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Research Article

Atracurium as an Adjunct to Local Anesthetic for Peribulbar Anesthesia in Cataract Surgery: A Controlled Randomized Clinical Study.

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Abstract

Background: Regional anesthesia is a preferred technique for ophthalmic surgery. **Objectives:** Using the peribulbar approach to perform cataract surgery, we aimed to determine if the addition of atracurium to a local anesthetic mixture affected the onset and duration of akinesia of the globe and eyelid. **Method:** 120 individuals scheduled for peribulbar block during cataract surgery participated in this prospective, randomized, double-blind investigation. Two groups were formed from the patients by random assignment. There is a control group (Group C) and an atracurium group (Group A). Six milliliters of a local anesthetic were used: two milliliters of 0.5% bupivacaine, one milliliter of 2% lidocainemixed with hyaluronidase (150U) two milliliters of 2% lidocaine, and one milliliter of 0.9% saline for the control group, and addong five milligrams of atracurium, at a dosage of 0.05 mg/kg, mixed with one milliliter of 0.9% saline, for the sytudy group l group. **Results:** Group A had substantially greater upward, downward, nasal, and temporal globe akinesia scores than group C did among the cases evaluated. When looking at the distribution of orbicularis function scores, group A had a substantially greater percentage of patients with a score of 2 (76.7%) compared to the control group (43.3%). Group A had a considerably greater percentage of instances (56.7%) when it came to the distribution of levator function scores compared to group C (46.7%). Group A had significantly higher patient satisfaction scores (P value<0.05) compared to group C. Group A patients reported far less pain than the control group at the end of the procedure, as well as 1 hour, 2 h, 6 h,and 24 hlater. **Conclusion:** Adding atracurium to local anesthetic showed superior outcomes in muscle akinesia , pain management and patient satisfaction.

Keywords: Cataract surgery; Peribulbar anesthesia; Atracurium.

Introduction

When it comes to eye surgeries, regional anesthetic is the way to go. It's an effective form of ocular anesthetic for eye procedures, and it's safe and cheap [(1)].

Because major problems including retrobulbar bleeding, globe perforation, and brain-stem anesthesia are less common with peribulbar blocks, they are considered safer than retrobulbar blocks [(2)].

A local anesthetic may not be able to reach the necessary sensory and motor nerves due to the intricate network of connective tissue membranes that divide the orbital space [(3)].

Among the topical anesthetics used for intracameral irrigations and cataract surgery, lidocaine is currently the most common. The unpreserved version has improved local tolerance and is available in concentrations ranging from 1% to 4%. The solution's pH is typically below 6, which makes instillation somewhat unpleasant. When applied to the cornea, the anesthetic takes longer to take effect than when using ester compounds [(4)].

When applied to the eye, lidocaine quickly passes through the cornea's epithelium and stroma, blocking the cornea's sodium channels. Because of this, even with unpreserved prepa-rations, there may be instances of transient stromal and epithelial swelling. Because lidocaine does not break down in the eye, it may numb the tissues in the anterior chamber for up to 20 minutes[5].

Supplements to intravenous numbing agents for eye procedures: The planned technique, required duration, and patient characteristics determine the appropriate selection of local and regional anesthetic for eye surgery. A combination of anesthetic treatments is typically necessary to produce best results [6] because the face has extensive redundancy of sensory innervation.

Insufficient analgesia or akinesia is provided by some blocks. In order to enhance the analgesia, akinesia, and duration of the anesthetic block, numerous adjuncts have been added to the local anesthetic fluid. Adjuvants that can be used to improve regional ophthalmic anesthetic include hyaluronidase, epinephrine, bicarbo-nates, muscle relaxants, opiates, and clonidine. So far, hyaluronidase has been the go-to ingredient for eye drops. Some research suggests that it may depolymerize and hydrolyze the glycose-minoglycan hyaluronan, which in turn increases tissue permeability and the spread of anesthesia [7].

As competitive acetylcholine (ACh) antagonists, non-depolaerized neuro-muscular blockers (nNMBs) attach themselves directly to the postsynaptic membrane's alpha subunits of nicotinic receptors. The usual process of impulse transmission from the main motor cortex to the motor endplates involves the release of acetylcholine from the presynaptic terminal, diffusion across the synaptic membrane, and binding to the postsynaptic membrane's nicotinic receptor. After connecting to the receptor, the sodium (Na+) channel domain opens, letting Na+ ions in and depolarizing the motor endplate from its resting membrane potential of -100 mV to a depolarized potential of +40 mV. In this metabolic process, nNMBs play a role by inhibiting ACh binding to the alpha subunits on nicotinic receptors, which in turn triggers the release of calcium ions (Ca2+) that help with muscle contraction.

preserving the motor endplate that is polarized. Patients going through perioperative procedures benefit from this metabolic process, which causes muscle paralysis [8].

