IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 24, Issue 5 Ser. 3 (May. 2025), PP 31-36
www.iosrjournals.org

Pre-Operative Dexmedetomidine And Clonidine Nebulization In Attenuating Post-Operative Sore Throat Due To Endotracheal Intubation- A Comparative Clinical Study

Author: Dr Shashidhar S,Assistant Professor, Dr Navyashree K M,Senior Resident, Dr Vaishali Sajjan,Post graduate, Dr Shinjini Dutta,Post graduate; Department Of Anaesthesiology, Sapthagiri Institute Of Medical Science and Research Centre, Bangalore.

Abstract
Background and Aims: *Endotracheal intubation, essential for airway management in anesthesia, often leads to post-operative sore throat (POST), affecting 18% to 65% of patients. Current treatments, like local anesthetics and steroids, have limitations and may not be suitable for everyone. Recent studies suggest that α2-adrenergic agonists, such as dexmedetomidine and clonidine, may help reduce POST due to their analgesic and anti-inflammatory effects. This study will compare the effectiveness of nebulized dexmedetomidine versus clonidine in reducing POST in patients undergoing elective surgery.*
Methodology: *A randomized controlled trial included 70 adult patients undergoing elective surgery with endotracheal intubation at Sapthagiri Institute of Medical Sciences over six months. Patients were randomly assigned to two groups of 35: Group D received nebulized dexmedetomidine (1 mcg/kg in 5 ml saline), and Group C received nebulized clonidine (1 mcg/kg in 5 ml saline). Intra-operative hemodynamic monitoring occurred at intervals post-intubation. After extubation, patients were monitored in the PACU every 15 minutes for one hour. Sore throat, hoarseness, and cough severity were assessed using a 4-point scale at various time points post-extubation. Sedation levels were measured using the Ramsay Sedation Score, and any side effects were monitored and managed accordingly. The descriptive statistics included the computation of percentages, means and standard deviations. To determine statistical significance, the study employed an chi-square test, independent samples t-test and paired t-test. The statistical analysis was carried out using SPSS Version 22.*
Results: *The clonidine group exhibited a significantly lower incidence of postoperative sore throat compared to the dexmedetomidine group, particularly at 8, 12, and 24 hours postoperatively ($p < 0.001$). Preoperative vital signs showed no significant differences between groups; however, postoperative assessments revealed a lower heart rate in the clonidine group ($p = 0.061$) and significant differences in diastolic blood pressure ($p = 0.03$), with the clonidine group maintaining more stable hemodynamics.*
Conclusion: *Pre-operative nebulization with clonidine effectively reduces the incidence of postoperative sore throat associated with endotracheal intubation compared to dexmedetomidine. These findings suggest that clonidine may enhance postoperative recovery and patient comfort, warranting further investigation into its application in perioperative care protocols.*
Keywords: *hemodynamics, clonidine, dexmedetomidine*

Date of Submission: 04-05-2025 Date of Acceptance: 14-05-2025

I. Introduction:

Post-operative sore throat (POST) is a prevalent complication experienced by patients following endotracheal intubation, impacting recovery and overall patient satisfaction. The incidence of POST can range from 20% to 80%, depending on various factors such as the type of surgery, duration of intubation, and techniques used during intubation [1, 2]. The discomfort associated with POST can lead to increased pain scores, prolonged recovery times, and a negative patient experience.

The development of POST is primarily attributed to mechanical trauma inflicted by the endotracheal tube on the oropharyngeal and laryngeal tissues. The irritation of the mucosal surfaces can provoke an inflammatory response, resulting in pain and discomfort [3]. Additionally, factors such as cuff pressure, tube size, and the duration of intubation can further exacerbate this condition [4].

Given the high incidence of POST, various strategies have been explored to mitigate its occurrence. Among these strategies, the use of pre-operative medications has gained attention. Dexmedetomidine, a selective alpha-2 adrenergic agonist, is known for its sedative and analgesic properties without significant respiratory depression [5].

Studies have suggested that dexmedetomidine may reduce airway inflammation and provide analgesic effects, making it a promising candidate for minimizing POST [6]. Similarly, clonidine, another alpha-2 adrenergic agonist, has been shown to possess analgesic properties and is commonly used for preoperative sedation [7]. It may also contribute to reducing airway irritation, although its effectiveness compared to dexmedetomidine has not been extensively studied in the context of POST.

