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Review Article

The effect of adding dexmedetomidine to local anesthetic mixture for peribulbar block in vitreoretinal surgeries

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KEYWORDS

Dexmedetomidine;
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Abstract *Purpose:* The purpose of this study was to compare the effect of adding different doses of dexmedetomidine to local anesthetic mixture for peribulbar block in vitreoretinal surgeries as regards duration, efficacy and pain relief.

Materials and methods: In this prospective randomized double blind clinical study, 160 patients were equally divided into four groups: *Group C* (*the control group*) ($n = 40$) received 10 ml mixture of lidocaine 2% and bupivacaine 0.5% with 120 IU of hyaluronidase, *group D*15 ($n = 40$) received a 10 ml mixture of lidocaine 2% and bupivacaine 0.5% with 120 IU of hyaluronidase + 15 μg dexmedetomidine, *group D*20 ($n = 40$) received a 10 ml mixture of lidocaine 2% and bupivacaine 0.5% with 120 IU of hyaluronidase + 20 μg dexmedetomidine *and group D*25 ($n = 40$) also received a 10 ml mixture of lidocaine 2% and bupivacaine 0.5% with 120 IU of hyaluronidase + 25 μg dexmedetomidine.

The onset of globe anesthesia and akinesia and their duration, the intraocular pressure (IOP), patient comfort and surgeon satisfaction were all assessed.

Data were analyzed and the results were presented as mean ±SD (Standard Deviation) and Ranges, number (%) and median (IQR) (Inter quartile range). Chi-square test ($x2$) was used to compare nonparametric variables. Comparison between groups was done using Analysis of Variance (ANOVA-One Way) as a parametric test and Kruskal Wallis Analysis of Variance by ranks as a nonparametric test. P values less than 0.05 ($p < 0.05$) was considered to be significant.

Results: The onset of globe anesthesia was shorter in dexmedetomidine groups in comparison with control group. The difference was statistically significant in group D25 and group D20 in comparison with the control group ($p > 0.05$). Regarding the duration of globe analgesia, adding dexmedetomidine to the local anesthetic mixture prolonged the duration of globe analgesia, and this difference was statistically significant in group D25 in comparison with the control group ($p > 0.05$). Regarding the duration of globe akinesia although there was prolongation of the

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duration of akinesia in all groups the difference was statistically significant only in group D25 when compared to the control group ($p > 0.05$). The Verbal Rating Score (VRS) during surgery didn't show any significant difference when comparing the dexmedetomidine groups (D15, D20 and D25) to the control group or when comparing the four groups to each other ($p < 0.05$).

Conclusions: Adding dexmedetomidine to a mixture of lidocaine 2% and bupivacaine in peribulbar block shortened sensory and motor block onset, extended the analgesia period and the motor block duration. It also significantly decreased the intraocular pressure and enabled better operating conditions. In this study, the addition of 25 μ dexmedetomidine to the local anesthetic mixture showed the best outcome.

Contents

1. Introduction

Patient comfort, safety and low complication rates are the essentials of local anesthesia in ophthalmic surgery. Vitreoretinal surgeries are known to be lengthy surgeries and painful especially during specific steps of the surgery.

Many adjuvants were tried before to help to improve the potency of the block and increase the duration of analgesia and akinesia intra- and post-operatively [1,2].

Dexmedetomidine was used before in neuroaxial blocks and regional blocks and proved to decrease the onset of anesthesia and akinesia and increase the duration of analgesia and akinesia in all these blocks [3].

In this study we tried small doses of dexmedetomidine as adjuvants with tight range increments in combination with the usual mixture of the local anesthetics used in peribulbar block (15 μg, 20 μg and 25 μg) comparing it with a control group to detect precisely which dose was the best.