There are a lot of research that detail how nNMBs affect peribulbar anesthesia. These investigations show that atracurium, when added to peribulbar anesthesia, enhances anesthesia quality and causes akinesia to start earlier with no side effects at all [9].

Patient and Method

El-Minia University Hospital was the site of this prospective, randomized, double-blind clinical trial, which ran from 2023 to 2024. Registration in the ClinicalTrials.gov database under the NCT06600945 ID and clearance from the El-Minia University faculty of medicine's ethical committee (ID: 610\2023) were both carried out.

In this study, 120 individuals, 20-80 years old, male and female, with ASA physical status I and II, who were scheduled to have elective cataract surgery (phacoemulsi-fication and intraocular lens implantation) were considered. Patients were not included if they: refused to participate in the study, had a history of fits, were taking medication known to interact with neuromuscular blocking drugs (such as aminoglycosides, tetracyclines, antiarrhy-thmic quinidine), had local sepsis, abnormal coagulation, or had high myopia (axial length greater than 30 mm or less than 21 mm).

Choosing at Random

The patients were randomly assigned to one of two groups, with 60 patients in each, and then placed in sealed envelopes according to the sample size requirements. Underwent a peribulbar block with 6 ml of local anesthetic (two milliliters of 0.5% bupivacaine and one milliliter of 2%

lidocaine combined with 150 U of hyaluronidase, two milliliters of 2% lidocaine, and one milliliter of 0.9% saline) as part of Group C (Control group).

The first group, known as the "Atracurium group," had a peribulbar block with a total of 6 milliliters of local anesthetic (2 milliliters of 0.5% bupivacaine and 1 milliliter of 2% lidocaine combined with hyaluronidase (150 U) + 2 milliliters of lidocaine 2% + 0.05 mg/kg atracurium (up to 5 mg) in 1 milliliter of 0.9 saline.

Methods: we made sure that every patient gave their written informed consent. The peribulbar block procedure will be carried out in the operating theater. A vein was inserted after local anesthesia was injected into the skin, and noninvasive blood pressure, a 5-lead electrocardiogram, and pulse oximetry were continuously monitored. Cushions are put under the pressure points to ensure the patients' comfort. Patients were instructed to assume the primary gaze position while lying on their backs with a little pillow under their heads. It was carefully avoided that any excess solution would flood the patient's eyes while the face was swabbed with the suitable cleansing solution. The patient was verbally accompanied at each stage of the block.

To implement the peribulbar strategy, a needle was inserted extraconally, or outside the muscular cone formed by the extraocular muscles, using the peribulbar two-point injection technique. (the areas above and below the eye's sockets) The anesthesiologist made a gentle upward movement of the eyeball by palpating the groove between it and the inferolateral orbital margin with one index finger. Using a small, disposable 25-gauge needle attached to a 5 ml syringe of local anesthetic, a single transcutaneous infero-temporal injection was administered with the needle's bevel facing the globe, tangential to the globe, and parallel to the orbit's floor. All the way down to 30 mm below the infraorbital line, the infero-temporal injection was administered. After doing an aspiration test, 6 cc of anesthetic mixture was administered over the course of 30 seconds. It was decided to discontinue injecting the research medicine in its intended volume as soon as the upper eyelid started to droop or the orbit got full. All injections were given slowly to ensure the patient's comfort and to promote the local anesthetic's diffusion throughout the orbit. The anesthetic is distributed and intraocular pressure is reduced by massaging and intermittently applying gentle pressure on a piece of gauze covering the eyelids after an orbital injection. One investigator worked on each block.

Evaluation Criteria

Akinesia and anesthesia, which comprise the block quality, were the principal outcomes.

• The grading system for evaluating lid akinesia: [10] and [11].

The assessment of eye movement was done using a three-point scale that took into account the direction of gaze (0-2); 0 indicates complete akinesia, 1 indicates partial movement in either or both eyelid margins, and 2 indicates normal movement in either or both eyelid margins. The orbicularis muscle was used for lid closure and squeezing, and the levator palpebrae muscle was used for lid opening. The patients were instructed to open their eyelids and then give them a maximal squeeze to see if they had lid akinesia.

