of postoperative vomiting.

METHODS: 120 consecutive children aged 2-12 years, scheduled for elective strabismus surgery, were enrolled. A standardised total intravenous anaesthetic was given. The development of the oculocardiac reflex was noted and the number of vomiting episodes in the first 24 hours was recorded. On completion of the study, children who were operated with myopexy according to Faden were allocated to a Faden group, those without a myopexy to the non-Faden group. All the patients were operated on by the same surgeon with standardised techniques.

RESULTS: The Faden group was younger, lighter, and the operation time was longer ($P < 0.05$). The incidence of vomiting was greater in the Faden group; 53% versus 12% ($P < 0.05$). The incidence of oculocardiac reflex was similar in both groups; 40% in the Faden versus 28% in the non-Faden group respectively. The total dose of propofol and alfentanil was similar between the groups. Requirement of analgesics for postoperative pain was similar in both groups. The only independent risk factor for postoperative vomiting was the Faden operation.

CONCLUSION: The surgical method used for strabismus correction in children has a great influence on the incidence of postoperative vomiting. The Faden operation is associated with a very high incidence of postoperative vomiting; this particular group of patients has to be considered as a high risk group for postoperative vomiting and deserves antiemetic prophylaxis.

Psychomotor recovery in very old patients after total intravenous or balanced anaesthesia for cataract surgery.

Br. J. Anaesth 2001; 86: 203-8

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BACKGROUND: It has been suggested that early psychomotor recovery should be improved after total intravenous anaesthesia (TIVA) compared to conventional techniques, due to faster drug elimination. However, this has not been reliably demonstrated. If a difference exists, it may be particularly relevant in the elderly population.

METHOD: Psychomotor recovery after TIVA with remifentanyl/propofol was compared with etomidate/fentanyl/isoflurane (BAL) in 40 ASA 1-111 patients aged 80 years or greater, having cataract surgery. Recovery times were recorded and psychomotor recovery was assessed according to simple reaction time, critical flicker fusion frequency (CFF) and short-term memory 30 min, 2 h and 1 day after surgery.

RESULTS: Physical characteristics of patients in the two groups (19 in the TIVA group and 21 in the BAL group) were comparable. The TIVA group recovered significantly more quickly. Both groups showed a poorer psychomotor performance 30 min after surgery than at baseline assessment, but simple reaction time and short-term memory were close to baseline values 2 h after surgery. Only performance in the CFF test remained below baseline at this point. No deficits in psychomotor performance were noted on the first day after surgery. We conclude that there is only a minor deficit in psychomotor function in elderly patients 2 h after cataract surgery under general anaesthesia and that psychomotor function recovers completely by 24 h after surgery.

Dexamethasone is a cost-effective alternative to ondansetron in preventing PONV after paediatric strabismus repair.

Br. J. Anaesth 2001; 86: 84-9.

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BACKGROUND: This study evaluated the antiemetic efficacy, cost-effectiveness and clinical utility of prophylactic ondansetron and dexamethasone compared with placebo in the prevention of postoperative nausea and vomiting (PONV) in children.

METHOD: 135 children, 2-15 yr, ASA 1-11, undergoing strabismus repair were induced with halothane and nitrous oxide in oxygen or i.v. thiopental. The children received i.v.

dexamethasone 1 mg kg⁻¹ to a maximum of 25 mg, ondansetron 100 ug kg⁻¹ to a maximum of 4 mg or placebo (n=45). Episodes of PONV were recorder for the first 24 h after the operation. True outcome measures (parental satisfaction score, duration of stay in the postanaesthesia care unit and fast tracking time), therapeutic outcome measures (number needed to prevent (NNTP) PONV) and the cost to benefit a child were analysed.

RESULTS: The incidence and severity of PONV in the first 24 h were significantly less in the dexamethasone and ondansetron groups than in the placebo group (P < 0.05). The incidence (P=0.04) and severity (P=0.03) of PONV at the 6-24 h epoch were significantly less in the dexamethasone group than in the ondansetron group. Recovery time (P=0.07), fast tracking time (P=0.6), parental satisfaction scores (P=0.08) and NNTP PONV were comparable (NNTP=2) in both the ondansetron and the dexamethasone group. The cost to benefit a child with dexamethasone was approximately 22 times less than that of ondansetron.

