Subjective visual experience during extracapsular cataract extraction and intraocular lens implantation under retrobulbar anaesthesia

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CLINICAL STUDY

Abstract

Purpose **To investigate the subjective visual experience of patients during cataract surgery under retrobulbar anaesthesia.**

Methods **One hundred cataract patients who underwent routine extracapsular cataract extraction and intraocular lens implantation under retrobulbar anaesthesia were interviewed by the authors on the same day after their operation regarding their visual experience in the operated eye during surgery.**

Results **Forty-three men and 57 women were included in the study. Their mean age was 68.4 years (range 40–87 years). Their pre-operative best corrected visual acuity ranged from 6/12 to perception of light. Eighty-four eyes had no other ocular pathology apart from cataract. Twenty patients reported no light perception during the surgery. The rest reported that they could see light (80 patients), one or more colours (56 patients), movements (39 patients), flashes (36 patients), instruments (16 patients) and/or the surgeon's fingers or hands (10 patients). The colours seen included red (29 patients), yellow (29 patients), green (12 patients), blue (11 patients) and orange (2 patients). Fifteen patients saw a spectrum of colours similar to that of the rainbow. Forty-four patients reported that the brightness of light changed during the operation. Five patients found their visual experience frightening. There was no correlation between those who found the experience frightening and the sex or age of patient, presence of coexisting ocular pathology, duration of operation, whether the operation was the first or second cataract operation in the patient, or the type of visual sensation experienced.**

Conclusion **Many patients undergoing cataract surgery under retrobulbar anaesthesia experience a variety of visual sensations that may be frightening in a small proportion of cases.**

Key words Cataract surgery, Regional anaesthesia, Vision, Visual sensation

A temporary reduction in visual acuity has been shown to occur with retrobulbar anaesthesia.[1–3] This is consistent with findings of a transient afferent pupillary defect and marked reduction of the visual evoked potential with this form of regional anaesthesia.[2–4]

Despite the effect of retrobulbar anaesthesia on the optic nerve, some function of the optic nerve is retained as evidenced by the not-infrequent remarks from patients that they could see with their operated eye during cataract surgery. This ability to see what is happening during surgery can be a cause of anxiety for both the patient and surgeon and has not been well studied.

We conducted a survey to investigate what subjective visual experience, if any, patients have during extracapsular cataract extraction and intraocular lens (ECCE/IOL) implantation under retrobulbar anaesthesia. We also sought to investigate whether this visual experience is frightening to some patients, and to identify any pre- or intraoperative factors that may be associated with those who found the experience frightening.

Patients and methods

Consecutive cataract patients who underwent routine ECCE/IOL implantation under retrobulbar anaesthesia were interviewed by the authors regarding their visual experience in the operated eye during surgery. This was done using a standard questionnaire while the patients were resting in the recovery room between half an hour to four hours after surgery. The patients were not informed of the interview pre-operatively and there was also no discussion with them on the possible intraoperative subjective visual sensation that

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they might experience. Patients who were unable to complete the questionnaire for any reason or who experienced major intraoperative complications were excluded from the study.

All patients received standard pre-operative medications, including oral diazepam 5 mg for sedation, and topical tropicamide 1% (Mydriacyl, Alcon, Fort Worth, TX) and phenylephrine 2.5% (Mydfrin, Alcon, Forth Worth, TX) for pupil dilation in the operated eye. Topical flurbiprofen sodium 0.03% (Ocufen, Allergen, Westport, Co. Mayo, Ireland) was also instilled pre-operatively for inhibition of intraoperative miosis. Topical proparacaine hydrochloride 0.5% (Alcaine, Alcon, Forth Worth, TX) was instilled into the eye before the dilating eyedrops were given.

A standardised technique for anaesthesia and akinesia was used in all cases. Each patient received a retrobulbar block and an O'Brien facial block on the side to be operated. The anaesthetic agent was lignocaine HCl 2% (Delta West, Bentley, Western Australia) with adrenaline 1:200 000 and hyaluronidase (Wydase, Wyeth Laboratories, PA) 7.5 units/ml of anaesthetic solution.

A standardised retrobulbar technique aiming for intraconal injection of the anaesthetic solution was used in all patients. The patients were instructed to open both eyes and direct gaze to the primary position. The injection was made through the skin at the junction of the lateral and middle thirds of the inferior orbital rim and between the globe and the inferior orbital rim. The needle was first advanced about 1.5–2.0 cm of its length parallel to the orbital floor and then directed superiorly towards the optic nerve and advanced another 1.5–2.0 cm. Aspiration was performed to rule out intravascular location and 2.5–3.0 ml of the anaesthetic solution was injected. After the needle was withdrawn, a 7.5 × 7.5 cm gauze pad was positioned over the closed eyelids and a Honan balloon was applied at a pressure of 30 mmHg for 5–10 min before surgery. Six millilitres of the anaesthetic solution was used for the O'Brien akinesia.

