

Peri-operative Outcomes of Dexmedetomidine as an Additive to Subtenon Block Compared with Intravenous Dexmedetomidine for Patients Undergoing Vitreoretinal Surgery under General Anesthesia

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ABSTRACT

Background: Several medications such as dexmedetomidine can be used as adjuvants with anesthesia to reduce the stress response during surgery resulting in good post-operative outcomes and safe recovery times.

Aims: To compare the peri-operative outcomes of subtenon block with or without dexmedetomidine versus dexmedetomidine infusion as adjuvants to general anesthesia in subjects undertaking retinal operations.

Design: A prospective randomized double-blind controlled clinical trial

Patients and methods: Through the use of sealed opaque envelopes, 120 participants were randomly divided into three groups. Group **SB** received subtenon bupivacaine and lidocaine and IV infusion of normal saline. Group **SD** received subtenon bupivacaine, lidocaine, and dexmedetomidine and IV infusion of normal saline, whereas Group **DI** received subtenon saline and IV infusion of dexmedetomidine. Peri-operative hemodynamics and intra-ocular pressure were measured and recorded. Intra-operative bleeding, recovery times, post-operative sedation and pain scores, first analgesic times, total analgesic requirements, and the incidence of PONV and OCR were also assessed and documented.

Statistical analysis: A prospective analysis of the collected data was performed using the SPSS program for Windows (version 22).

Results: The results showed that IV dexmedetomidine has decreased cardiovascular responses to surgery as signified by decreased HR and MAP with a significant drop in IOP measurements before induction and after intubation, in comparison to other groups. Administering dexmedetomidine either or IV in the subtenon block led to a significant reduction in pain scores of the first post-operative six hours, the total pethidine consumption, and the surgical bleeding.

Conclusion: When used as a supplement to general anesthesia during retinal surgery, dexmedetomidine is effective at reducing the airway response to tracheal intubation and extubation and maintaining peri-operative hemodynamic stability. Dexmedetomidine is also an efficient method for lowering intraocular pressure, surgical bleeding, and postoperative analgesic consumption with a better recovery profile. It can be administered either through IV infusion or combined with local anesthetics in subtenon block.

KEYWORDS: Dexmedetomidine - Anesthesia Adjuvants - Subtenon Block - Local Anesthetics - Vitreoretinal Surgery.

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INTRODUCTION

Anesthetic management in retinal surgery constitutes a unique challenge as it is a painful surgical procedure that includes intra- and extra-ocular dissection. The lengthy procedure was connected to a significant incidence of post-

operative nausea and vomiting (PONV) and oculo-cardiac reflex (OCR). Additionally, because many patients are elderly and have co-morbid illnesses such hypertension, diabetes mellitus, and ischemic heart disorders, the hemodynamic stability of the patients is crucial. [1] The goal

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of anesthesia for patients undergoing retinal surgeries is to create a bloodless, immobile operative field without significantly raising intraocular pressure (IOP). Additionally, we want to provide appropriate, efficient analgesia and promote recovery while maintaining stable peri-operative hemodynamic parameters. [2]

Several medications can be used as adjuvants with anesthesia to reduce the stress response during surgery, resulting in good post-operative outcomes and safe recovery times. [3] In ophthalmic procedures, regional anesthesia in the form of subtenon block has been utilized as a supplement to general anesthesia to provide good, efficient post-operative analgesia. [4] With a good safety record, a blunt cannula is placed into the subtenon space under direct visibility, making it a known effective and potentially safer alternative approach. [5]

Dexmedetomidine is a highly selective, centrally acting α_2 agonist that has no respiratory depressive effects and both sedative and analgesic qualities. [6] It has been utilized as a regional anesthesia additive to extend the analgesic effect of local anesthetics. [7] In order to achieve stable peri-operative hemodynamic variables and reduce the need for peri-operative anesthesia, it is utilized as an adjuvant to general anesthesia. [8]

In order to assess the peri-operative results of subtenon block with or without dexmedetomidine against dexmedetomidine infusion as adjuvants to general anesthesia in participants undergoing retinal procedures, this study compared the two methods. The main goal was to evaluate how long it took across groups to take their first post-operative analgesic dose and how much total analgesia they needed. Finding differences in IOP, intra-operative bleeding, and OCR incidence between the study groups was one of the secondary outcomes. Another was evaluating how the study drugs affected post-operative hemodynamic stability, recovery times, post-operative pain and sedation scores, and the prevalence of PONV.