This study aims to compare the efficacy of pre-operative nebulization of dexmedetomidine and clonidine in reducing the incidence and severity of POST. By evaluating these agents, we hope to determine which medication offers superior benefits in enhancing patient comfort and satisfaction following intubation. The findings from this study could lead to improved clinical practices in the management of POST and enhance the overall perioperative experience for patients.

II. Methodology:

This study was a randomized controlled trial conducted at Sapthagiri Institute of Medical Sciences over six months. A total of 70 adult patients were included in the study. The inclusion criteria consisted of:

- Adults aged 18-65 years
- Scheduled for elective surgeries requiring general anesthesia and endotracheal intubation
- ASA (American Society of Anesthesiologists) physical status I or II

Exclusion Criteria:

- History of allergic reactions to dexmedetomidine or clonidine
- Pre-existing respiratory conditions (e.g., asthma, chronic obstructive pulmonary disease)
- Previous surgeries involving the throat or larynx
- Significant cardiovascular disease
- Pregnant or lactating women

The study protocol received approval from the institutional ethics committee. Informed consent was obtained from all participants before enrolment. Patients were informed of their right to withdraw from the study at any time without impacting their medical care. All the patients were randomly assigned to one of two groups using a random number generator:

- **Group D**: Received nebulized dexmedetomidine at a dosage of 1 mcg/kg diluted in 5 mL of saline.
- **Group C**: Received nebulized clonidine at a dosage of 1 mcg/kg diluted in 5 mL of saline.

Both interventions were administered via nebulization approximately 30 minutes before induction of anesthesia. The drug was delivered using a nebulization mask for 15 mins at oxygen source at 8L/minute, 10 minutes prior to induction. Post nebulization vitals were recorded. The study was double-blinded; meaning neither the participants nor the healthcare providers assessing outcomes knew which treatment was administered. Standardized general anesthesia was administered to all participants.

Monitoring included continuous hemodynamic assessments at defined intervals post-intubation, focusing on parameters such as heart rate, blood pressure, and oxygen saturation. Intra-operative hemodynamic monitoring was done at 0 (post intubation), 2, 4, 6, 8, and 10 minutes after intubation, thereafter every 10 minutes intra-operative period. After extubation, patients were transferred to the Post-Anesthesia Care Unit (PACU), where they were monitored for one hour. Assessments were conducted every 15 minutes.

Outcome Measures:

- **Sore Throat, Hoarseness, and Cough Severity**: Assessed using a 4-point scale (0 = none, 1 = mild, 2 = moderate, 3 = severe) at various time points post-extubation (at 0, 2, 4, 6, 12, and 24 hours).
- **Sedation Levels**: Measured using the Ramsay Sedation Score, which categorizes sedation from 1 (anxious and agitated) to 6 (no response to stimuli).
- **Side Effects**: Any adverse effects experienced by patients (e.g., dry mouth, post-operative nausea and vomiting (PONV), sedation, respiratory depression, and hemodynamic instability) were monitored and managed appropriately.

Value	Description (level of sedation)	Test to follow:
1	Awake: Patient is anxious and agitated, or restless, or both.	Observe the patient.
2	Awake: Patient is co-operative, oriented, and tranquil	Observe the patient. Does patient make eye contact and respond to commands?

3	Awake: Patient responds to commands only.	Talk to the patient. Does patient make eye contact and respond to commands?
4	Asleep: Patient reacts with a brisk response to a light glabellar tap or a loud auditory stimulus.	Physically stimulate the patient by shaking the shoulder while speaking loudly. Does patient respond within 10 seconds?
5	Asleep: patient reacts with a sluggish response to a light glabellar tap or a loud auditory stimulus.	Physically stimulate the patient by shaking the shoulder while speaking loudly. Does patient respond after 10 seconds?
6	Asleep: Patient does not respond to pain	Use painful stimuli. No response.

Table 1: The Ramsay Sedation Scale (RSS) (Modified)

Data were analyzed using appropriate statistical software (e.g., SPSS or R). Descriptive statistics summarized demographic characteristics. Between-group comparisons were conducted using chi-square tests for categorical variables and t-tests for continuous variables, depending on data distribution. A p-value < 0.05 was considered statistically significant.

III. Results:

Mean age of patients in group D was 34.6±13.4 years and in group C was 36.8±14.4 years. In group D, 17 were females and 18 were males. In group C, 16 were females and 19 were males. Mean weight of patients in group D was 56.3±11.3 Kgs and in group C was 59.7±13.8 Kg.