• Globe akinesia evaluation: each of the four cardinal directions (upward, downward, nasal, and temporal) will be assessed using a three-point scale (0-2).

• The score for the orbicularis and levator functions [12].

0 indicates normal function, 1 indicates limited closure, and 2 indicates flickering or no closure in the orbicularis.

The levator function is as follows: 0 indicates no ptosis, 1 indicates partial ptosis, and 2 indicates complete ptosis.

• There are 3 points for extraocular motility[13]: 0 for conjugate movement, 1 for disconjugate movement, and 2 for no movement or flickering.

• A digital spear pressure score and a topical anesthetic sting rating system[12]: 0 for no sensation and 1 for a strong sensation.

• Corneal anesthesia score: evaluate the cornea at1,3,5,10,15, and 20 minutes following injection with a tiny piece of cotton wool [13].

The secondary outcomes included the following: the total time it took to complete the procedure from beginning to end (in minutes), hemodynamic data (including heart rate and mean arterial pressure), the time it took for the block to begin and terminate, the pain and analgesic scores after surgery, patient satisfaction, and the number of problems.

An ocular movement score of (1) or lower in every direction and an eyelid akinesia score of (0) will be recorded as the commencement of sensory and motor block, which is characterized as corneal anesthesia. By timing the start of discomfort and the return of eye movement, we can determine the duration of the sensory and motor block in minutes. Anaalgesia and pain score following surgery: The following is a verbal rating scale from 0 (no pain), 1 (mild pain), 2 (moderate pain), 3 (severe pain), and 4 (tormenting pain). After the procedure, you will be monitored for pain at 1-, 2-, 6-, and 24-hour intervals. A score of 2 or higher on the verbal evaluation will result in the administration of 500 mg of paracetamol tablets. We will keep track of the time it takes to start taking the analgesic and the total amount of medication needed in a day.

After the surgery, the patients were given a satisfaction survey to fill out. One of our study assistants, who will remain anonymous regarding the kind of anesthetic, assessed the patient's level of satisfaction by inquiring about the intensity of discomfort.

Local anesthetic injection risks include systemic issues such as dyspnea, broncho-spasm, seizures, decreased consciousness, allergies, weakness, respiratory distress, and intravascular injection. Local problems such as oedema of the eyelids or cornea, chemosis or hemorrhage of the conjun-ctiva, perforation of the globe, bleeding of the vitreous or orbit, etc.

Using G Power 3.1.92 software, we conducted a power analysis using an independent samples T test set to a significance level of 0.05 in order to determine the optimal sample size. A total of 120 samples were needed, with an allocation ratio of 1, thus 60 each group, with a significance level of 0.05 (type I error) and a power of 90%. An effect size of 0.26 was also determined.

I used SPSS 26 for Windows (SPSS Inc., Chicago, IL, USA) to compile, tabulate, and analyze all of the data. Using the Shapiro-Whitney U test, we made sure the data was normally distributed. The qualitative data was shown using relative percentages and frequencies. To determine the difference between the qualitative variables, the chi-square test ($\chi 2$) and Fisher exact were employed, as previously mentioned. The two groups were compared using a two-sample Student's t-test, and the quantitative data was presented as mean ± SD (Standard deviation). To compare the medians of two separate groups, we used non-parametric data provided as median and IQR and computed Mann-Whitney U-tests. To conduct pairwise comparisons, parametric data was subjected to the paired t-test, while nonparametric data was subjected to the Wilcoxon signed-rank test. Statistical significance was defined as a P-value below 0.05.

Results

A total of 120 patients were qualified and evaluated; they were randomized and allocated into two equal groups in (Fig. 1).

The two groups were comparable in age, sex, weight ASA classification and Time of operation (Table 1).

Regarding the comparison of preoperative MAP, HR, and Oxygen saturation during injection, after 5min, 10 min, 15 min, 20 min, 25 min, 30 min and postoperative between studied groups, the results were non-statistically significant (P value>0.05) (Table 2).

There was a significant difference between group A and group C regarding to the

percentage of patients delivered score 0 and score 1 lid akinesia as in (Figure 2). Regarding the comparison of globe akinesia score upward, downward, there was no significant difference between the two groups while as regard to the temporal and nasal between studied groups, the results were statistically significant (P value<0.05) (Table 3).

