

Retrobulbar versus subconjunctival anesthesia for cataract surgery

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Abstract

Objectives: To compare the effectiveness, in terms of pain relief and akinesia of retrobulbar and subconjunctival an aesthesia during cataract surgery and also to compare the degree of postoperative ptosis associated with each technique.

Materials and Methods: Consecutive adult patients undergoing cataract surgery between March and June 2008 at the Guinness Eye Center Onitsha, were randomized into retrobulbar and subconjunctival an aesthesia by simple random sampling. Patients' subjective perception of pain was graded into none, mild, moderate and severe; eyeball movement during surgery was graded into none, slight, moderate excessive. Two weeks after surgery, the palpebral fissure width was measured with the metre rule to determine the degree of post-operative ptosis.

Results: Of the 90 patients studied, 55 (61.1%) patients had subconjunctival an aesthesia while 35(38.9%) had retrobulbar injection. In the retrobulbar injection group 25 (71.4%) patients had none or mild pains compared to 44 (80.0%) in the subconjunctival injection group; while 10 (28.6%) patients in the retrobulbar group experienced moderate to severe pains, 11 (20%) patients in the subconjunctival group had moderate pains and none experienced severe pains. But the difference in the degree of pain perception between the 2 groups is not statistically significant ($\chi^2 = 0.01$; $df = 1$; $P > 0.05$). In the retrobulbar injection group, there was none or slight movement of the globe in 30 (85.7%) patients compared to 49 (89.1%) patients in the subconjunctival group. While 5 (14.3%) patients in the retrobulbar injection group had moderate globe movement, no patient in this group had excessive movement. In the subconjunctival injection group, 5 (9.1%) patients had moderate movement and 1 (1.8%) patient had excessive eyeball movement. The difference in the movement of the eyeball between the retrobulbar and the subconjunctival injections group was not significant ($\chi^2 = 0.004$; $df = 1$; $P > 0.05$). In the retrobulbar injection group, the palpebral fissure width was within ≥ 10 mm in 18 (51.0%) patients compared with 29 (53.0%) patients in the subconjunctival group. This difference was not statistically significant ($\chi^2 = 0.0006$; $df = 1$; $P > 0.05$).

Conclusions: Both retrobulbar and subconjunctival an aesthetic techniques are effective and safe for cataract surgery although the pain experience may be slightly more for patients being operated upon under retrobulbar anaesthesia.

Key words: Cataract surgery, an aesthesia, retrobulbar injection, subconjunctival injection

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Introduction

Cataract extraction is the most common intraocular surgery performed worldwide. To relieve pain on the patient during the procedure, cataract surgery could be performed with local or general anesthesia.^[1] However, cataract surgery is more commonly performed in adults under local anesthesia.

Advantages of local anesthesia are many and include ease of administration, no need for expensive equipment, safe even if patients have medical co-morbidity such as hypertension, diabetes, etc. The disadvantages include ocular motility, the need for additional sedation in apprehensive patients, needle

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stick injury to the globe and retrobulbar hemorrhage,^[2] increased intraorbital pressure,^[3] and post-operative diplopia due to hematoma formation and injury to the extraocular muscle.^[4]

Several techniques are employed in the administration of local anesthetics including retrobulbar, sub-Tenon, peribulbar, subconjunctival injections and topical drops.^[1-5] Each of these approaches has its merits and demerits. Topical drops may suffice in phacoemulsification. But retro-ocular and peribulbar injections are often required in wide incision cataract surgery. Wide incision extracapsular cataract extraction (ECCE) and manual sutureless cataract surgery (SICS) are the most common cataract surgical techniques practiced by ophthalmologists in Nigeria (Nwosu SNN. Survey of cataract surgery techniques in Nigeria. 34th Annual Scientific Conference of the Ophthalmological Society of Nigeria. Lagos: Sept 2009).

The main objective of the present study was to compare the effectiveness, in terms of pain relief and akinesia of retrobulbar and subconjunctival anesthesia during cataract surgery. The secondary objective was to compare the degree of postoperative ptosis associated with each technique.