2. Methods

After obtaining approval from The Ethics and Research Committee of the Research Institute of Ophthalmology, written informed consent was taken from 160 adult patients, scheduled for elective vitreoretinal surgery under local anesthesia, whom were included in this prospective double-blinded, randomized clinical trial. Inclusion criteria included patients with axial length 22–28 mm, and ages ranged between 40 and 80 years. Patients were ASA I-III. Method of randomization was closed envelope. These patients were randomly allocated into four equal groups:

Group C (*the control group*) ($n = 40$) received 10 ml mixture of lidocaine 2% and bupivacaine 0.5% with 120 IU of hyaluronidase.

*Group D*15 ($n = 40$) received a 10 ml mixture of lidocaine 2% and bupivacaine 0.5% with 120 IU of hyaluronidase + 15 μg dexmedetomidine.

*Group D*20 ($n = 40$) received a 10 ml mixture of lidocaine 2% and bupivacaine 0.5% with 120 IU of hyaluronidase + 20 μg dexmedetomidine.

*Group D*25 ($n = 40$) also received a 10 ml mixture of lidocaine 2% and bupivacaine 0.5% with 120 IU of hyaluronidase + 25 μg dexmedetomidine.

All patient received peribulbar block by an experienced anesthesiologist, and both patient and anesthesiologist were blinded to the drug mixture used.

Exclusion criteria included coagulation problems, communication problems, allergy to dexmedetomidine or local anesthetic, patients receiving adrenergic blockers or having heart block, high myopia (axial length more than 28 mm) and staphylomas.

On arrival to operating room, a vein was cannulated and the arterial blood pressure was measured with an automated oscillometer, 5 leads electrocardiography was connected and arterial oxygenation was measured by a pulse oximetry.

Each patient received 10 ml of the anesthetic mixture according to his/her group. The patient was asked to fix his eyes looking straight forward toward the ceiling while lying in a supine position. A 10 ml syringe with a 25G needle was used for the local anesthetic injection. After negative aspiration, the first 5 ml was slowly injected as lateral as possible the inferior orbital margin with the bevel directed toward the equator of the eye ball and the other 5 ml was given between the caruncle and the medial canthus.

Intermittent gentle massage was applied for 10 min. After satisfactory sensory and motor block, oxygen 3 L/min was delivered through a nasal cannula to the patient. Surgery was then allowed to proceed.

Premedication, topical anesthesia or sedation were *not given* at the time of the block or during the intraoperative period.

Ephedrine and atropine were available to be given whenever decreased mean arterial pressure (MAP) or heart rate more than 20% of the patient's baseline reading had occurred respectively, as a side effect to any systemic absorption of the dexmedetomidine.

Atropine 1 mg/ml, diluted with saline to a concentration of 0.1 mg/ml and given 0.01 mg/kg if bradycardia and ephedrine 30 mg/ml diluted with saline to a concentration of 3 mg/ml if hypotension.

Sedation levels: were monitored on a 4-point scale (0 = alert, 1 = drowsy, 2 = asleep but easily aroused, 3 = comatose) and were checked every 15 min during the procedure and every 30 min during the first two postoperative hours [1].

Verbal Rating Scale (*VRS*): Intraoperative pain was assessed every 30 min intervals from the onset of the surgical intervention till its end and postoperative pain was assessed every 2 h for 6 h after the operation by a 5-point VRS (0 = no pain, 1 = mild pain, 2 = moderate pain, 3 = severe pain and 4 = unbearable pain).

Patient was asked to rate pain whenever felt during surgery or in the postoperative period and express it in numbers corresponding to the VRS. Intraoperatively, if pain (VRS = 3 or 4) was reported, supplement local anesthetic mixture (2 ml lidocaine + 2 ml bupivacaine) will have been given by a medial canthal injection. Postoperatively, diclofenac intramuscular injection or intravenous infusion will be given once pain was reported.

Hemodynamic monitoring: The heart rate and MAP were assessed before the peribulbar block (Baseline reading), 15 min after injection and every 30 min during the surgery.

Complications and side effects: Local and systemic complications related to the technique and the drugs used were monitored.