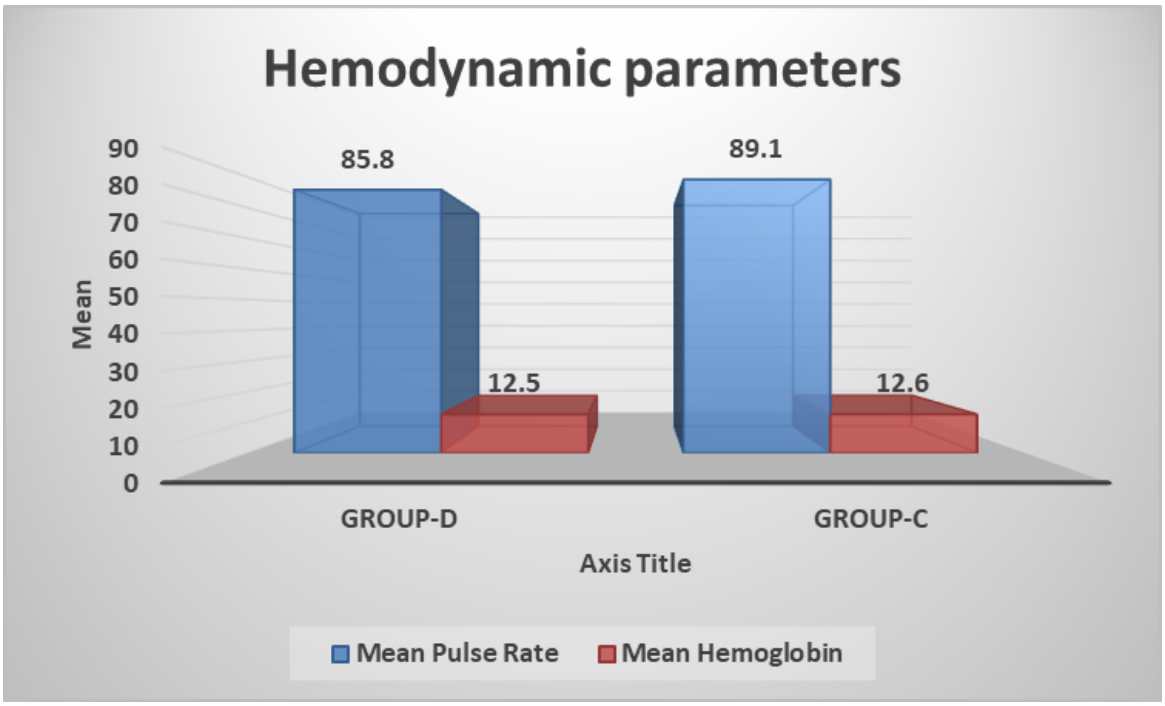
Parameters	Group-D	Group-C	p-value
Mean age in years (SD)	34.6±13.4	36.8±14.4	0.23
Gender (Female/male) [n]	17/18	16/19	0.067
Mean Weight in kg	56.3±11.3	59.7±13.8	0.227

Table 2: Demographic parameters of group D and C

Mean pulse rate in group D was 85.8±11.4 and group C was 89.1±15.0. Mean Hb levels in group D was 12.5±2.12 and group C was 12.6±1.72. Mean TLC levels in Group D were 7741.5±2876.7 and Group C were 7704.2±2286.8. Mean platelet count in group D was 303506±1346.6 and group C were 273420.5±128762.7.

Parameters	Group-D	Group-C	p-value
Mean Pulse Rate	85.8±11.4	89.1±15.0	0.305
Mean Hemoglobin	12.5±2.12	12.6±1.72	0.399
Mean TLC	7741.5±2876.7	7704.2±2286.8	0.954
Mean Platelet count	303506±1346.6	273420.5±128762.7	0.3797

Table 3: Mean hemodynamic parameters of both the groups



Severity of POST in group C was also found less as compared to group D. The results indicate a significant difference in the severity of post-operative sore throat (POST) between the two groups (Group-D and Group-C) at various time points post-extubation. At the 2-hour mark, there was no significant difference in severity ($p = 0.064$), with both groups showing similar distributions across the severity scale. However, significant differences emerged at the 4-hour mark ($p = 0.002$) and continued to be notable at the 8-hour ($p < 0.001$), 12-hour ($p < 0.001$), and 24-hour assessments ($p < 0.001$).