Materials and Methods

Consecutive adult patients undergoing cataract surgery between March and June 2008 at the Guinness Eye Center Onitsha were randomized into retrobulbar and subconjunctival anesthesia by simple random sampling using the balloting technique.

Each patient had premedication with IM pentazocine 30 mg. The facial nerve was paralyzed with the injection of 3 ml 2% xylocaine plus 1:100,000 adrenaline using the Nadbath technique.^[1] For hypertensive patients, plain xylocaine (i.e. without adrenaline) was used for all the anesthetic injections including facial nerve block, retrobulbar, and subconjunctival injections.

For the retrobulbar injection the procedure was as follows:

- 3 ml 2% xylocaine plus 1:100,000 adrenaline (or plain xylocaine for hypertensive patients) was injected retrobulbarly transcutaneously entering the orbit at the junction of the lateral and middle third of the inferior orbital margin with the needle directed medially and posteriorly and staying as close to the orbital floor as possible using 22G needle. Ocular massage immediately following the injection was carried out for 3 min.

The procedure for subconjunctival injection was as follows:

- The lids were separated with speculum and 1 ml 2% xylocaine plus 1:100,000 adrenaline (or plain xylocaine for hypertensive patients) was injected in the pericorneal

conjunctiva in all quadrants using 25G needle.

The grading of patients' subjective perception of or reaction to pains was as follows:

- None: no complaint or movement during surgery
- Mild: Wincing requiring reassurance
- Moderate: crying but head/eyes steady; no additional medication
- Severe: restless; moving head away from operation field; rolling eyes; require additional medication.

Movement of the globe once conjunctival incision has started was graded as follows:

- None: no movement
- Slight: minimal oscillatory movement not disturbing instrumentation on the eyeball
- Moderator: rolling the eyeball that disturbs tissue handling but eye still within the operating field
- Severe: rolling the eyeball away from the operating field.

Two weeks after surgery, the palpebral fissure width was measured with the meter rule to determine the degree of ptosis. With the patient looking in the primary position (straight ahead position) and frontalis pressure maintained, the distance between the central upper lid margin and the central lower lid margin is recorded. None of the patients had ptosis preoperatively.

Results

Ninety patients (90 eyes), aged 18–85 years, were studied. Seventy-seven patients were aged ≥ 50 years, while 13 (14.4%) were aged ≤ 49 years [Table 1]. There were 52 (57.8%) males and 38 (42.2%) females. There was no difference in age ($\chi^2 = 0.01$; $df = 1$; $P > 0.05$) or gender ($\chi^2 = 0.007$; $df = 1$; $P > 0.05$) between the two groups.

Fifty-five (61.1%) patients had subconjunctival anesthesia, while 35 (38.9%) had retrobulbar injection. Table 2 shows the degree of perception of pain in the two groups. In the retrobulbar injection group 25 (71.4%) patients had none or mild pains compared to 44 (80.0%) in the subconjunctival injection group, while 10 (28.6%) patients in the retrobulbar group experienced moderate to severe pains, 11 (20%) patients in the subconjunctival group had moderate pains and none experienced severe pains. However the difference in the degree of pain perception (mild to no pains versus moderate to severe pains) between the two groups is not statistically significant ($\chi^2 = 0.01$; $df = 1$; $P > 0.05$).

Table 3 shows the extent of movement of the eyeball during surgery. In the retrobulbar injection group, there was none or slight movement of the globe in 30 (85.7%) patients compared to 49 (89.1%) patients in the subconjunctival group. While 5 (14.3%) patients in the retrobulbar injection

Table 1: Age distribution

Age (years)	No.	%
<20	1	1.1
20 – 29	3	3.3
30 – 39	5	5.6
40 – 49	4	4.4
50 – 59	16	17.8
60 – 69	29	32.3
70 – 79	20	22.2
80+	12	13.3
Total	90	100.0