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 Dr. David Leetham Robinson, SURREY
 Dr. M.J. Rooney, DORRIDGE, SOLIHULL
 Dr. Alison Ross, ABERDEEN
 Dr. Anthony P. Rubin, LONDON
 Dr. Heinrich Ruschen, ESSEX
 Dr. David M. Ryall, MIDDLESBROUGH
 Dr. John Sale, BUCKS
 Dr. Sandeep Saxena, LEEDS LS15 4AU
 Dr. S.J. Seddon, STOKE ON TRENT
 Dr. Lalith Sekhar, SUNDERLAND
 Dr. R. Sharawi, GRASBY,
 Dr. Zahid Sheikh, YORK
 Dr. Fatehsingh Shekhawat, COVENTRY
 Dr. Roger Slater, MANCHESTER
 Mr David Smerdon, MIDDLESBROUGH
 Dr. Peter Stoddart, BRISTOL
 Dr. Peter Sweet, WORTHING
 Dr Andy Taylor, NOTTINGHAM
 Dr Evelyn Taylor, BUCKS
 Dr Ian Robert Taylor, HANTS,
 Dr Gurvinder Thind, LIVERPOOL
 Dr. Malcolm Thompson, LONDON
 Dr. Sean Tighe, CHESTER
 Dr Thelma Tipping, VALE OF GLAMORGAN
 Dr Michael Twohig, BRIGHTON
 Dr Andrei Varvinski, CARDIFF
 Dr Sashi Bala Vohra, BIRMINGHAM
 Dr Anthony Christopher Wainwright, SOUTHAMPTON
 Dr. L.M. Walton (Hardie), DUNDEE
 Dr. Duncan Weir, EDINBURGH
 Dr. Emert White, WARWICK
 Dr. A.D.B. Williamson, SUTTONCOLDFIELD
 Dr Sean Williamson, MIDDLESBROUGH

LOCAL ANAESTHESIA FOR OPHTHALMIC SURGERY

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Friday, 8th February 2002, Middlesbrough

A CME approved meeting for anaesthetists and ophthalmologists on Local Anaesthesia for Ophthalmic Surgery will be held in **North Riding Infirmary, Middlesbrough on Friday, 8th February 2002**. The meeting will include **lectures and live demonstration of orbital blocks**. Attendance is limited to 50 participants.

Application form and information from Mrs Pat McSorley (**Course Administrator 01642-854601 email: cmkumar@globalnet.co.uk**). Registration fee is £225 (BOAS Members £200) (inclusive of catering). **Cheque payable to Cleveland School of Anaesthesia.**

PROGRAMME

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|---|--|
| 09.00-9.25 | Registration & Coffee (Staff Restaurant) <i>Lectures Ward 56 (Day Centre)</i> |
| 9.25 | Welcome: Dr Chris Dodds, Middlesbrough |
| Chairman: | Dr Robert Johnson, Bristol |
| 9.30-10.15 | Anatomy Relevant to Orbital Blocks Prof Jonathan Dutton, North Carolina, USA |
| 10.15-11.00 | The evolution of an effective regional anaesthesia blocking technique for intraocular surgery Dr Roy Hamilton, Calgary, Canada |
| 11.15-11.45 | Coffee Break (Staff Restaurant) |
| Chairman | Dr A P Rubin, London |
| 11.45-12.15 | Sub-Tenon's Block : What's new Dr Chris Dodds, Middlesbrough |
| 12.20-12.45 | Local Anaesthesia for Posterior Segment Surgery Mr Bartley McNeela, Middlesbrough |
| 12.50-13.45 | Lunch |
| 13.45 -17.00 | Live Demonstration of Orbital Blocks(Ward 56) |
| Demonstration Co-ordinators: Drs Anthony Rubin, Chandra Kumar, Mr Tim Dowd, Mr Mamdou El-Naggar and Mr David Smerdon | |
| <u>Retro and/ or peribulbar</u> | |
| Combined Retroperibulbar | Dr Chandra Kumar, Middlesbrough |
| Hamilton's Technique | Dr Roy Hamilton, Calgary, Canada |
| Other Needle Blocks | Dr Sean Williamson, Middlesbrough Dr Anthony Rubin, London |
| <u>Sub-Tenon's</u> | |
| Metal Cannula | Dr Caroline Carr, London |
| Kumar-Dodds's Cannula | Dr Chris Dodds, Middlesbrough |
| Short Cannula | Mr Bartley McNeela, Middlesbrough |
| Greenbaum's Cannula | Dr Chandra Kumar, Middlesbrough |
| 17.00 | Closing remarks Dr Chris Dodds, Middlesbrough |

10th Video-conference Meeting

Programme Director and meeting Organiser: Dr Chandra Kumar, Consultant Anaesthetist, Cleveland School of Anaesthesia, South Cleveland Hospital, Middlesbrough TS4 3BW.

Tel: 01642-854601, email: cmkumar@globalnet.co.uk