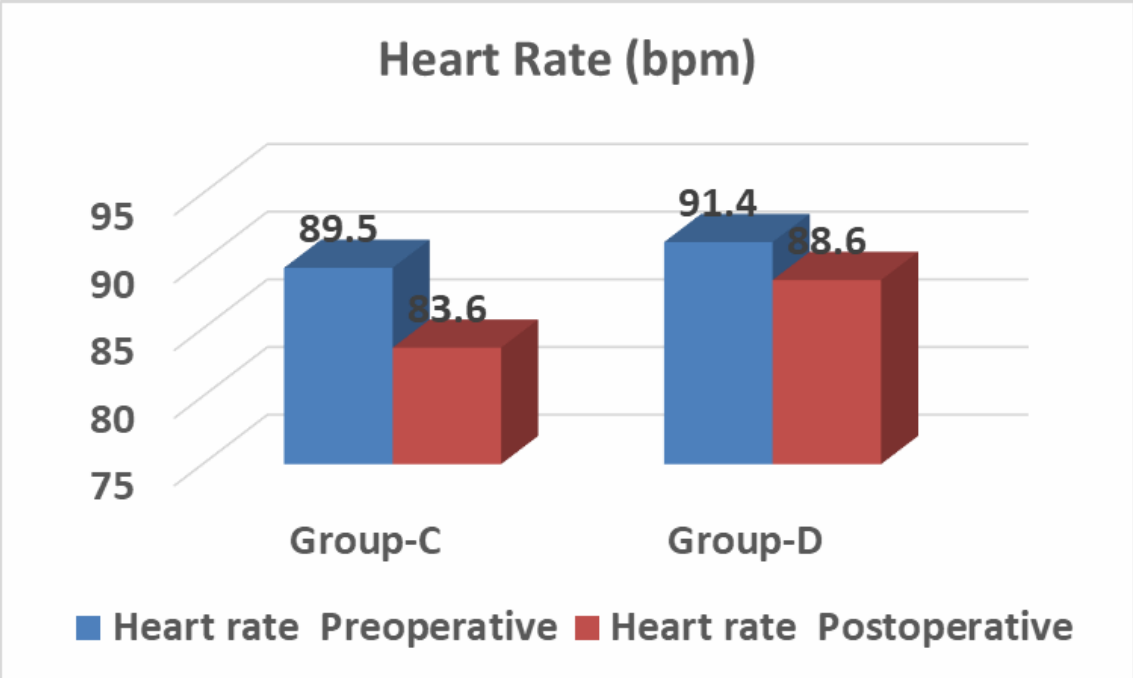
Time	Scale of POST	Group-C	Group-D	p-value
2nd hour	1	9 (25.7%)	7 (20%)	0.064
	2	22 (62.9%)	20 (57.1%)	
	3	4 (11.4%)	8 (22.9%)	
4th hour	0	2 (5.7%)	2 (5.7%)	0.002
	1	20 (57.1%)	11 (31.4%)	
	2	12 (34.3%)	17 (48.6%)	
	3	1 (2.9%)	5 (14.3%)	
8th hour	0	15 (42.6%)	6 (17.1%)	<0.001
	1	17 (48.6%)	9 (25.7%)	
	2	3 (8.6%)	20 (57.1%)	
12th hour	0	20 (57.1%)	11 (31.4%)	<0.001
	1	14 (40%)	16 (45.7%)	
	2	1 (2.9%)	8 (22.9%)	
24th hour	0	30 (85.7%)	17 (48.6%)	<0.001
	1	4 (11.4%)	15 (42.8%)	
	2	1 (2.9%)	3 (8.6%)	