Patients and methods

120 ASA I and II patients, aged 40 to 65, of either sex, participated in this prospective randomized double-blind clinical trial. They were scheduled for elective vitreoretinal surgeries under general anesthesia at the Center of Ophthalmology at Mansoura University after receiving approval from the local institutional review board (IRB) with the code number (MD/ 16.12.55) and obtaining written consent from all study participants after informed consent was obtained

Exclusion criteria were mental, psychological, or neurological disorders, hyperactive airway diseases or a history of sleep apnea, bleeding or coagulation disorders, deafness with communication difficulties after surgery, a history of drug or alcohol abuse, morbid obesity, pregnancy or lactation, endophthalmitis, and prior surgery in the same eye.

Age, sex, body mass index (BMI), and ASA status for each patient were recorded. All patients underwent pre-operative evaluations, including history-taking, a clinical examination, laboratory tests, in addition to an electrocardiograph. All of the study participants received a detailed explanation of the anesthesia method and the study protocol.

120 people were divided into three groups, each of which had 40 patients, using sealed opaque envelopes and a computer-generated random number sequence. These randomly chosen individuals got an IV infusion of the study medications as a loading dose almost before the onset of anesthesia, continued throughout the operation at a predetermined infusion rate, and discontinued upon completion of the surgery. On the other hand, after intubation, patients underwent subtenon block. The following regimen was used for the IV infusion of medications and the block, with groups being randomly assigned: -

- **Group (SB) (Subtenon Bupivacaine) (n=40):** received subtenon mixture of lidocaine 2% (1.5 mL), bupivacaine 0.5% (1.5 mL) and normal saline (1 mL), and IV infusion of normal saline.
- **Group (SD) (Subtenon Dexmedetomidine) (n=40):** received subtenon mixture of lidocaine 2% (1.5 mL), bupivacaine 0.5% (1.5 mL) and dexmedetomidine (0.5 μ g/kg) (1 mL), and IV infusion of normal saline.
- **Group (DI) (Dexmedetomidine Infusion) (n=40):** received subtenon normal saline (4 mL) and dexmedetomidine IV in a dose (1 μ g/kg) in 50 mL saline completed in 10 minutes as loading dose before induction, after that a maintenance dose of 0.4 μ g/kg/h (4 μ g/mL) was infused till the end of the operation.

After the patient fasting for eight hours and the introduction of an IV cannula, patient monitoring by (pulse oximetry, three leads ECG, and non-invasive BP), was done by the Datex-ohmeda Cardiocap II (Helsinki, Finland) monitoring system, and baseline values were documented. The study drugs were then administered in a loading dosage during a 10-minute period. Following the administration of 100% oxygen, fentanyl (1 g/kg), propofol (2 mg/kg), and atracurium (0.5 mg/kg) were used to induce anesthesia, which enabled the insertion of an endotracheal tube and regulated ventilation to maintain EtCO₂ between 30-35 mmHg. After intubation, subtenon block was performed, and anesthesia was maintained by isoflurane (1.5%), oxygen in the air, top-up doses of atracurium (20% of intubating dose), and IV infusion of the studied medications.

The subtenon block was carried out by the ophthalmologist, who tunneled posteriorly with curved Stevens scissors to create a narrow channel to the posterior subtenon space after cutting through the conjunctiva and tenon's tissue inferonasally to expose the scleral surface. The medication solution was then slowly delivered into the

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subtenon space using a blunt-tipped subtenon cannula that had been introduced into the posterior subtenon space.

Neostigmine (0.04 mg/kg) and atropine (0.02 mg/kg) were used to reverse residual muscular relaxation following the procedure, after all infusions had been stopped and the use of isoflurane had been discontinued. Following the completion of its requirements, extubation was carried out, and 100% oxygen was administered using a face mask. Patients were then taken to the PACU to be monitored for two hours, after which they were moved to the ward where a nurse who was blind to the study observed them for 24 hours.

As an OCR (dysrhythmia or a sudden drop in heart rate (HR) of more than 25% from baseline) was considered to occur during the process. It was treated by asking the surgeon to stop stimulation, but if this did not resolve the issue or the HR dropped below 50 beats per minute, IV atropine (0.01 mg/kg) was administered. Mean arterial pressure (MAP) less than 25% of the baseline value, often known as peri-operative hypotension, was treated with an IV 200 mL fluid bolus; however, if this proved ineffective or if MAP fell below 60 mmHg, an IV ephedrine 5 mg bolus was administered. By using IV beta-blockers like 0.5 mg boluses of propranolol, peri-operative hypertension and/or tachycardia (MAP and HR > 25% of baseline values) were treated.