As regard to the orbicularis function and levator function score between studied groups, there was no significant difference between the group A and group C (P value<0.16 and 0.14) respectively. In addition, the distribution of orbicularis function score and levator function score among studied cases, there was higher percentage of cases in group A who had orbicularis function of score 2 (76.7%) than among cases of control group (43.3%) while as regard to levator function score it was (56.7%) in group A and (46.7%) in group C with no significant difference.
The results were statistically significant (P value<0.05) for the upward, downward, medial, and lateral comparison of EOM scores between the groups (Table 4).

When comparing the topical anesthetic sting scores and digital spear pressure between the groups the group A and group C showed non-statistically significant results (P values >0.99 and 0.13, respectively) (Fig. 2).

Regarding the comparison of EOM score upward, downward, medial, and lateral between studied groups, the results were statistically significant (P value<0.05). in addition,

For the percentage of the distribution of EOM score upward, downward, medial and lateral among studied cases, it was found that, there is significant higher percentage of score 2 among cases of group A than control.

Regarding the intergroup comparison of Corneal sensation score among studied cases at 1min, 3min, 5min, 10min, 15min and 20 minutes, the results were statistically significant (p value <0.05). Also, the intragroup comparison of corneal sensation score between different times interval for each group showed that, in group A, there was significant increase in corneal sensation score began after 5min till after 20 min compared to after 1 min (p value<0.05) while non- significant difference was found in corneal sensation score after 3min compared to after 1min (p value >0.05). For control group, there is significant increase in corneal sensation score began after 3min till after 20 min compared to after 1 min (p value<0.05) as (Table 5).

There was no discernible difference between groups A and C when comparing the onset and duration of motor and sensory block between the groups under study (Table 6).
The pain score among studied cases at the end of operation, after 1h, 2h, 6h and 24 hours, the results were statistically significant (p value <0.05) while there was no significant change in pain score was found till after 24 hours compared to the end of operation in both groups (Table 7).

When comparing the first analgesic and total paracetamol requirements of the groups under study, group A and group C did not differ significantly (Table 8).
By comparing the patient satisfaction scores of the groups under study, the findings were statistically significant (P value<0.05), with the median (IQR) for groups A and C being 4(4-5) and 3(3-3) respectively.

There were two occurrences of retinal detachment in group C and one case of floppy iris in group A, indicating that the results of the comparison of complications between the groups under study were not statistically significant (P value>0.05).

Table (1): Comparison between studied groups regarding baseline data.

	Group A (N=60)	Group C (N=60)	p value
Age (y) Mean ±SD. (Range)	60.2±9.6 (37-80)	61.1±9.9 (37-79)	0.11
Weight (kg)	85.9±8.1	84.3±8.1	0.84
Sex			
Male	22 (36.7%)	22 (36.7%)	
Female	38 (63.3%)	38 (63.3%)	0.15
ASA classification			
I	38 (63.3%)	36 (60%)	0.91
II	22 (36.7%)	24 (40%)	
Time of operation			
Mean ±SD.	25.1±2.8	25.7±2,9	0.97
Range	20-30	20-30	

Group A (atracurium group), Group C (control group), ASA (American society of anesthesiology). Values are presented as mean ± standard deviation (Mean ± SD) by t test, or number and percentage (n %) by Pearson chi-square.
*p is significant at <0.05.

Table (2): Comparison between studied groups regarding MAP and HR.

MAP	Group A	Group C	p value
	(N=60)	(N=60)	
Preoperative MAP	93±16.7	93.9±16.6	0.30
MAP during injection	92±16.1	92.8±12.5	0.31
After 5 min	92±16.7	92.9±16.5	0.34
After 10 min	90.4±16.6	91.3±15.5	0.36
After 15 min	89±16.1	90.1±16	0.51
After 20 min	88±19	89.1±16.3	0.81
After 25 min	88.6±15	89.5±17	0.86
After 30 min	91.2±16.5	91.9±17.7	0.29
Postoperative	90.3±16.5	89.2±17.4	0.43
HR			
Preoperative HR	81.3±10.2	82.7±9.9	0.65
HR during injection	84.3±10.2	84.9±10	0.72
After 5 min	82.5±10	83.87±9.9	0.65
After 10 min	83.5±10.5	84.7±9.8	0.66
After 15 min	79.9±10.3	80.8±9.9	0.68
After 20 min	81.2±10.2	82.6±9.4	0.75
After 25 min	79.7±11	81±9	0.57
After 30 min	80.3±11.5	80.8±9.8	0.45
Postoperative	80±10.5	81±10	0.61

Group A (atracurium group), Group C (control group), MAP (mean arterial pressure), HR (heart rate). Values are presented as mean ± standard deviation (Mean ± SD) by t test. *p is significant at <0.05.