$\chi^2 = 0.01$; $df = 1$; $P > 0.05$

Table 2: Degree of pain perception

Degree of pain	Retrolbulbar injection No. (%)	Subconjunctival injection No. (%)
None	20 (57.1)	34 (61.8)
Mild	5 (14.3)	10 (18.2)
Moderate	8 (22.9)	11 (20.0)
Severe	2 (5.7)	0 (0.0)
Total	35 (100.0)	55 (100.0)

$\chi^2 = 0.01$; $df = 1$; $P > 0.05$

group had moderate globe movement, no patient in this group had excessive movement. In the subconjunctival injection group, 5 (9.1%) patients had moderate movement and 1 (1.8%) patient had excessive eyeball movement. However the difference in the movement of the eyeball (mild to no movement versus moderate to excessive movement) between the retrolbulbar and the subconjunctival injections group were not significant ($\chi^2 = 0.004$; $df = 1$; $P > 0.05$).

Table 4 shows the palpebral fissure width 2 weeks after surgery as a measure of post-operative ptosis. In the retrolbulbar injection group, the palpebral fissure width was within ≥ 10 mm in 18 (51.0%) patients compared with 29 (53.0%) patients in the subconjunctival group. This difference was not statistically significant ($\chi^2 = 0.0006$; $df = 1$; $P > 0.05$).

Discussion

This study demonstrates that both retrolbulbar and subconjunctival anesthetic techniques are effective in achieving analgesia/akinesia during cataract surgery. However, patients who received retrolbulbar anesthesia tended to experience more pains although this is not statistically significant. It was also observed that while the subconjunctival injection commenced action almost immediately after injection the retrolbulbar technique was a bit slower. This difference in the time of onset of action may account for the slight difference in the pain experienced by the two groups. The surgeon may need to wait a little for the anesthetic to take effect after retrolbulbar anesthetic injection.

Table 3: Eyeball movement

Eyeball movement	Retrolbulbar injection No. (%)	Subconjunctival injection No. (%)
None	20 (57.1)	39 (70.9)
Slight	10 (28.6)	10 (18.2)
Moderate	5 (14.3)	4 (7.3)
Excess	0 (0.0)	2 (3.6)
Total	35 (100.0)	55 (100.0)

$\chi^2 = 0.004$; $df = 1$; $P > 0.05$

Table 4: Palpebral fissure width

Palpebral fissure width (mm)	Retrolbulbar injection No. (%)	Subconjunctival injection No. (%)
7	4 (11.4)	1 (1.8)
8	5 (14.3)	8 (14.5)
9	8 (22.9)	17 (30.9)
10	12 (34.3)	21 (38.2)
11	6 (17.1)	8 (14.5)
Total	35 (100.0)	55 (100.0)

$\chi^2 = 0.0006$; $df = 1$; $P > 0.05$

Other advantages of the subconjunctival technique we observed included the need for less anesthetic volume and the absence of the need for ocular massage. However, the drawbacks of the subconjunctival anesthesia included subconjunctival hemorrhage and chemosis which we observed to be common with this technique. The distension of the conjunctiva by the anesthetic volume endures throughout the surgery and may interfere with a clear operation field.

Although the palpebral fissure width was not measured pre-operatively, none of the patients had ptosis. Post-operatively patients that received retrolbulbar anesthetic injection tended to have more postoperative ptosis. This complication may be due to the prolonged effect of the drug on the ciliary ganglion. Ptosis has also been observed to complicate retrolbulbar alcohol injection.^[6] Post-operative ptosis has also been thought to be due to the disinsertion of the levator muscle tendon by the bridle suture.^[7] If this later mechanism is the sole cause one would expect an equal incidence of post-operative ptosis in both groups since bridle suture was used in all the patients.

In conclusion, our study has shown that both retrolbulbar and subconjunctival anesthetic techniques are effective and safe for cataract surgery although the pain experience is slightly more with the retrolbulbar group. Other differences, albeit statistically insignificant, were that while eye movement may occur more frequently in the subconjunctival group, post-operative ptosis was a little more in the retrolbulbar group.

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