Collected data

- Baseline measurements of HR and MAP were taken before to induction, during induction, after intubation, after subtenon, then at 10-minute intervals during the entire procedure, at the end of the surgery, following extubation, and upon arrival in the PACU, as well as every 30 minutes for the next two hours until the patient was discharged from the PACU. OCR or hypotension episodes were recorded. Atropine and ephedrine post-operative requirements were also noted.
- Schiøtz-Tonometer was used to measure IOP before the study drug was loaded (basal), before anesthesia was started, after the endotracheal tube had been inserted, and once the procedure was over.
- The 6-point Ramsay Sedation Score (RSS) was used to evaluate post-operative sedation after extubation and every 30 minutes in the PACU for 2 hours: - 1 = Anxious, or agitated and restless, or both, 2 = Cooperative, oriented, and calm, 3 = Drowsy but responds to commands, 4 = Asleep, rapid response to light glabellar tap or loud auditory stimulus, 5 = Asleep, sluggish response to light glabellar tap or loud auditory stimulus, and 6 = Asleep and unarousable. [9]
- The verbal rating scale (VRS) was used to evaluate the pain intensity immediately after the surgery and for the first hour, two hours, six hours, 12 hours, and 24 hours afterward. In the event that the VRS was 4 or at the

patient's request, IV pethidine (1 mg/kg) was given. Post-operatively, the timing of the first analgesic demand and the total amount of analgesics consumed in the first 24 hours were recorded. Incidence of PONV was assessed during the first 2 hours in the PACU and subsequently in the ward for 24 hours.

- Using a 3-point rating scale, peri-operative bleeding was evaluated as follows: 0 = indicates no bleeding; 1 = indicates no interference with operation; and 2 = indicates interference with hemorrhage. [10]
- Lastly, the following time intervals were recorded: - Extubation time: the interval between the discontinuation of anesthetics and removal of the endotracheal tube. Emergence time: from anesthetic discontinuation to the first response or eye-opening on verbal command. The time needed to obtain a modified Aldrete score of 10 in the PACU. [11]

Statistical analysis

The analysis and evaluation of the study's sample size were conducted using A Priori G-power (version 3.1.9.2, Germany). 38 participants in each group were sufficient to detect a difference of 20% in the post-operative analgesic consumption between the groups under the assumption that error (type 1) = 0.05 and error (type 2) = 0.2 (power of study = 80%). It was expected that 5% of patients would drop out. So, to detect this difference, 40 participants in each group were required.

The SPSS program (version 22) for Windows was used to code, process, and analyze the recorded values. The Kolmogorov-Smirnov test was used to analyze a normal distribution of numerical values. The data's normal distribution was represented as mean and SD, and matched in varied groups using one-way ANOVA and a post-hoc Bonferroni test as well as in the same group using repeated measures ANOVA with a post-hoc Dunnett's test. The data's non-normal distribution was represented as a median and range, and non-parametric comparisons were made first with the Kruskal-Wallis test and later with the Mann-Whitney U test. Categorical data were presented as percentages and numbers, and the Chi-square test was used to compare them. If $P \leq 0.05$, all values were considered statistically significant.

RESULTS

In this study, 145 patients were screened for eligibility; 25 patients were excluded, leaving 120 to be randomized and divided into three groups, each of which had 40 patients, as shown in the flow chart. **Figure (1)** Regarding demographic data, durations of anesthesia, and surgery, there were no significant differences between the studied groups. **Table (1)**

According to the hemodynamic parameters, HR and MAP had statistically significant lower values from basal values in group (DI); this significance started before induction and continued throughout the intra-operative period

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till 2 hours in the PACU. On the other hand, groups (SB) and (SD) recorded non-significant lower values in HR and MAP from basal values apart from a considerable rise following intubation and extubation. In addition, group (DI) displayed statistically significantly reduced HR and MAP relative to groups (SB) and (SD); this significance began before induction and continued throughout the intra-operative period till 2 hours in the PACU. **Figures (2) & (3)** No statistically significant differences were noted among the studied groups regarding the occurrence of OCR, hypotension, and the need for atropine or ephedrine.