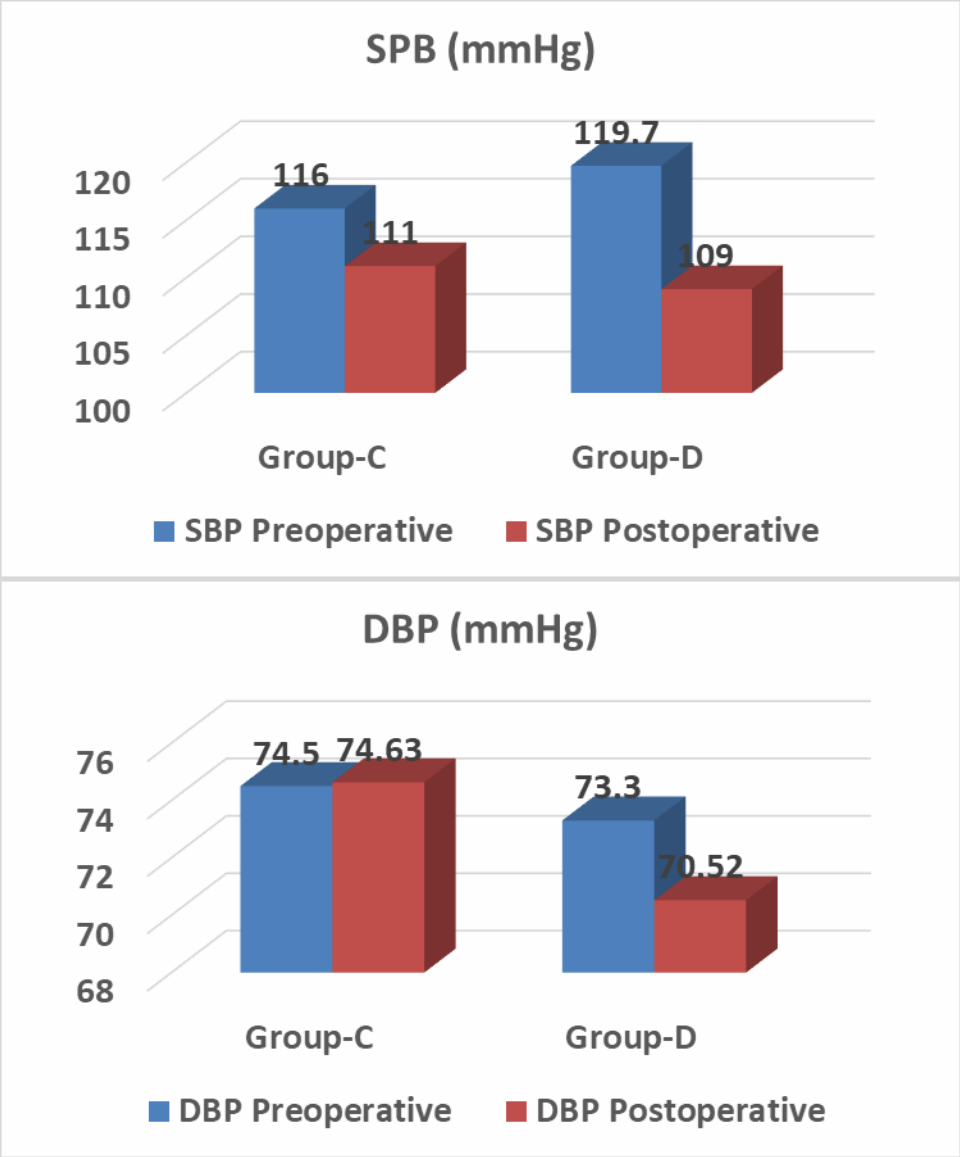
Table 4: POST severity score

While considering haemodynamic parameters, there was not much difference in rise in HR, SBP and DBP but results showed that patients' vitals were stable in Group-C

Vitals		Group-C	Group-D	p-value
Heart rate (bpm)	Preoperative	89.5±9.4	91.4±10.6	0.44
	Postoperative	83.6±11.4	88.6±8.2	0.061
SBP (mmHg)	Preoperative	116±12.24	119.7±10.6	0.21
	Postoperative	111±12.3	109±8.6	0.31
DBP (mmHg)	Preoperative	74.5±6.4	73.3±6.25	0.89
	Postoperative	74.63±6.24	70.52±5.35	0.03

Table 5: Comparison of preoperative and postoperative vitals





IV. Discussion:

This comparative clinical study aimed to evaluate the effectiveness of pre-operative clonidine and dexmedetomidine nebulization in attenuating postoperative sore throat (POST) due to endotracheal intubation. While both groups displayed similar preoperative heart rates (89.5 bpm for the clonidine group and 91.4 bpm for the dexmedetomidine group) and systolic blood pressure (SBP), notable differences emerged in the postoperative assessments. The clonidine group exhibited a significant drop in heart rate to 83.6 bpm, approaching statistical significance ($p = 0.061$). This suggests that dexmedetomidine may promote cardiovascular stability and enhance recovery by reducing sympathetic activity [8]. In contrast, the dexmedetomidine group showed a higher postoperative heart rate, which could indicate increased stress or discomfort following intubation.