Table (3): Comparison between studied groups regarding globe akinesia score.

	Group A (N=60)	Group C (N=60)	p value
globe akinesia upward. median (IQR)	1(0-1)	1(1-1)	0.89
globe akinesia downward. median (IQR)	1(0-1)	1(0-1)	0.22
globe akinesia nasal. median (IQR)	0(0-1)	1(1-1)	<0.001*
globe akinesia temporal. median (IQR)	0(0-1)	1(1-2)	<0.001*
globe akinesia upward % score 0	23(38.3%)	12(20%)	0.061
score 1	35(58.3%)	44(73.3%)	
score 2	2(3.3%)	4(6.7%)	
globe akinesia downward % score 0	18(30%)	16(26.7%)	<0.12
score 1	42(70%)	36(60%)	
score 2	0(0%)	8(13.3%)	
globe akinesia nasal % score 0	32(53.3%)	8(13.4%)	<0.001*
score 1	18(30%)	38(63.3%)	
score 2	10(16.7%)	14(23.3%)	
globe akinesia temporal % score 0	29(48.3%)	4(6.7%)	
score 1	26(36.7%)	34(56.7%)	<0.001*
score 2	4(8.3%)	22(36.7%)	

Group A (atracurium group), Group C (control group), Values are presented as median interquartile range (IQR). Data were analyzed by Mann–Whitney U-test number and percentage (n %) by Pearson chi-square. and $P < 0.05$ is considered significant.

Table (4): Comparison between studied groups regarding extra ocular motility.

	Group A (N=60)	Group C (N=60)	p value
EOM upward score median (IQR)	1(1-2)	1(0-1)	<0.001*
EOM downward score median (IQR)	1(1-2)	1(0-1)	<0.001*
EOM medial score median (IQR)	1(2-2)	1(0-1)	<0.001*
EOM lateral score median (IQR)	2(2-2)	1(0-1)	<0.001*
EOM upward score %			
score 0	12(20%)	20(33.3%)	<0.001*
score 1	20(33.3%)	36(60%)	
score 2	28(46.7%)	4(6.7%)	
EOM downward score %			
score 0	12(20%)	20(33.3%)	<0.001*
score 1	22(36.7%)	37(61.6%)	
score 2	26(43.3%)	3(5%)	
EOM medial score %			
score 0	8(13.3%)	22(36.7%)	<0.001*
score 1	16(26.7%)	29(48.3%)	
score 2	36(60%)	9(15%)	
EOM lateral score %			
score 0	2(3.3%)	18(30%)	<0.001*
score 1	12(20%)	32(53.3%)	
score 2	46(76.7%)	10(16.7%)	

Group A (atracurium group), Group C (control group), Values are presented as median interquartile range (IQR). Data were analyzed by Mann–Whitney U-test, number, and percentage (n %) by Pearson chi-square. and $P < 0.05$ is considered significant.

Table (5): Comparison between studied groups regarding corneal sensation score.

	Group A (N=60)	Group C (N=60)	p value
Corneal sensation 1 min median (IQR)	1(1-2)	0(0-1)	0.001*
Corneal sensation 3 min median (IQR)	1(1-2)	(1-1) #	0.001*
Corneal sensation 5 min median (IQR)	1.5(1-2) #	1(1-2) #	0.007*
Corneal sensation 10 min median (IQR)	2(2-2) #	1(1-2) #	0.001*
Corneal sensation 15 min median (IQR)	2(2-2) #	1.5(1-2) #	0.001*
Corneal sensation 20 min median (IQR)	2(2-2) #	1(1-2) #	0.001*
P value	<0.001*	<0.001*	

Group A (atracurium group), Group C (control group), Values are presented as median interquartile range (IQR). Data were analyzed by Mann–Whitney U-test. and $P < 0.05$ is considered significant. # significant difference with corneal sensation at 1 min.

Table (6): Comparison between studied groups regarding onset and duration of motor and sensory block.