There was a statistically significant drop in IOP measurements in group (DI) in comparison to other groups before induction and after intubation. Also, there was a statistically significant decrease in IOP at the end of surgery in groups (SD) and (DI) as compared to group (SB). **Table (2)**

In terms of recovery times, there were statistically significant longer durations in group (DI) as compared to other groups regarding times to extubation, emergence, and modified Aldrete score of 10 in PACU. **Table (3)** The mean

RSS was found to be significantly higher in group (SD) and (DI) than in group (SB) from the time of extubation up to one hour post-operatively. **Table (4)**

As regards post-operative period, patients in groups (SD) and (DI) achieved significantly lower values of VRS as compared with those in group (SB) between the periods from one to six hours post-operatively. **Table (5)** Consequently, total pethidine consumption (mg) was significantly less in groups (SD) and (DI) compared with the patients in group (SB). Furthermore, groups (SD) and (DI) had a statistically significant longer time to the first request for analgesia relative to those in group (SB). In addition, there were no statistically significant variations in the incidence of PONV between the studied groups. **Table (6)**

There were no cases of bleeding interfering with surgery (grade 2) in the studied groups. Surgical bleeding (grade 1) was significantly less in groups (SD) and (DI) than in group (SB). Otherwise, the absence of bleeding (grade 0) was significantly more in groups (SD) and (DI) than in group (SB). **Table (6)**

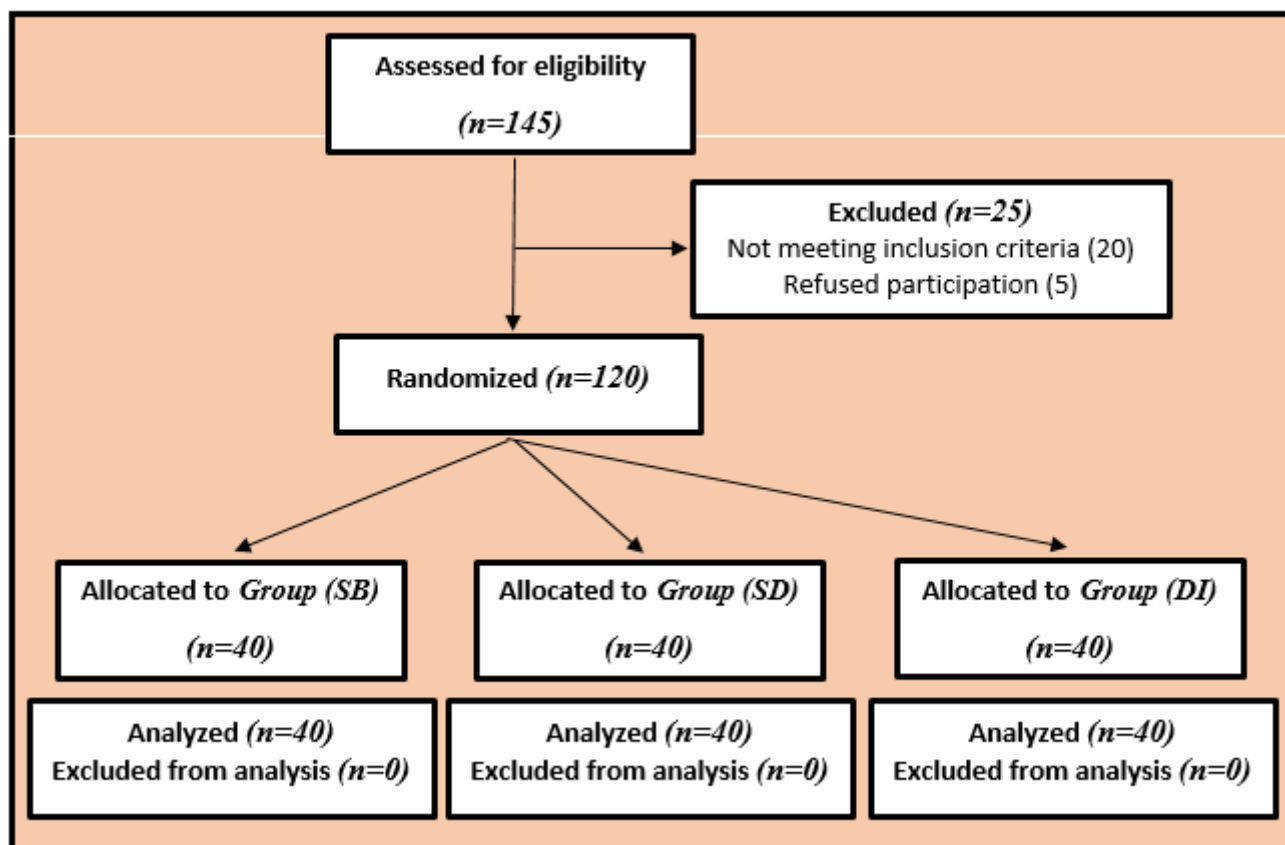


Figure (1): Consort flow chart

Table (1): Demographic data, durations of surgery and anesthesia (min).

