

Use of Clonidine in Peribulbar Block in Patients Undergoing Cataract Surgery

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Abstract: The present study was done to evaluate the effect of addition of Clonidine to local anesthetic mixture of Mepivacaine and Hyaluronidase on IOP, onset and duration of peribulbar block. Methods: A randomized double-blind, placebo-controlled study. The study comprised two groups of 12 patients each. Group A (control group received 8 ml of a mixture of Mepivacaine and Hyaluronidase with 1 ml of normal saline, while group B (Clonidine group) received 1.5 µg/kg added to the above mixture. Onset and duration of lid akinesia, globe anesthesia and akinesia were assessed. IOP was measured 5 minutes before local anesthesia injection and 1, 5, 10 minutes after local anesthesia injection. We found that addition of Clonidine to local anesthetic mixture resulted in significant increase in the duration of lid akinesia, globe anesthesia and globe akinesia. It was also found that Clonidine decreases the IOP significantly at 5, 10 minutes after injection. The onset time was similar in both groups. Conclusion: we found that addition of Clonidine 1.5 µg/kg to local anesthetic mixture significantly increases the duration of anesthesia, decreases the IOP after peribulbar block.

Key words: Clonidine, peribulbar block, cataract surgery, IOP.

INTRODUCTION

Clonidine is a centrally active α_2 agonist, was introduced as an antihypertensive. It has been used in ophthalmic anesthesia several years ago. Mjehed *et al.*(1996) found that its addition in retrobulbar block has several advantages: it decreases IOP, enhances anesthesia and akinesia and increases intraoperative sedation. However, Connelly and colleagues(Connelly, N.R., 1999) added Clonidine to local anesthetic in peribulbar blocks and they didn't find any effect of it on IOP, onset time and postoperative analgesic requirements. They did not comment on the quality, duration of peribulbar block. In this study, the effect of addition of Clonidine to Mepivacaine-Hyaluronidase mixture on IOP, onset, duration of anesthesia and analgesia after peribulbar block for cataract surgery was evaluated.

Design: A randomized double-blind, placebo-controlled study.

MATERIALS AND METHODS

After receiving institutional approval, informed consent was obtained from 24 patients who were undergoing elective cataract extraction surgery. The patients selected in this study were ASA physical status I and II. Those who were receiving chronic Clonidine or analgesic therapy were excluded. Premedication, topical anesthesia or sedation was not given at the time of the block or during the intraoperative period.

The patients were randomly divided into 2 group (n = 12) receiving either Mepivacaine 3% plus 1 ml normal saline or supplemented with Clonidine 1.5 µg/kg in 1ml saline (total 8 ml). Hyaluronidase 75 IU was added to both solution. Each patient received 8 ml of Mepivacaine 3%- Hyaluronidase solution with either saline or Clonidine. First 5 ml was injected at the junction of the lateral one third and medial two thirds of the inferior orbital margin with the bevel directed towards the equator of the eye ball and the other 3 ml was given 2 mm medial and inferior to the supraorbital notch. The block was performed by a 26-gauge 13 mm needle. Gentle massage was applied for 10 minutes. Patients were assessed for the ocular sensations (globe anesthesia) and the movement of eyelid (lid akinesia) and ocular muscles (globe akinesia) at 30-second intervals until the block was adequate for surgery and then every 15 minutes until recovery.

A scoring system that mentioned by Dopfimer *et al.*(1996) was used and subsequently by Nicoll *et al.*(1986) on a 3 point scale from 0 to 2 (0 = no movement, 1 = reduced movement and 2 = normal

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movement). Scoring was done by an independent trained observer who was blinded to the anesthetic mixture used. The ocular movements were scored in each direction of gaze (superior, inferior, medial and lateral) with a maximum score of 2 points for each direction with a possible maximum total of 8 points. In the absence of complete akinesia in any direction after 10 minutes, supplementary anesthesia was provided with a further injection of 2-4 ml of the test solution in the same manner as given before. For assessment of lid akinesia the patients were asked to open their eye lids and then squeeze them together maximally. It was recorded as grade 1 if there was no apposition of lids on attempted closure, mild apposition of lid margins was taken as grade 2, and the appearance of wrinkles of outer canthus was grade 3.

