

Addition of Dexmedetomidine to Local Anaesthesia for Retrobulbar Block: Does It Improve The Quality of Anaesthesia?

Research Article

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Abstract

Background: We evaluate addition of dexmedetomidine to local anesthesia in retrobulbar block in patient underwent primary retinal detachment surgery.

Methods: Sixty patients were randomly allocated into two equal groups (n=30). In both retrobulbar block was performed. In addition, group B received dexmedetomidine 1µg/kg with local anesthesia. Motor kinesis, motor and sensory block duration, postoperative pain was assessed by visual analog scale time and first demand for analgesia were recorded. Also degree of sedation evaluated during surgery.

Results: In group B with addition of dexmedetomidine the number of patient who developed akinesia more and requirement of supplementary injection were lowered. Also duration motor and sensory block was longer and requirement for postoperative analgesic were significantly less with mean sedation scores were higher in patients receiving dexmedetomidine with local anesthesia.

Conclusion: We are concluded that addition of dexmedetomidine to local anesthesia will improve the quality of block, increase the duration of block, prolong the duration of postoperative analgesia and decrease requirements for postoperative analgesic without side effects.

KeyWords: Dexmedetomidine; Retrobulbar block; Lidocaine.

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Introduction

Retrobulbar block involves disposition of local anesthetic inside muscle cone. It aim to block the ciliary nerves, the ciliary ganglion and cranial nerves II, III and VI. Cranial nerve IV not affected since it lies outside the muscle cone [1]. The characteristics of patients for vitreoretinal surgery, most of them elderly and associated with diseases such as diabetes mellitus and cardiac problems, make L.A. advisable to reduce risks and morbidity. Retinal detachment surgery associated with high incidence of postoperative pain as a result inactivation of ocular muscle and sclera and or increase intraocular pressure from expansion if gas bubble or tight bucking or encirclement [2, 3].

For many ophthalmic surgeons, LA has become more preferred over general anesthesia (GA) owing to quicker patient rehabilitation, avoidance of probable complications from GA and better analgesic properties postoperatively [4]. Dexmedetomidine is a potent highly selective and specific α_2 adrenoreceptor agonist that has both sedative and analgesic effects with no respiratory depression. In addition it possesses sympatholytic and antinociceptive effects that allow hemodynamic stability during surgical stimulation [5, 6]. Compared with clonidine, dexmedetomidine is about eight times more specific for α_2 : α_1 selectively ratio of 1600:1 [7]. We designed this study to evaluate the effect of addition of dexmedetomidine to LA for retrobulbar block and does it improve quality of block or not?

Patient and Methods

After the approval of the study by ethical committee and informed consent from patients, 60 patients of ASA (American Society of Anesthesiologists) Grade I – III between the ages of 46 and 72 years were enrolled in this study that underwent for primary retinal detachment surgery.

The patient with hematological disease, bleeding or coagulation abnormalities, psychiatric diseases, history of allergy to use drug were excluded from study. All operations were performed by the same experienced surgeon.

Patients were randomly allocated to one of the following, two equal groups (N=30 in each group).

All patients received retrobulbar block injected at junction of lateral one third and medial two thirds of infra-orbital rim, using a

24 G disposable 35mm needle. The injection consisted of a 60:40 mixture of 2% Lidocaine and 0.5% Bupivacaine with 10 I.U. / ml of Hyaluronidase, while patients in group B received 1µg/Kg mixed with local anesthesia. The drug syringes were prepared by anesthesia technician, who unaware of proceeding.

After negative aspiration 5-7ml of the local anesthesia solution was slowly injected until a complete drop and fullness of upper eyelid. To decrease intra-ocular pressure, mechanical orbital compression applied for 10 min. in all patients by using Honan ballon, adjusted to 30mmHg. Patients were evaluated for motor akinesia from Grade 0-2; Zero if there was free movement, one if there was a partial movement and 2 if there was no movement. This was done for each of four recti, levator superiors and orbicularis oculi muscles.

The maximum score was 12 indicates total akinesia. An eye with a score less than 8, received a repeat 3ml injection of the same anesthetic mixture and recorded. No intra-ocular local supplementation was used in any patient. A nasal cannula applied and supplemental oxygen was given throughout the procedure at rate of 3L/min for all patients. Sensory block was considered with ablation of corneal reflex after installation of drops of physiological solution on the conjunctiva and cornea. The motor and sensory block durations (min.) were evaluated frequently in post-operative period every hour. Post-operative pain was assessed by visual analog scale (0= no pain, 10= worst pain). If VAS for pain was >4 Diclofenac 1mg/Kg was given intramuscularly. If pain severe VAS >7 in addition to Diclofenac Tramadol 100mg I.M was given as well. The time for first demand for analgesia, dosage and number of patients asked for analgesia during first 24 hours post-operatively were recorded. In operating theater, a good intravenous access was secured and monitoring devices were attached, which include heart rate, electrocardiograph (ECG), pulse oximetry (SPO2). Non-invasive blood pressure (NIBP), respiratory rate and baseline parameters were recorded. The success of block was measured by motor akinesia of eye and by assessment of hemodynamic stability as indicated by the absence of increase in heart rate and or systolic blood pressure or more than 20% compared with baseline values obtained in pre-operative period.