	Group (SB) (n=40)	Group (SD) (n=40)	Group (DI) (n=40)	P-value
Age (year)	52.4±10.6	53.4±9.4	52.7±11.5	0.91

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Gender (Male/Female)	28/12	26/14	20/20	0.16
BMI (kg/m²)	28.6±4.9	27.5±3.8	28.1±5.2	0.71
ASA (I/II)	22/18	18/22	17/23	0.49
Anesthesia duration (min)	75.7±22.6	78.5±16.2	80.5±24.2	0.61
Surgery duration (min)	63.8±21.9	66.1±17.3	68.1±24.1	0.68

(Data were expressed as mean± standard deviation or number)

(**SB**: Subtenon Bupivacaine, **SD**: Subtenon Dexmedetomidine, **DI**: Dexmedetomidine Infusion)

ASA: American Society of Anesthesiologists, BMI: Body Mass Index

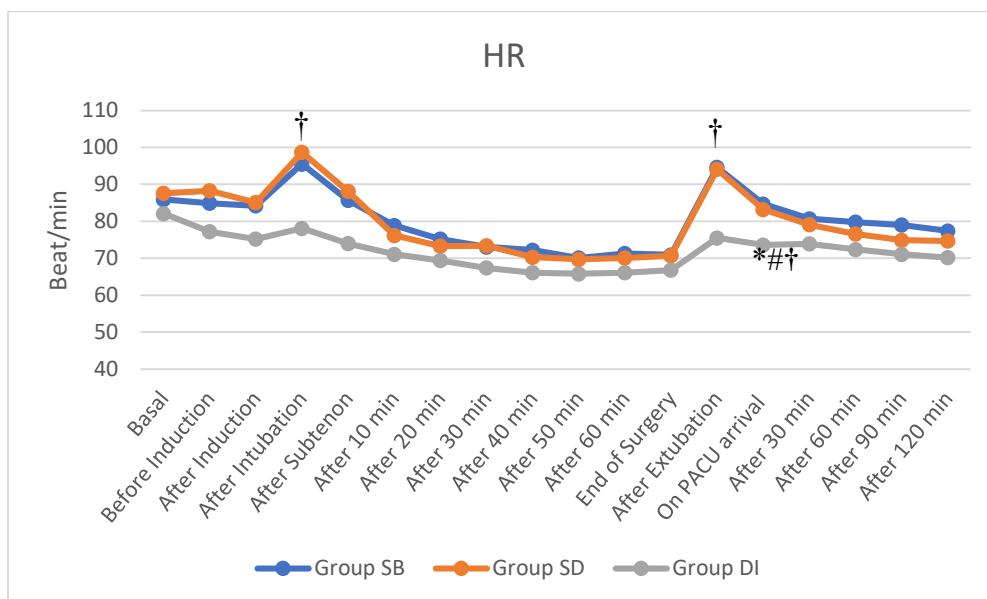


Figure (2): Peri-operative heart rate (HR) mean values (beat/min)

(**SB**: Subtenon Bupivacaine, **SD**: Subtenon Dexmedetomidine, **DI**: Dexmedetomidine Infusion)

(Significant P value was ≤ 0.5)

(*: Significance in group (DI) relative to group (SB), #: Significance in group (DI) relative to group (SD), †: Significance relative to the baseline)