All surgeries were performed with the Carl Zeiss operating microscope. The cataract surgery was performed as follows: A Barraquer wire lid speculum was inserted and a superior rectus bridle suture was placed using a 4–0 black silk. A peritomy from the 9:30 to 2:30 o'clock position was performed. A partial-thickness corneoscleral incision was made at the posterior edge of the surgical limbus, 11 mm in length, with a no. 64 Beaver blade. The anterior chamber was entered by means of a 25 gauge needle. The needle was then fashioned into a cystotome using a Castroviejo needle holder. Can-opener anterior capsulotomy was performed under Balanced Salt Solution or a viscoelastic (Healon). The Beaver blade was used to enter the anterior chamber and the incision was extended with corneal scissors to the full extent of 11 mm. A Colibri microforceps was positioned at the 12:00 o'clock position on the posterior wound lip to depress it and a muscle hook was placed on the sclera over the ciliary body at the 6:00 o'clock position. With depression of the posterior wound lip and counter-pressure inferiorly, the lens nucleus was expressed. Cortical clean-up was achieved with a Simcoe irrigation-aspiration cannula. A one-piece polymethylmethacrylate posterior chamber intraocular lens (Cilco or Pharmacia) was then implanted. The final wound closure was achieved with seven interrupted 10–0 nylon sutures (Ethilon). Subconjunctival injection of gentamicin 20 mg, cephazolin 100 mg and dexamethasone 4 mg was given at the end of the operation. The eye was then patched.

Results

Of 103 consecutive cataract patients who underwent planned ECCE/IOL implantation under retrobulbar anaesthesia, 100 were included in the study. Two patients with severe deafness were excluded from the study because of difficulty in administering the questionnaire. A third patient was excluded because the surgery was complicated by intraoperative posterior capsule rupture and vitreous loss for which automated anterior vitrectomy was performed and an anterior chamber intraocular lens implanted.

There were 43 male and 57 female patients. Their mean age was 68.4 years (range 40–87 years). Their pre-operative best-corrected visual acuity ranged from 6/12 to perception of light. Eighty-four eyes had no other ocular pathology apart from cataract. The coexisting ocular pathology in the other 16 eyes was background diabetic retinopathy (5 eyes), myopic chorioretinal degeneration (2 eyes), glaucoma (2 eyes), macular drusen (2 eyes), corneal opacities (2 eyes), asteroid hyalosis (1 eye), retinitis pigmentosa (1 eye) and myelinated nerve fibres (1 eye).

Table 1. *Types of intraoperative visual sensation experienced by cataractous eyes without and with coexisting ocular pathology*

	Eyes wihout coexisting ocular pathology (n = 84)		Eyes with coexisting ocular pathology (n = 16)		
Types of visual sensation	No.	%	No.	%	p value[a]
Light	67	79.8	13	81.3	0.598
Colours	51	60.7	5	31.3	0.029
Movements	36	42.9	3	18.8	0.059
Flashes	31	36.9	5	31.3	0.449
Instruments	13	15.5	3	18.8	0.493
Surgeon's fingers or hands	9	10.7	1	6.3	0.500
Change in brightness of light	39	46.4	5	31.3	0.200

[a]Fisher's exact test, one-tailed.

Table 2. *Potential associated factors in patients who did and did not find the visual experience frightening*

Potential associated factors	Patients who found visual experience frightening (n = 5)	Patients who did not find visual experience frightening (n = 95)	p value
Sex			
Male	2	41	1.000[a]
Female	3	54	
History of cataract operation in fellow eye			
No	2	66	0.324[a]
Yes	3	29	
Coexisting ocular pathology			
Yes	4	80	1.000[a]
No	1	15	
Age (years), mean (SD)	67.4 (8.6)	68.5 (9.9)	0.816[b]
Duration of operation (min), mean (SD)	22.0 (7.6)	24.2 (8.9)	0.586[b]

[a]Fisher's exact test, two-tailed.
[b]Unpaired t-test.

Equal numbers (50) of operations were performed on the right and left eye. The operations were the patients' first cataract surgery in 68 cases, while 32 patients had had a previous cataract operation in their fellow eye. The mean duration of operation was 24.1 min (range 10–80 min).

Twenty patients had no perception of light with the operated eye during the entire surgery. Eighty patients saw at least some light during the operation. In addition, some patients reported that they could see one or more colours (56 patients), movements (39 patients), flashes of light (36 patients), surgical instruments (16 patients) and/or the surgeon's fingers or hands (10 patients).