Hypotension defined as systolic arterial pressure falling more than 20% mmHg was treated with Ephedrine and heart rate <50 beats/min was treated with Atropine. Intravenous fluids were given according to body weight and operative loss requirement. During surgical procedure adverse event like nausea, vomiting, pruritis, and shivering were recorded and treated.

Patient Monitoring

Hemodynamic variable (heart rate and mean arterial blood pressure) at baseline and after the retrobulbar block every 10 minutes until end of surgery. Pain assessment by Visual Analog Scale (0= No pain, 10= Worst pain). Pain score was assessed during surgery, at the end of surgery and every 4 hours for 24 hours post-operatively.

The degree of sedation evaluated also by Ramsay Scale during surgery [8].

Table 1. Ramsay Scale.

Patient	Grade
*Awake, excited or agitated	1
*Awake, quiet, responds	2
*Obnubilado, quiet, responds	3
*Asleep, responds strongly to verbal or tactile stimulation	4
*Asleep, responds lazily to verbal or tactile stimulation	5
*Asleep, no response to stimulation and every 1hour for 4 hours post-operatively	6

Statistical Analysis

At the end of Study, all data compiled systematically and analyzed using analysis of variance and chi-square test. Chicago III was used to compare the continuous variables between the two groups. Values of P <0.05 was considered significant and P <0.0001 as highly significant. Pain and Sedation Scores were analyzed with the Mann-Whitney U Test – SPSS U15.0 for Windows Software (SPSS, Inc, Chicago, Illinois USA) was used for statistical analysis.

Results

A total of 60 patients underwent retinal detachment surgery enrolled in this study and randomly divided into two groups. The demographics profiles of the patients in both groups were comparable with regards to age, weight, and ASA physical status was similar in both groups and mean duration of surgery was comparable in both groups and statistically non significant (P>0.05). (Table 2).

Table 2. The Demographic data of patients of both groups.

Demographic Characteristics	Group A (N:30)	Group B (N:30)
*Age	67.3 + 7.82	63.8 + 6.65
*Sex (M:F)	18:12	16:14
*Weight (Kg)	72.4 + 9.54	69.3 + 6.64
*ASA (I/II/III)	17/11/2	19/8/3
*Mean Duration of surgery (min.)	105.5 + 14.68	112.6 + 13.18

In group B, heart rate and systolic blood pressure decreased significantly relative to baseline values, however there was no statistical difference between groups when compared for MAP, HR, SPO2 intra-operatively and post-operatively (Fig. 1,2).

The number of patients developed global akinesia (15 min after block) higher in group B, 29 patients (96.6%) while 25 patients (83.3%) in group A develop akinesia (P=0.024). The number of patients who required supplementary injection were significantly lower (P=0.024) in group B, 1 patient (3.33%) compared with 5 patients (16.6%) in group A. The total volume of L.A. injected in group B which is 7.2 ml, which is significantly less (P= 0.029) than the volume of L.A. in group A 8.3 ml. The duration of motor block (min) was significantly longer (P= 0.001) in group B (182 + 15) compared with patients in group A (125 + 17). As well as sensory block duration time (min) was significantly longer (P=

Figure 1. Heart Rate measurements in both studied groups values are means \pm SD MAB