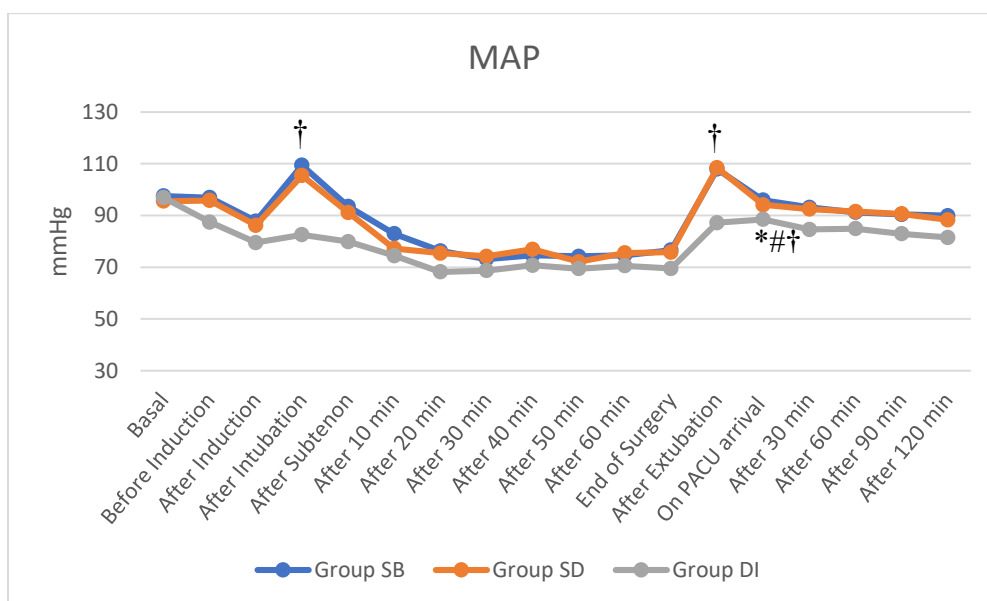


Figure (3): Peri-operative mean arterial blood pressure (MAP) mean values (mmHg)

(**SB**: Subtenon Bupivacaine, **SD**: Subtenon Dexmedetomidine, **DI**: Dexmedetomidine Infusion)

(Significant P value was ≤ 0.5)

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(*: Significance in group (DI) relative to group (SB), #: Significance in group (DI) relative to group (SD), †: Significance relative to the baseline)

Table (2): Peri-operative intra-ocular pressure (IOP) (mmHg).

Time	Group (SB) (n=40)	Group (SD) (n=40)	Group (DI) (n=40)	P-value
Basal	15.1±2.4	15.1±3.1	15.2±2.5	0.55
Before	15.1±2.4	15.1±3.1	13.1±2.2	0.001
After intubation	15.9±2.5	16.1±2.1	14.1±1.9	0.001
End of surgery	14.8±3.5	11.9±2.3 ¥	11.7±1.9 *	0.01

(Data were expressed as mean± standard deviation)

(SB: Subtenon Bupivacaine, SD: Subtenon Dexmedetomidine, DI: Dexmedetomidine Infusion)

(Significant P value was ≤ 0.5)

(*: Significance in group (DI) relative to group (SB), #: Significance in group (DI) relative to group (SD), ¥: Significance in group (SD) relative to group (SB))

Table (3): Recovery times (minutes).

Time (minutes)	Group (SB) (n=40)	Group (SD) (n=40)	Group (DI) (n=40)	P-value
Extubation time	7.6±1.8	8.1±1.6	9.8±2.2*#	0.001
Emergence time	9.4±2.2	11.4±2.7	13.7±2.6*#	0.001
Time to Aldrete score 10 in PACU	11.3±2.5	12.4±2.9	14.1±3.2*#	0.03

(Data were expressed as mean± standard deviation)

(SB: Subtenon Bupivacaine, SD: Subtenon Dexmedetomidine, DI: Dexmedetomidine Infusion)

(Significant P value was ≤ 0.5)

(*: Significance in group (DI) relative to group (SB), #: Significance in group (DI) relative to group (SD))

Table (4): Post-operative Ramsay sedation scores (RSS) (1-6).

Time	Group (SB) (n=40)	Group (SD) (n=40)	Group (DI) (n=40)	P-value
After	2.0±0.3	2.7±0.6 ¥	3.3±0.9 *	0.001
30 min	1.9±0.2	2.3±0.5 ¥	2.8±0.4 *	0.001
60 min	1.8±0.3	2.1±0.4 ¥	2.4±0.5 *	0.002
90 min	1.7±0.3	2.0±0.0	2.0±0.0	0.67
120 min	1.5±0.5	2.0±0.0	2.0±0.0	0.47

(Data were expressed as mean± standard deviation)

(SB: Subtenon Bupivacaine, SD: Subtenon Dexmedetomidine, DI: Dexmedetomidine Infusion)

(Significant P value was ≤ 0.5)

(*: Significance in group (DI) relative to group (SB), ¥: Significance in group (SD) relative to group (SD))

Table (5): Post-operative verbal rating scores (VRS) (0-10).