The colours that were seen included red (29 patients), yellow (29 patients), green (12 patients), blue (11 patients) and orange (2 patients). Fifteen patients saw a spectrum of colours similar to that of the rainbow.

Forty-four patients reported that the brightness of light changed during surgery. The light fluctuated in brightness in 22 patients, became brighter in 20 patients and became dimmer in 2 patients during the course of the operation.

The types of intraoperative visual sensation experienced by eyes without and with coexisting ocular pathology were analysed separately (Table 1). Sixty-one per cent of eyes without coexisting ocular pathology experienced one or more colours, compared with 31.3% of those with coexisting ocular pathology. This difference is statistically significant (p = 0.029, Fisher's exact test, one-tailed). The differences in the proportions of eyes that reported seeing light, movements, flashes, surgical instruments, surgeon's fingers or hands, and change in brightness of light in the two groups were not statistically significant (Table 1).

Five patients found their visual experience frightening. There was no statistically significant correlation between those who found the experience frightening and the sex or age of patient, presence of coexisting ocular pathology, duration of operation, whether the operation was the first or second cataract operation in the patient (Table 2) or the type of visual sensation experienced (Table 3).

Table 3. *Types of visual sensation experienced by patients who did and did not find the visual experience frightening*

Type of visual sensation	Visual sensation experienced?	Patients who found visual experience frightening (n = 5)	Patients who did not find visual experience frightening (n = 95)	p value[a]
Light	Yes	5	75	0.319
	No	0	20	
Colours	Yes	5	51	0.051
	No	0	44	
Movements	Yes	4	35	0.074
	No	1	60	
Flashes	Yes	4	32	0.055
	No	1	63	
Instruments	Yes	1	15	0.590
	No	4	80	
Surgeon's fingers or hands	Yes	0	10	0.584
	No	5	85	
Change in brightness of light	Yes	4	40	0.115
	No	1	55	

[a]Fisher's exact test, one-tailed.

Discussion

The effect of regional anaesthesia on the subjective vision of patients has not been well studied. There is a common misconception amongst some ophthalmologists that retrobulbar or peribulbar anaesthesia blocks the optic nerve completely and results in no perception of light. Previous studies by Talks *et al*.[5] and Scott *et al*.,[6] however, have shown that only 25% and 22% of their series respectively had no perception of light following a peribulbar anaesthetic injection. This figure is comparable to the 20% of patients who experienced no light perception in our series following retrobulbar anaesthesia.

Two studies have reported the effect of retrobulbar anaesthesia on visual acuity.[1,2] Levin and O'Connor[2] reported that all 26 patients in their study who received a 4 ml retrobulbar injection of a 1:1 mixture of lignocaine 2% and bupivacaine 0.75% experienced a significant decrease in their visual acuity 10 min after the injection. All the patients had at least light perception. Nineteen (73.1%) said they could see the surgical instruments moving during surgery.

Brent and Singh[1] looked at 30 patients who received 2–3 ml of the same mixture of local anaesthetics as those in the series reported by Levin and O'Connor. They found the visual acuity decreased by a mean of 2.83 ± 2.32 lines on the Jaeger near chart 10 min after the injection. The visual acuity did not change in four eyes.

Murdoch and Sze[7] reported the first detailed study on subjective vision during cataract surgery. The majority of their patients had peribulbar anaesthesia while some had retrobulbar anaesthesia. They reported that 54 of 56 patients could see with their eye during surgery. They showed a significant association of total visual loss with retrobulbar anaesthesia.

We routinely give diazepam, a benzodiazepine, as a premedication to all our patients for its sedative effect unless there is contraindication to its use. The use of diazepam may have influenced the outcome of our study in several ways. Firstly, diazepam may reduce alertness and make patients less attentive to their environment, including their visual environment. Secondly, it may result in antegrade amnesia and affect the recall of visual experience during the interview. Thirdly, hallucination has been associated with the use of diazepam. However, this last effect is likely to be negligible in our patients because of the small dosage used. We therefore believe that the incidence of the various visual sensations reported by our patients could have been higher if they were not given diazepam pre-operatively. Despite this, a significant proportion of our patients reported experiencing a variety of visual sensations during surgery.

Our study on the subjective visual experience of patients during ECCE/IOL implantation under retrobulbar anaesthesia is the largest series in the English literature. To the best of our knowledge, it is the first report that some patients find the visual experience during surgery frightening. We believe that for those patients particularly concerned about what they can expect to see during surgery, a discussion on the possible intraoperative visual experience before cataract surgery may allay their fear during surgery.

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