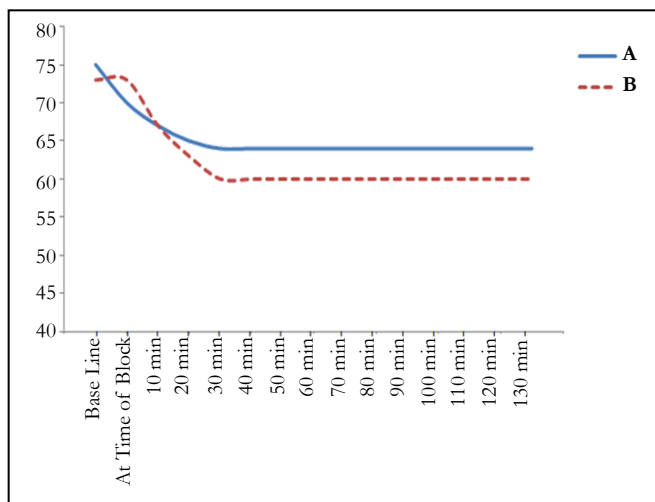
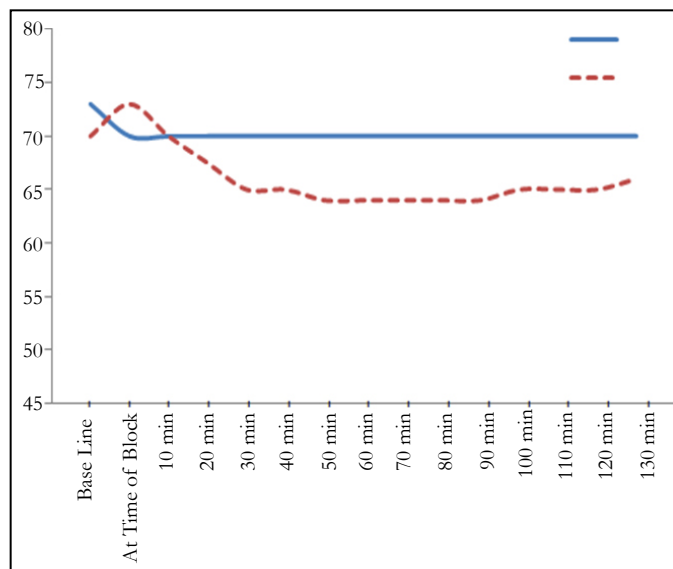


Figure 2. Mean arterial blood pressure in both studied groups values are means \pm SD



0.001) in group B (402 \pm 19) compared with patients in group A (245 \pm 25) [Table 3]

Table 3. The Demographic data of patients of both groups.

	Group A (N:30)	Group B (N:30)	P Value
Number of patients developed ocular akinesia (15 min after block)	25 -83.30%	29 -96.60%	P= 0.024
Number of patients require supplementary L.A.	5 -16.60%	1 -3.33%	P= 0.024
• Total volume of L.A. injected	8.3 ml \pm 1.2	7.2 ml \pm 0.8	P= 0.029
• Motor block duration time (min)	125 \pm 17	182 \pm 15	P= 0.001
• Sensory block duration time (min)	245 \pm 25	402 \pm 19	P = 0.001

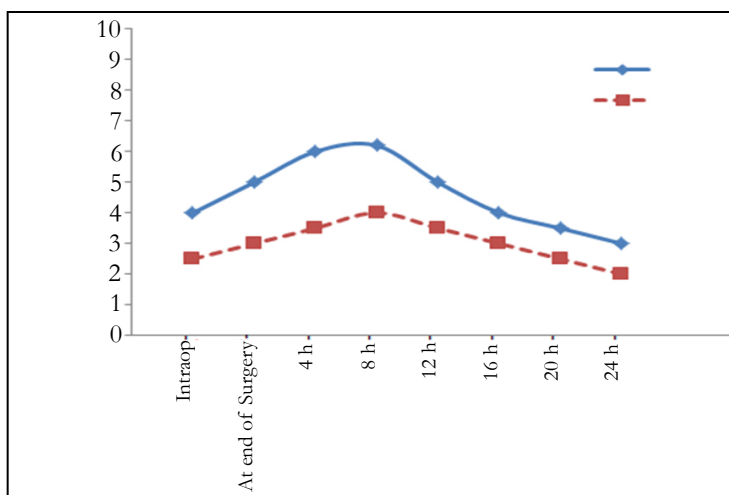
Table 4 shows the degree of sedation observed in both studied groups. Mean sedation scores were significantly higher in group B compared to patients in group A as 10 patients (33.3%), in group B had sedation score of 3 as compared to 3 patients (10%) in group A. Only 9 patients (30%) in group A had sedation scores of 1 compared with 3 patients (10%) in group B, which was highly significant statistical entity. Table 4.

Table 4. Intra-operative sedation score in both studied groups

Sedation scores during surgery	Group A	Group B
1	9 (30%)	3 (10%)
2	18 (60%)	17 (56.6%)
3	3 (10%)	10 (33.3%)
4	0	0
5	0	0
6	0	0

In first 24 hours post-operatively patients in group B had lower values of visual analog scale of pain compared with patients in group A. (Fig. 3)

Figure 3. Visual analog scale in two studied groups



VAS

All patients in group A required postoperative pain medication during the first 24 hour compared with 20 patients (66.6%) in group B ($P= 0.04$). The time of first request to analgesia was longer in patients of group B [mean 16 (14-18) hour] as compared with those who in group A [mean 9 (7-11) hour]. The diclofenac consumption (mg) was significantly less in group B (88.6 ± 12.5) compared with patients of group A (195.3 ± 32.5). Also, the percentage of patient who required tramadol injection were significantly less in group B 3 patients (10%) compared with group A 9 patients (30%). Table 5.