Time	Group (SB) (n=40)	Group (SD) (n=40)	Group (DI) (n=40)	P-value
Arrival to PACU	1 (0-3)	1 (0-2)	1 (0-3)	0.20
One hour	2(0-4)	1(0-2) ¥	1(0-3) *	0.01

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Two hours	3(1-5)	2(1-3)¥	2(1-4) *	0.001
Six hours	4(1-6)	3(2-4) ¥	3(2-5) *	0.008
12 hours	3(2-6)	3(2-4)	3(2-5)	0.28
24 hours	2(2-4)	2(1-4)	1(1-3)	0.85

(Data were expressed as median (range))

(SB: Subtenon Bupivacaine, SD: Subtenon Dexmedetomidine, DI: Dexmedetomidine Infusion)

(Significant P value was ≤ 0.5)

(*: Significance in group (DI) relative to group (SB), ¥: Significance in group (SD) relative to group (SD))

Table (6): First analgesic time (min), total analgesic consumption (mg), bleeding scores, and incidence of post-operative nausea and vomiting (PONV).

	Group (SB) (n=40)	Group (SD) (n=40)	Group (DI) (n=40)	P-value	
1st analgesic time (min)	154.2±82.9	244.2±124.2 ¥	235.1±81.8 *	0.001	
Total analgesic consumption (mg)	94.4±31.8	76.6±15.8 ¥	71.3±26.3 *	0.03	
Incidence of PONV	19 (22.5 %)	8 (20 %)	6 (15 %)	0.68	
Bleeding scores	0	18 (45 %)	32 (80 %) ¥	30 (75 %) *	0.002
	1	22 (55 %)	8 (20 %) ¥	10 (25 %) *	0.002
	2	0 (0 %)	0 (0 %)	0 (0 %)	--

(Data were expressed as mean± standard deviation, or number (percentage))

(SB: Subtenon Bupivacaine, SD: Subtenon Dexmedetomidine, DI: Dexmedetomidine Infusion)

(Significant P value was ≤ 0.5)

(*: Significance in group (DI) relative to group (SB), ¥: Significance in group (SD) relative to group (SD))

DISCUSSION

Usage of the various anesthetic adjuvants is very popular to maintain a sustained depth of general anesthesia, alleviate the peri-operative stress response to general anesthesia, and preserve hemodynamics throughout the procedure. Additionally, these drugs demonstrated benefits in reducing the prevalence of PONV and the need for post-operative analgesics. [12] Also, regional anesthesia in the form of subtenon block offers appropriate analgesia and lowers the frequency of OCR and PONV. [5]

The findings of the current study demonstrated that IV dexmedetomidine has a lowered sympatho-adrenal and cardiovascular responses to anesthesia and surgery as signified by decreased HR and MAP in comparison to other groups. Consistently, dexmedetomidine infusion has been shown to attenuate a variety of surgical stress responses, resulting in stable peri-operative hemodynamics without undue fluctuations, particularly during intubation, extubation, and emergence from anesthesia. This can be attributed to its sympatholytic activity and stabilizing effect on the heart and blood pressure. [13] [14]

Similarly, dexmedetomidine infusion showed a substantial drop in HR and MAP compared to other groups. until two hours in the PACU. This finding is in accordance with studies made by Tufanogullari et al. in 2008 and Patel et

al. in 2012 who also found similar results. This may be due to the half-life of dexmedetomidine; about two hours. [15] [16] In contrast, Gurbet and his colleagues reported in 2006 that there were no appreciable differences between the dexmedetomidine group and the placebo group in terms of HR and MAP findings in the PACU; this may be referred to the use of a higher dose of fentanyl which may provide better attenuation of the stress response. [17]

On the other hand, this study's findings showed that subtenon block produces non-significantly reduced HR and MAP values from baseline in addition to a significantly higher value following intubation and extubation. This result accords with a research conducted in 2016 by Abouammoh and his colleagues [5] Otherwise, Chhabra et al. in 2009 found that subtenon block offers steady hemodynamic parameters that do not vary throughout intubation and extubation. This may be attributed to the use of a laryngeal mask airway rather than an endotracheal tube. [18]

The present study has demonstrated that no discernible or significant changes were detected among the studied groups regarding the occurrence of OCR, hypotension, and the need for atropine or ephedrine. This finding is in accordance with several studies that recorded the same result. [18] [19]