Patient comfort: Intraoperative and postoperative patient comforts were assessed using 2 scale simple questionnaire (1 = comfortable, 0 = uncomfortable).

Surgeon satisfaction: Surgeons were asked about their convenience with the anesthesia during surgery using also a 2 scale simple questionnaire (1 = satisfied, 0 = unsatisfied).

2.1. Sample size calculation

Power analysis was performed using one way Analysis of Variance (ANOVA) on duration of sensory block because it was the main outcome variable in the present study. A previous study [3] showed that the standard deviation of duration of sensory block was about 57 min with a mean of 187 min. Based upon the assumption that adding dexmedetomidine to local anesthetic prolongs the duration of sensory block by 20% and taking power 0.8 and alpha error 0.05, a minimum sample size of 38 patients was calculated for each group. A total of patients in each group 40 were included to compensate for possible dropouts.

3. Results

One hundred and sixty adult patients who had undergone elective vitreoretinal eye surgery under peribulbar block were included in this study. These patients were divided randomly into four equal groups by closed envelopes, Groups D15, D20 and D25 who received 15, 20 and 25 μ dexmedetomidine adjuvant to peribulbar local anesthetic mixture respectively and a control group that received the local anesthetic mixture only. The demographic characteristics including age, gender and duration of surgery did not show any statistical significant difference between the four groups (Table 1).

Regarding the block characteristics

The onset of globe anesthesia, was shorter in dexmedetomidine groups in comparison with control group. The difference was statistically significant in group D25 and group D20 in comparison with the control group ($p > 0.05$) (Table 2).

Regarding the onset of globe akinesia, however adding dexmedetomidine to the block shortened the onset of globe akinesia in dexmedetomidine groups (Table 2).

The lid akinesia score showed no statistical significant difference in between groups when compared together or when compared to Group C. (Table 2).

Regarding the duration of globe analgesia, adding dexmedetomidine to the local anesthetic mixture prolonged the duration of globe analgesia (group D25 260 min, group

Table 1 Demographic characteristics, duration of surgery, surgeon's and patient's satisfaction.

	Group C ($N = 40$)	Group D15 ($N = 40$)	Group D20 ($N = 40$)	Group D25 ($N = 40$)	P value
Age years	44 ± 15.72	47 ± 12.90	50.7 ± 15.32	50.9 ± 12.70	0.556
Gender					
• Male *n* (%)	28 (70)	30 (75)	31 (77.3)	27 (68.2)	0.778
• Female *n* (%)	12 (30)	10 (25)	9 (22.7)	13 (31.8)	
Duration of surgery (min)	111 ± 30	110 ± 35	103 ± 40	122 ± 37	0.23
Surgeon's satisfaction					
• Satisfied *n* (%)	29 (72)	30 (75)	31 (77.3)	35 (87.5)	0.596
• Not satisfied *n* (%)	11 (28)	10 (25)	9 (22.7)	5 (12.5)	
Patient's comfort					
• Satisfied *n* (%)	35 (87.5)	37 (92.5)	38 (95)	38 (95)	0.4
• Non-satisfied *n* (%)	5 (12.5)	3 (7.5)	2 (5)	2 (5)	

Ordinal data are expressed as Mean ± SD, nominal data are expressed as frequencies (%). $P < 0.05$ is considered significant.

Table 2 Block characteristics.