	Group A (N=60)	Group C (N=60)	p value
Onset of motor block (min). mean± SD range	 2.38±0.88 1-4	 2.5±0.96 1-4	 0.84
Duration of motor block (min). mean± SD range	 181±58.9 120-360	 183.7±55.7 120-360	 0.98
Onset of sensory block (min). mean± SD range	 1.7±0.61 1-3	 2.06±0.77 1-3	 0.07
Duration of sensory block (min). mean± SD range	 179±68.5 60-360	 150±69.2 60-300	 0.34

Group A (atracurium group), Group C (control group). Values are presented as mean ± standard deviation (Mean ± SD) by t test. *p is significant at <0.05.

Table (7): Comparison between studied groups regarding pain score.

	Group A (N=60)	Group C (N=60)	p value
Pain score at end median (IQR)	0(0-1)	1(0-1)	0.006*
Pain score after 1h median (IQR)	0(0-1)	1(0-1)	<0.001*
Pain score after2h median (IQR)	0(0-1)	1(0-1)	<0.001*
Pain score after 6h median (IQR)	0(0-1)	1(0-1)	<0.001*
Pain score after 24h median (IQR)	0(0-1)	1(0-1)	<0.001*
P value	0.99	0.99	

Group A (atracurium group), Group C (control group), Values are presented as median interquartile range (IQR). Data were analyzed by Mann–Whitney U-test. and P < 0.05 is considered significant.

Table (8): Postoperative analgesia.

	Group A (N=60)	Group C (N=60)	p value
first analgesic requirement (min). mean± SD range	 176.8±68.7 60-360	 150±68.2 60-300	 0.40
total requirement of paracetamol (g) mean± SD range	 2.4±0.67 1-4	 2.7±0.57 2-4	 0.14

Group A (atracurium group), Group C (control group). Values are presented as mean ± standard deviation (Mean ± SD) by t test. *p is significant at <0.05.

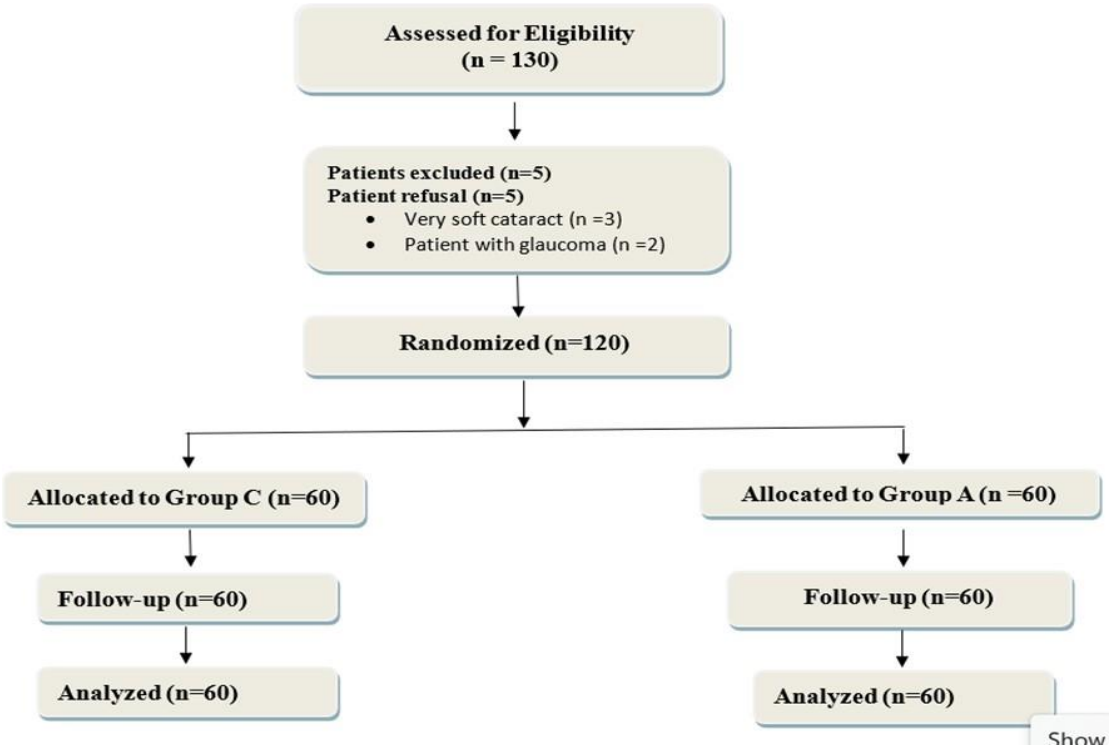

Fig. (1): Flow chart.