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Also, the current study agrees with a number of studies that reported that when dexmedetomidine was administered intravenously, IOP readings were decreased before induction, after intubation, and at the end of surgery because the pressor response was attenuated after intubation. [20] [21] [22] Additionally, this study is in line with prior studies that recorded that adding dexmedetomidine to local anesthetics dramatically reduced IOP at the end of surgery. [23] [24]

Dexmedetomidine's impact on IOP may be attributable to its direct vasoconstrictor action on the ciliary body's afferent blood vessels, which results in less aqueous humor generation. Moreover, it lessens the sympathetically mediated vasomotor tone of the ocular drainage system, which enhances the outflow of aqueous fluid. In addition to the relaxing of extraocular muscles brought on by subtenon block, its associated steady hemodynamic response may also help to reduce IOP.

On the contrary, when they were kept at comparable anesthetic levels, Lee and his colleagues in 2007 stated that there was no considerable difference in the IOP reduction between the dexmedetomidine and placebo groups. This may be referred to their belief that dexmedetomidine's influence on α_2 receptors is less plausible than the IOP reduction's reflection of the substantial drop in MAP. [25]

The results of this study pass in parallel with Harsoor et al. in 2014 who demonstrated that dexmedetomidine infusion considerably prolonged anesthetic recovery times. This observation can be explained by the locus coeruleus' reduction of neuronal firing, which then inhibits norepinephrine release, activity, and histamine secretion, and produces hypnosis that resembles natural sleep. [8] Dexmedetomidine, on the other hand, was reported by Le Bot et al. in 2015 to stabilize hemodynamics, enhance quality of life, and make extubation simple without delaying recovery. [26]

According to the results of the present study, subtenon block with or without dexmedetomidine had no discernible impact on recovery times. Similarly, Abouammoh and his colleagues in 2016 found that subtenon block demonstrated earlier recovery times when compared to the placebo group; a finding that comes with the results of this study. [5]

Patients receiving a dexmedetomidine infusion were shown to be more sedated during the post-operative period in the current study. This is in accordance with a number of studies conducted by Chattopadhyay et al. in 2014 and Priye et al. in 2015, who also noted that dexmedetomidine infusion caused increased post-operative drowsiness, which was possibly due to the drug's extended elimination half-life. [27] [28]

Moreover, when dexmedetomidine was added to subtenon block, Eskandr et al. in 2014 and Ghali et al. in 2015 observed a significant increase in sedation scores; a finding

that copes with the results of this study. [7] [23] This can be related to the systemic absorption of dexmedetomidine that produced a central effect.

The current study is compatible with many studies that found that after receiving an IV infusion of dexmedetomidine, post-operative pain scores and total analgesic requirements decreased dramatically, and it took noticeably longer for the patient to request first analgesia. [29] [30]

Furthermore, when used with local anesthetics in different regional blocks, dexmedetomidine has been shown to extend the duration of the block and post-operative analgesia. The findings of Eskandr et al. in 2014 and Ghali et al. in 2015 were consistent with the findings of this study, showing that the pain scores were significantly better in the post-operative period with lower analgesic consumption and longer time to the first analgesic requirement after adding dexmedetomidine to subtenon block. [7] [23]

These effects of dexmedetomidine can be explained by central and peripheral actions. The locus coeruleus and dorsal horn of the spinal cord contain α_2 adrenoceptors, which mediate the central activities. The peripheral activities are mediated through the vasoconstrictive effects of the α_2 adrenoceptors, which lower the inflammatory response and raise the threshold for action potentials, slowing or blocking neuronal conduction.

A crucial result of this study was the considerable reduction in bleeding resulted in a better surgical field that was observed when dexmedetomidine was administered either through IV infusion or added to subtenon block. This finding is in agreement to studies made by Parikh et al. 2013 and Jamaliya et al. 2014. [31] [32] The decline in IOP may have been responsible for this lessened bleeding.

CONCLUSION

When used as a supplement to general anesthesia during retinal surgery, dexmedetomidine is effective at reducing the airway response to tracheal intubation and extubation and maintaining peri-operative hemodynamic stability. Dexmedetomidine is also an efficient method for lowering intraocular pressure, surgical bleeding, and postoperative analgesic consumption with a better recovery profile. It can be administered either through IV infusion or combined with local anesthetics in subtenon block.

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