	Group C ($N = 40$)	Group D15 ($N = 40$)	Group D20 ($N = 40$)	Group D25 ($N = 40$)	P value
Onset of anesthesia (min)	2.5 (2,3.7)	1.8 (1.5,3)	1.55 (1.3,2.8)*	1.3 (1.05,2.6)*	0.03
Onset of akinesia (min)	10.5 (9,12.3)	9 (8,11.1)	8.3 (6.5,10.8)	8 (6.3,10)	0.05
Duration of analgesia (min)	179 (107,197)	192 (122,221)	227 (154,247)	260 (178,284)*	0.01
Duration of akinesia (min)	122 (101,147)	149 (122,165)	150 (125,175)	170 (132,195)*	0.01
Lid Akinesia score					
• 1	25 (62.5%)	29 (72.5%)	29 (72.5%)	30 (75%)	0.39
• 2	12 (30%)	11 (27.5%)	10 (25%)	9 (22.5%)	
• 3	3 (7.5%)	0 (0%)	1 (2.5%)	1 (2.5%)	
Sedation level					
• 0 alert	40 (100%)	40 (100%)	40 (100%)	40 (100%)	1.00
• 1 drowsy	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
• 2 asleep	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
• 3 comatose	0 (0%)	0 (0%)	0 (0%)	0 (0%)	

Ordinal data expressed as median (IQR), while nominal data is expressed as frequency (%).
P value > 0.05 is considered significant.
* Denotes statistical significance compared to group C.

D20 227 min, group D15 192 min and the control group 179 min). This difference was statistically significant in group D25 in comparison with the control group ($p > 0.05$). However no statistical significant difference was detected when comparing group D20 or group D15 to the control group. Also, the comparison between the three dexmedetomidine groups showed no statistical significant difference (Table 2).

Regarding *the duration of globe akinesia,* although there was prolongation of the duration of akinesia in all groups (group D25 170 min, group D20 150 min, group D15 149 min and Group C 122 min) the difference was statistically significant only in group D25 when compared to the control group P value < 0.05. No significant difference was detected when comparing group D25 to D20 or D15 (Table 2).

Effect on intra-ocular pressure (IOP) in mmHg

Within the same group a statistically significant decrease in the IOP was detected when comparing IOP 5 min and 10 min in Group D25 to the baseline measurement (p value = 0.01), while no significant differences were detected when comparing the IOP5 min and 10 min to the baseline measurement in any other group (Groups C, D15 and D20). Also, a statistically significant decrease was detected when comparing IOP5 min and 10 min in Group D25 to the same readings in the Group C, while no significance was found comparing the same measurements in Groups D15 and D20 to Group C (Table 3).

Regarding the assessment of Pain Intra-and Post-operative: The VRS during surgery didn't show any significant difference when comparing the dexmedetomidine groups (D15, D20 and D25) to the control group or when comparing the four groups to each other ($p < 0.05$) (Tables 4 and 5).

There was no change in *the sedation level* after the peribulbar block and during the whole surgery in any of the four groups in comparison with the pre-block state (Table 2).

Regarding the hemodynamic monitoring (*the mean HR and MAP*), there was no significant difference within all groups

Table 3 Intra Ocular Pressure (IOP) in mmHg.

	Group C	Group D15	Group D20	Group D25	P value
IOP BL	16.05 ± 1.3	15.7 ± 1.22	15.35 ± 1.27	15.4 ± 1.53	0.3
IOP 5 min	14 ± 1.89	13.5 ± 2.08	13.1 ± 2.7	12.45 ± 2.08*,¶	0.01
IOP 10 min	12.89 ± 3.13	12.6 ± 2.04	11.95 ± 1.66	11 ± 1.64*,¶	0.01

Data are presented as Mean ± SD.
IOP: Intraocular pressure, BL: Baseline.
* Denotes significance compared to the same reading in group C.
¶ Denotes significance compared to the baseline reading in the same group.

Table 4 Intraoperative VRS.

	Group C	Group D15	Group D20	Group D25	P value
Starting Surgery	0 (0,0)	0 (0,0)	0 (0,0)	0 (0,0)	0.7
30 min	0 (0,0)	0 (0,0)	0 (0,0)	0 (0,0)	
60 min	0 (0,0)	0 (0,0)	0 (0,0)	0 (0,0)	
90 min	0 (0,1)	0 (0,1)	0 (0,1)	0 (0,0)	
120 min	0 (0,1)	0 (0,1)	0 (0,1)	0 (0,1)	

Ordinal data represented as median (IQR), VRS: Verbal Rating Scale.$P > 0.05$ is considered significant.