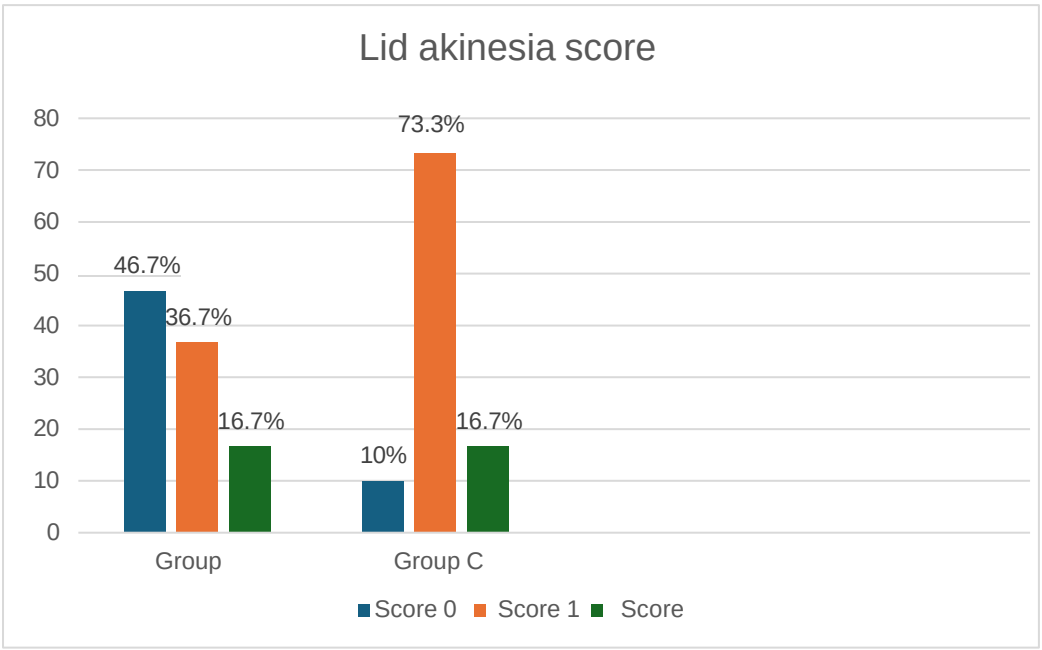

Fig. (2): Bar chart represent comparison between studied groups regarding lid akinesia score.

Group A (atracurium group), Group C (control group), Values are presented as percentage (n %) by Pearson chi- square. and $P < 0.05$ is considered significant.