Intraocular pressure was measured 5 minutes before injection of local anesthetic at the baseline. Tetracaine eye drops were given before measurements to comfortably allow IOP measurement. The other readings were 1, 5, 10 minutes after injection of local anesthetics. It was done using Schiotz tonometer.

The duration of anesthesia and akinesia was assessed by the occurrence of pain and the recovery of ocular and eyelid movements. Sedation levels were monitored on a 4-point scale (0 = alert, 1 = drowsy, 2 = asleep but easily aroused, 3 = comatose) were checked every 15 minutes during the procedure and every 30 minutes during the first two postoperative hours.

Statistical Analysis:

Patients’ characteristics, duration of surgery, onset and duration of anesthesia and analgesia, hemodynamic variables and IOP measurements were analysed by Student’s t-test between groups. For inter-group comparison of ocular motility score, Wilcoxon rank-sum (Mann-Whitney) test was used. Friedman-two way analysis of variance (non parametric) with multiple range test and Bonferroni correction was used for within-group comparison of sedation score. A value of $p < 0.05$ was considered significant.

Results:

The demographic data, duration of surgery and the number of patients requiring supplementary injection to achieve perfect akinesia were comparable among the two groups (Table 1).

There was no significant difference between the two groups regarding the onset times of lid akinesia, globe anesthesia and globe akinesia ($p > 0.05$). The duration of globe anesthesia and globe akinesia in Clonidine group was significantly greater ($p < 0.05$) than in control group. The duration of lid akinesia in the clonidine group was also highly significant than in control group ($p < 0.001$) (Table 2).

The measurement of IOP is less in the Clonidine group but the IOP variation was clinically significant $p < 0.05$ in P5 and P10 (Table 3 and Fig. 1).

The patients in Clonidine group were significantly sedated 60-90 minutes after the block (4 patients had grade 1 sedation and one had grade 2 sedation) as compared to the control group (all are awake).

Table 1: Demographic data, Duration of Surgery and Subjects requiring supplemental block.

Variable	Group A	Group B
Age	52.8±17.4	62.4±13.8
Weight	63.7±15.9	59.3±19.4
Sex (M/F)	9/3	7/5
ASA Physical Status (I/II)	10/2	9/3
Duration of Surgery (min.)	75±17	74±12
No. of patients requiring supplemental injection	4	3

Values are expressed as mean±SD. There were no statistically significant differences.

Group A = Mepivacaine only; Group B = Mepivacaine + Clonidine; n = 12 in each group, Hyaluronidase was added to both groups.

Table 2: Onset and duration of block (mean±SD)

Variable	Group A	Group B
Onset time(s):		
Globe anesthesia	34.7±10.8	27.7±11.3
Lid akinesia	65.2±26	45.8±18
Globe akinesia	195.1±98.8	141.7±30.3
Duration of block (min.)		
Globe anesthesia	66.9±10.6	83.4±26.8*
Lid akinesia	89.1±29.3	180.8±40.4**
Globe akinesia	165±28	205.8±52.6*

Group A = Mepivacaine only, Group B = Mepivacaine + Clonidine; n = 12 in each group, Hyaluronidase was added to both groups.; $p > 0.05$ not significant; * $p < 0.05$ significant; ** $p < 0.001$ highly significant.

Table 3: Measurement of intraocular pressure (IOP)

Variable	Group A	Group B
P0	15.8±5.1	14.5±3.9
P1	18.2±6.8	16±4.4
P5	14.5±5	9.8±3.6*
P10	13.1±5.0	7.6±3.8*