Table 5 Postoperative VRS.

	Group C	Group D15	Group D20	Group D25	*P* value
Immediate postoperative	0 (0, 1)	0 (0, 1)	0 (0, 1)	0 (0, 1)	0.2
1 h	0 (0, 0)	0 (0, 0)	0 (0, 1)	0 (0, 1)	
2 h	1 (0, 2)	0 (0, 0)	0 (0, 1)	0 (0, 1)	
4 h	1 (0, 2)	1 (0, 2)	1 (0, 2)	0 (0, 1)	
6 h	2 (1, 3)	2 (1, 3)	1 (0, 2)	1 (0, 2)	

Ordinal data represented as median (IQR), VRS: Verbal Rating Scale.*P* > 0.05 is considered significant.

Table 6 Mean HR (Beat/min).

	Group C	Group D15	Group D20	Group D25	*P* value
Baseline	76(±13)	88(±15)	78(±9)	72(±13)	0.7
15 min after injection	74(±13)	86(±15)	75(±9)	71(±14)	
30 min after onset of surgery	73(±13)	84(±15)	74(±9)	70(±13)	
60 min	72(±13)	84(±15)	73(±9)	72(±13)	
90 min	72(±13)	83(±15)	72(±9)	74(±13)	
120 min	71(±14)	82(±15)	70(±9)	75(±13)	

Ordinal data expressed as Mean ± SD. HR: Heat rate.
P value > 0.05 is considered significant.

Table 7 Mean MAP (mmHg).

	Group C	Group D15	Group D20	Group D25	*P* value
Baseline	99(±13)	103(±16)	80(±12)	96(±16)	0.6
15 min after injection	103(±13)	98(±16)	78(±12)	92(±16)	
30 min after onset of surgery	100(±13)	96(±16)	77(±12)	91(±15)	
60 min	97(±13)	92(±16)	77(±12)	93(±16)	
90 min	95(±13)	91(±15)	76(±12)	96(±16)	
120 min	94(±13)	93(±16)	76(±12)	98(±16)	

Ordinal data expressed as Mean ± SD. MAP: mean arterial pressure.*P* value > 0.05 is considered significant.

through this study or when comparing the dexmedetomidine groups to the control group (Table 6 and 7).

Regarding the patient's comfort, Thirty-seven (92.5%) patients in Group D15, 38 (95%) patients in Group D20, 38 (95%) patients in Group D25 and 35(87.5%) patients in Group C were comfortable during operation. (Table 1) *Surgeons were satisfied* in 30 patients (75%) in Group D15, 31 patients (77.3%) in Group D20, 35 patients (87.5%) in Group D25 and 29 patients (72%) in Group C (Table 1).

4. Discussion

The results of this study showed that addition of 25 μg dexmedetomidine to a mixture of lidocaine 2% and bupivacaine 0.5% to peribulbar block shortened the onset of sensory and motor block, increased the duration of postoperative analgesia, duration of akinesia and decreased the IOP in a statistically significant way. Peribulbar block is commonly used for vitreoretinal surgery in adult, but using only local anesthetics for peribulbar anesthesia is usually associated with delayed onset of globe akinesia and corneal anesthesia [4], short duration of analgesia and frequent need of block supplementation [5].

To decrease the time of onset of action and increase the duration of analgesia, many additives [6] such as adrenaline, sodium bicarbonate and clonidine were added to local anesthetics. Dexmedetomidine is centrally acting, highly specific α2 agonist, and the principal mechanism for the analgesic action is spinal, even though there is a clear evidence for both supraspinal and peripheral sites of action [7]. The exact mechanism by which α2 adrenergic receptor agonists produce analgesia and sedation is not fully understood but it is likely to be multifactorial [8]. Peripherally, α2-agonists reduce the release of norepinephrine and cause α2 receptor independent inhibitory effects on nerve fiber action potentials. Centrally, α2-agonists inhibit substance *P* in the nociceptive pathway at the level of the dorsal root neuron and activate α2 adrenoceptors in the locus coeruleus [8,9]. So, activation of the α2 receptors will inhibit the release of norepinephrine, terminating the propagation of pain signals. Postsynaptic activation of α2 adrenoceptors in the central nervous system inhibits the sympathetic activity and thus can decrease the blood pressure and HR [10].