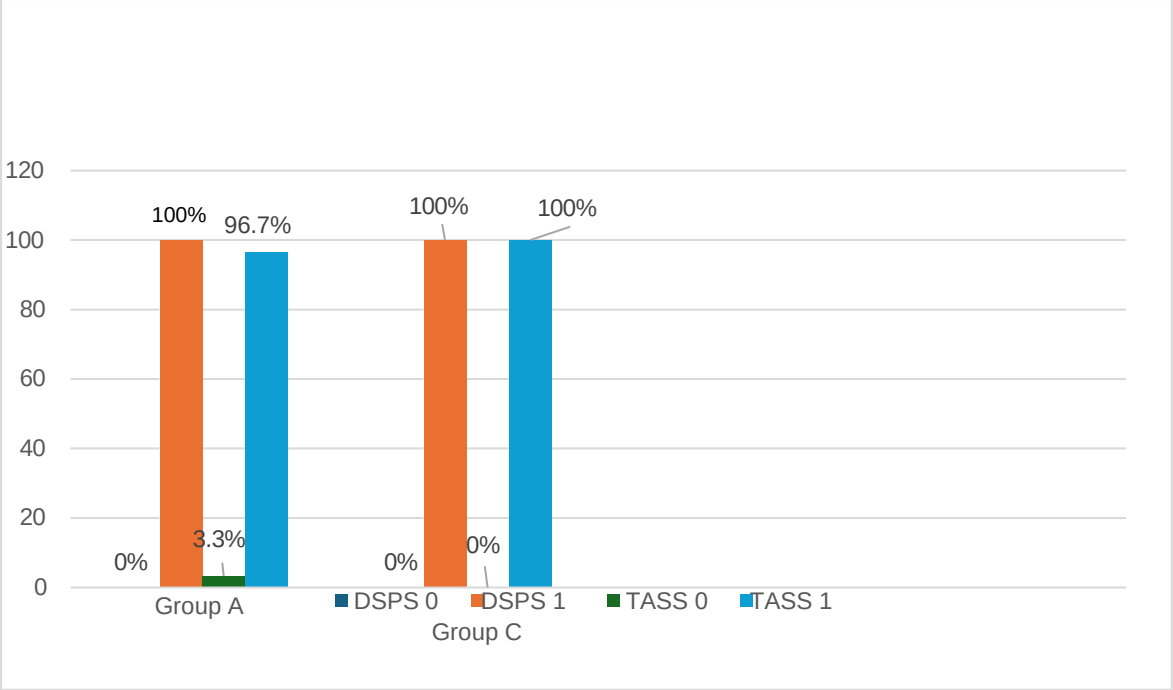

Fig. (3): Bar chart represent comparison between studied groups regarding Digital Spear Pressure Score (DSPS) and Topical Anesthetic Sting Score (TASS).

Group A (atracurium group), Group C (control group), Values are presented as percentage (n %) by Pearson chi-square. and P < 0.05 is considered significant.

Discussion

When it comes to intraocular surgery, local anesthetic is now more commonly used than general anesthesia. It is common practice to combine 2% lignocaine with 0.5% or 0.75 % bupivacaine to gain the advantages of both medications, such as bupivacaine's long-lasting effect and lignocaine's rapid-onset action and higher motor block [(14)].

It has been shown that atracurium, which are muscle relaxants, can improve peribul-bar anesthesia when added to a local anesthetic combination [(15)].

We discovered no statistically significant difference between the experimental and control groups. There was no statistically significant difference between the atracurium and control groups in terms of total akinesia, according to Godarzi et al., (2011), which sought to compare the effects of utilizing atracurium, cis-Atracurium, and a placebo as adjuvant agents to the local anesthetic substance on peribulbar-induced akinesia in cataract surgeries.

At 1 and 3 minutes, a significantly higher percentage of cases in the atracurium group had lid akinesia score 0 compared to cases in the control group, according to Elaraby et al., (2011) [(16)], who compared the effects of adding atracurium (5 mg) to the anesthetic mixture on akinesia of the eyelid and globe with respect to onset and duration in cataract surgery using sub-Tenon's technique. Thirty patients were divided evenly into two groups, with 5 ml of medicine each, based on random assignment.

We used 6 ml of local anesthetic, whereas he used 30 ml in his study. Another possible explanation could be that we used a different technique—subtenon in his—or that the numbers of patients in each group were different. Alternatively, it could be that his study used a different volume of local anesthetic.

Since all instances in every group had a digital spear pressure score of 1, our results demonstrated that there was no statistically significant difference with regard to this metric. Topical anesthetic sting score was another variable where the groups did not vary statistically.

Consistent with our findings, Raouf ramzy et al., (2019)[17] examined the effects of incorporating atracurium (5 mg) into a local anesthetic mixture on akinesia of the globe and eyelid in relation to the start and length of time after cataract surgery. They found no statistically significant difference in sensory function between the atracurium group (32 patients, 100%) and the control group (32 patients, 100%).

Consistent with Elgohary et al., (2019) [18], who found that patients in the atracurium group had a significantly higher median satisfaction score than those in the control group, our results demonstrated that patients in group A were more satisfied overall than those in group C.

We found no statistically significant difference in terms of complications between the groups under study in cataract surgeries when using atracurium or cisatracurium as an adjuvant to local anesthetic on peibulbar anesthesia, which is in line with El Gohary et al., (2019)[19]. One instance in group A had a floppy iris, while two cases in group C suffered retinal detachment.

Contrary to the findings of Zuhal Küçükyavuz et al., (2002) [20], we were unable to detect any effects of akinesia when low-dose atracurium was added to the local anesthetic combination.

One limitation of our study is that we do not have enough data to draw any firm conclusions regarding the use of these compounds in potentially laborious eye surgery.

The duration it took for total akinesia to start in group II (the atracurium group) was noticeably less than in group I (the control group) (P <.05).

Conclusion

As an adjuvant to local anesthetic for peribulbar anesthesia in cataract surgery, the atracurium group outperformed the control group across various parameters. This suggests that atracurium is more successful in regulating eye movement, orbicularis, and levator function. An increase in corneal sensation scores, a decrease in pain scores at different intervals, and an overall improvement in patient satisfaction with no adverse effects were all seen.

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