P0 measurement of IOP 5 minutes before local anesthesia

P1 measurement of IOP 1 minute after local anesthesia

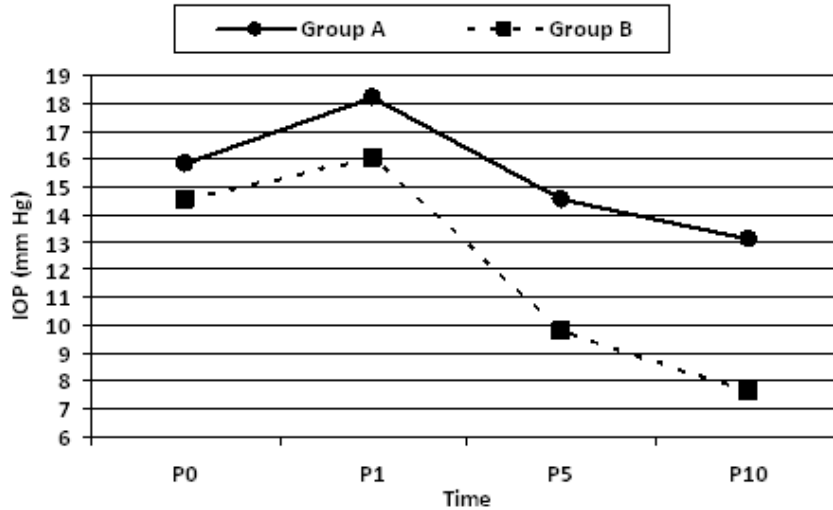
P5 measurement of IOP 5 minutes after local anesthesia

P10 measurement of IOP 10 minutes after local anesthesia

Group A = Mepivacaine only, Group B = Mepivacaine + Clonidine,

n = 12 in each group, Hyaluronidase was added to both groups.

*p < 0.05 significant.



Group A = Mepivacaine only, Group B = Mepivacaine + Clonidine,

P0: IOP 5 minutes before local injection

P1: IOP 1 minute after local injection

P5: IOP 5 minutes after local injection

P10: IOP 10 minutes after local injection

Fig. 1: Graphical presentation of IOP changes.

Discussion:

Mepivacaine has been used for more than 30 years, including ophthalmic procedures (Wood, 1990; Sanders, 1990 and Schneider, 1989). It has a low pKa responsible for a quick onset of block, and it spreads readily through tissues. This is useful in eye blocks because the target-structures are nerves dispersed throughout the corpus adiposum of the orbit (Wong, 1991). In fact, the benefit from Mepivacaine was of limited interest. Clonidine is a centrally active $\alpha 2$ agonist. It has been used as an additive to general and local anesthesia because of its analgesic, anxiolytic and sedative properties (Maze, 1991). There is a significant decrease in the intraocular pressure in the Clonidine group in our study. Mjahed *et al.*(1997) found the same result when added Clonidine to Lidocaine in cataract surgery done by retrobulbar block.

The mechanism of lowering IOP may be: vasoconstriction of efferent arteries of the ciliary process by alpha receptor stimulation and an increase in aqueous drainage secondary to a decrease in sympathetic vascular tone (Ahmad, 1993 and Gross, 1997). However, the results of Connelly and colleagues about the IOP were that there is a slight non-significant decrease in the IOP in both groups and the Clonidine did not alter the IOP, the volume they injected was 8 ml injectate volume in peribulbar which was the same of our value. The difference in our results in comparison to Connelly *et al.* may be due to difference in doses of Clonidine that we used nearly 100-135 μ g Clonidine But the dose used by Connelly was 100 μ g.

The study within hand indicates that Clonidine has no effect on the onset time of peribulbar block. In retrobulbar block, the decrease in onset is due to direct action of Clonidine on the nerve both locally and centrally (Mjahed, 1996). It was also found that there is a prolongation of anesthesia and analgesia with Clonidine group. The mechanism may be because of Clonidine's blocking conduction of C fibers and

increasing potassium conductance in isolated neurons. In spite that Mepivacaine is more potent local anesthetic than Lidocaine but it could not mask the effect of Clonidine in prolonging the duration of anesthesia and analgesia. In 2001 the results of Rashmi *et al.*(2001) also have shown that Clonidine enhances the duration of anesthesia and analgesia of Lidocaine after peribulbar block in 1µg/kg dose.

The present study suggests that addition of Clonidine 1.5 µg/kg to the local anesthetic mixture of Mepivacaine and Hyaluronidase significantly decreases the IOP and significantly increases the duration of peribulbar block and improves the analgesic duration.

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