Dexmedetomidine is widely used for sedation and analgesia during the entire perioperative period: as a premedication [11], an anesthetic adjunct for general and regional anesthesia [12], and as a postoperative sedative and analgesic [11–13].

This study was conducted to evaluate the effect of adding dexmedetomidine to LA mixture for peribulbar block in vitreoretinal surgeries, as a trial to decrease the volume of local

anesthetics used in the peribulbar block without affecting the block characteristics, as the larger the volume injected the higher the risks of increased IOP and intraorbital pressures and its risks (optic nerve compression, retinal artery occlusion and higher incidences of myopathies in extraocular muscle) [14–16].

In this study, one hundred and sixty patients were allocated in four equal groups (40 each), group C (control group), group D15 (15 μg added to the LA mixture), group D20 (20 μg added to the LA mixture) and group D25 (25 μg added to the LA mixture). In this study *the onset of corneal anesthesia* in group D25 was significantly shorter than in the control group ($p < 0.05$), whereas *the onset of globe akinesia* showed no statistical significant difference between group D25 and control group ($p > 0.05$). Also there was statistically significant decrease in the onset of analgesia between group D20 and control group ($p < 0.05$).

Channabasappa et al. [3] evaluated the effect of adding two different doses (25 μg and 50 μg) of dexmedetomidine to the lidocaine/bupivacaine mixture for peribulbar block in cataract surgeries. They reported that the onset of corneal anesthesia and globe akinesia was significantly shorter in group D50 than in the control group. In group D25, the onset of corneal anesthesia was significantly shorter than the control group but not the globe akinesia. These findings were coinciding with the results of this study regarding the onset of corneal anesthesia and globe akinesia in group D25.

Whereas in another study by Hala et al. [17], who studied the effect of adding two different doses of dexmedetomidine (25 μg and 50 μg) to levobupivacaine/hyaluronidase mixture and assessed their effects on the onset and duration of globe anesthesia and akinesia, they found out that the onset of corneal anesthesia and globe akinesia in group D25 was shorter than in the control group but the difference was not statistically significant [17].

In this study, the onset of corneal anesthesia in group D15 and the onset of globe akinesia in group D15 and D20 showed no statistically significant difference in comparison with the control group ($p > 0.05$). The use of α2 agonists as adjuvants to local anesthetics in ophthalmic regional blocks was started with the use of clonidine.

Madan et al. [18], compared the effect of clonidine added to lidocaine/hyaluronidase mixture in peribulbar block in three different doses (0.5 μg/kg, 1 μg/kg and 1.5 μg/kg) at the onset and duration of globe anesthesia and akinesia. They found that there was no statistically significant difference in between the three groups or when comparing each group to the control group regarding the onset of globe anesthesia or akinesia.

Reem et al. [19] compared the two α2 agonists (clonidine versus dexmedetomidine) in peribulbar block. They studied two groups of patients: one group received a mixture of lidocaine/bupivacaine/1 μg/kg clonidine and the other received lidocaine/bupivacaine/1 μg/kg dexmedetomidine. There was no statistical significance between the two groups regarding the onset of globe anesthesia and akinesia.