Table 5. Postoperative pain medications in two studied groups

	Group A	Group B
*Number of patients required postoperative analgesia	30 patients (100%)	20 patients (66.6%)
*Time of first requirement for analgesia (hours)	(14-18)	(7-11)
	mean 16	mean 9
*Diclofenac consumption (mg)	(195.3 ± 32.5)	(88.6 ± 12.5)
*Number of patients required tramadol analgesia	9 (30%)	3 (10%)

The incidence of various side effects in both groups were observed in intraop and postop period. Dry mouth was higher in both studied group but with no significant difference ($P > 0.05$). we did not observe respiratory depression in any patient from both group. The incidence of other side effects like nausea, vomiting, headache, dizziness, hypotension, bradycardia, shivering and pruritis observed and treated. Table 6.

Table 6. Side Effects in two studied groups

Side Effect	Group A	Group B
Nausea	2	3
Vomiting	1	1
Headache	2	1
Shivering	2	1
Dizziness	1	2
Dry mouth	4	5
Hypotension	1	2
Bradycardia	1	1
Respiratory depression	0	0

Discussion

The study of pharmacological properties of α -2 agonists have been extensively studied to achieve the desired effects in regional anesthesia. [9, 10, 11, 12] Regional administration of these drugs associated with sedation; analgesia, anxiolysis, hypnosis, and sympatholysis. [13, 14] Clonidine has been used successfully over the last decade for the said purpose and with introduction of dexmedetomidine has further widened the scope of α -2 agonist in regional anesthesia [15, 16] The faster onset of action of local anesthetics, rapid establishment of both sensory and motor block prolonged duration of postoperative period and stable cardiovascular parameters makes these agents a very effective adjuvant in regional

anesthesia [17, 18, 19, 20, 21]. This study has demonstrated that the use of dexmedetomidine with lidocaine for retrobulbar block for primary retinal detachment surgery provided more effective retrobulbar block with more patients who developed successful block and fewer patients who required supplementary injection and less volume of L.A. solution used compared with control group. Furthermore, the motor block duration and sensory block duration was significantly longer in the patients receiving dexmedetomidine also postoperative analgesia more prolonged with lower consumption of diclofenac and tramadol in patients receiving dexmedetomidine.

In previous studies designed for different clinical applications Bajwa and colleagues [22] Compared dexmedetomidine with clonidine in epidural anesthesia for patients underwent for vaginal hysterectomies. They found that dexmedetomidine is better neuraxial adjuvant compared to clonidine for providing early onset of sensory analgesia, adequate sedation and prolonged postoperative analgesia. Memis et.al. [23] in their studies of adding dexmedetomidine to lidocaine for intravenous regional anaesthesia, they reported that it improved the quality of anaesthesia and intraoperative, postoperative analgesia without causing side effects. Mauro et.al [24] in their study of clonidine and dexmedetomidine via epidural for postoperative analgesia and sedation in cholecystectomy they found statistically significant differences were found between groups in relation to sedation and analgesia, this difference were favorable for dexmedetomidine as the drug effectively inhibits transmission of nociceptive signals through the spinal cord when it joins to pre and post synaptic receptors causing sedation, analgesia and adequate quality anesthesia. Sensory block is installed quickly, in which surgical area can be manipulated, no matter which the motor block is not fully installed [25]. This results close to results obtained by Oril-Lopez et.al who use epidural dexmedetomidine plus local anesthetics to reduce anxiety and keep patient in a state of active sedation, which reduces the likelihood of respiratory depression which arise when adjuvant drugs are administered intravenously [26]. Brummett et.al found that the sensory and motor block in rats was enhanced significantly by addition of dexmedetomidine in combination with bupivacaine insciatic nerve block [27]. Results of the present study in agreement of study done by Obayah et.al. They found addition of dexmedetomidine to bupivacaine for greater palatine nerve block after cleft palate repair appeared to extend significant duration of sensory block and prolonged the duration of postoperative pain relief [28].

Conclusion

In conclusion., addition of dexmedetomidine to lidocaine in retrobulbar anesthesia will improve quality of local anesthesia and prolong postoperative pain relief and decrease requirement for analgesics with no side effects.

Declaration of Interest

- This study done in Bin Rushd Ophthalmic Center in Riyadh, K.S.A.
- The author indicates no financial support for any sources for this study.

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