Regarding the lid akinesia score in this study, there was no statistically significant difference between the four groups (control group, D15, D20 and D25) ($p > 0.05$). *Regarding the duration of analgesia*, in this study there was a statistical significant difference between group D25 and the control group ($p < 0.05$) whereas there was no significant difference between groups D15, D20 and the control group. These findings were similar to the results in Hala et al's [17] study where time to first rescue analgesia in their study was significantly longer in patients receiving 50 μg and 25 μg dexmedetomidine added the levobupivacaine/hyaluronidase mixture compared to patients receiving the anesthetic mixture alone. Channabasappa et al. [3] also found statistically significant longer duration of analgesia in patients receiving 50 μg and 25 μg dexmedetomidine added to lidocaine/bupivacaine mixture compared with the patients who received mixture of only local anesthetics. In this study, *the duration of akinesia* showed a statistical significant difference between group D25 and the control group ($p < 0.05$). On the other hand, there was no significant difference between groups D15 and D20 and the control group ($p > 0.05$) or in between the dexmedetomidine groups. Similarly, Hala et al. [17] and Channabasappa et al. [3] found out that patients who received 25 μg dexmedetomidine added to their anesthetic mixture used in the peribulbar block, showed a statistically significant increase in the duration of akinesia compared to the group of patients who received only the local anesthetic mixture. In this study, the duration of akinesia in group D25 was 170 min (112,195) whereas in the study by Channabasappa et al. [3] the duration in group D25 was 193 min ± 27.69 and in the study by Hala et al. [17] in group D25 was 197 min ± 25.95. The explanation of this difference between the three studies regarding the duration of akinesia, lies in the component of the anesthetic mixture used in each study. In this study lidocaine/bupivacaine/hyaluronidase mixture was used whereas Hala et al. [17] used levobupivacaine/hyaluronidase only so they replaced the short duration lidocaine volume with levobupivacaine while in the study by Channabasappa et al. [3] they used lidocaine/bupivacaine only without hyaluronidase, so the spread of the local anesthetics needed more time. But these clinically significant differences were not noticed regarding the duration of analgesia.

Also, Madan et al's [18] study found that the duration of globe analgesia and akinesia was significantly prolonged in patients receiving 1.0 and 1.5 μg/kg clonidine with lidocaine/hyaluronidase mixture when compared to the patients who received the lidocaine/hyaluronidase mixture alone. In Reem et al's [19] study, the duration of globe analgesia and globe akinesia showed a statistically significant increase in both groups of study (the clonidine group and dexmedetomidine group) in comparison with the control group.

Regarding the IOP, the addition of dexmedetomidine to the local anesthetic mixture in group D25 showed a statistically significant decrease in the IOP 5 min and 10 min after the injection of the local anesthetic mixture when comparing to the baseline measurement of the same group (12.45 ± 2.08, 11 ± 1.64 and 15.4 ± 1.53 respectively) ($p < 0.05$). Also significant decrease was detected when comparing IOP 5 min and 10 min in Group D25 to the same readings in Group C (12.45 ± 2.08, 11 ± 1.64 and 14 ± 1.89, 12.89 ± 3.13 respectively) ($p < 0.05$), while no significant differences were detected when comparing the IOP5 min and 10 min to the baseline measurement in any other group (Groups C, D15 and D20) nor when comparing the same readings in Group D15 and Group D20 to Group C. These results were correlating with those of Hala et al. [17] and Channabasappa et al. [3] where they found that the addition of dexmedetomidine to LA mixture (groups D25 and D50) caused a statistically significant decrease in IOP compared to control group at 1, 5, and 10 min

after injection. In the study by Reem et al. [19], there was a significant difference between the clonidine group and the dexmedetomidine group regarding the IOP measurements 5 min and 10 min after injection.

5. Conclusions

Adding dexmedetomidine to a mixture of lidocaine 2% and bupivacaine in peribulbar block shortened sensory and motor block onset, and extended the analgesia period and the motor block duration. It also significantly decreased the intraocular pressure and enabled better operation conditions. In this study, the addition of 25 μ dexmedetomidine to the local anesthetic mixture showed the best outcome.

Conflict of interest

None declared.

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