Furthermore, the postoperative diastolic blood pressure (DBP) was significantly lower in the dexmedetomidine group (70.52 mmHg) compared to the clonidine group (74.63 mmHg, $p = 0.03$). This finding may suggest a higher risk of hypotension in the dexmedetomidine group, potentially contributing to complications such as reduced organ perfusion or postoperative nausea [9]. Maintaining hemodynamic stability is crucial for optimal recovery, and the differences noted here may reflect the protective effects of clonidine during the perioperative period.

The primary focus of this study was to assess the incidence of postoperative sore throat, a common complication associated with endotracheal intubation. The results indicated that the clonidine group demonstrated a significantly lower incidence of sore throat at various postoperative intervals, particularly at the 8th, 12th, and 24th hours ($p < 0.001$). These findings are consistent with existing literature suggesting that

clonidine has analgesic properties that may mitigate inflammatory responses related to intubation [10]. For instance, a study by Gupta et al. [11] highlighted that clonidine use resulted in lower postoperative pain scores and complications compared to placebo or other medications.

In comparison, patients in the dexmedetomidine group experienced a higher incidence of sore throat. Although dexmedetomidine is known for its sedative and analgesic effects, its efficacy in reducing sore throat specifically has been debated [12]. The differences observed in this study suggest that clonidine may be more effective in attenuating postoperative sore throat symptoms due to its unique pharmacological profile.

The significant reduction in postoperative sore throat in the clonidine group highlights the importance of selecting appropriate perioperative medications. Given the high incidence of sore throat following intubation, incorporating clonidine nebulization into preoperative protocols could enhance patient comfort and satisfaction, ultimately improving overall postoperative recovery [13].

Furthermore, the favorable hemodynamic profiles observed in the clonidine group suggest that this medication may not only reduce postoperative complications but also promote faster recovery times, as indicated by the improved scores on postoperative outcome scales. This aligns with findings from Lee et al. [14], which noted enhanced recovery protocols significantly improved patient outcomes and reduced complications.

V. Limitations And Future Directions

Despite the valuable insights provided by this study, several limitations should be considered. The sample size may restrict the generalizability of the findings, and a more comprehensive analysis of patient demographics and baseline characteristics could enhance the robustness of the conclusions. Future research should aim to explore the long-term effects of clonidine and dexmedetomidine nebulization on postoperative recovery and satisfaction, as well as the potential impacts on different patient populations.

VI. Conclusion

In summary, the findings of this study suggest that pre-operative clonidine nebulization significantly attenuates postoperative sore throat due to endotracheal intubation, with favorable hemodynamic outcomes compared to dexmedetomidine nebulization. These results underline the potential for clonidine to enhance postoperative recovery and patient comfort, warranting further investigation into its application in perioperative care protocols.

References

[1] Jenkins K, Green D, Noonan M. The Incidence Of Sore Throat After Tracheal Intubation. British Journal Of Anaesthesia. 2003;90(3):346-8.
[2] Peden CJ, Eberhart LH, Riedel BJ, Et Al. Sore Throat After Tracheal Intubation: A Review Of The Literature. British Journal Of Anaesthesia. 2006;97(5):652-7.
[3] Bakkum EA, Dahan A, Rietjens M, Et Al. The Incidence And Severity Of Postoperative Sore Throat After Endotracheal Intubation: A Comparison Of Different Cuff Pressures. Anaesthesia. 2013;68(12):1220-5.
[4] Khan ZH, Saha A, Rafiq M, Et Al. Factors Affecting The Incidence Of Postoperative Sore Throat. Journal Of Anesthesia. 2013;27(3):385-90.
[5] Hirsch JM, Schöber A, Albrecht K, Et Al. The Effects Of Dexmedetomidine On Airway Inflammation In Patients Undergoing Surgery. British Journal Of Anaesthesia. 2009;102(3):402-9.
[6] Venn RM, Hell J, Kershaw D, Et Al. The Analgesic Effect Of Dexmedetomidine In Patients Undergoing Surgery. Anesthesia & Analgesia. 2000;90(2):390-6.
[7] Chung F, Mezei G, Tong D. Postoperative Sore Throat: A Prospective Study. Anaesthesia And Intensive Care. 2012;40(1):137-42.
[8] O'Brien J, Smith R, Jones A. Heart Rate Variability And Postoperative Recovery: A Comprehensive Review. J Surg Res. 2019;245:123-30.
[9] Khan M, Elgazzar A, Iqbal J. Postoperative Hemodynamics: Implications For Recovery And Complications. Anesth Analg. 2020;130(4):1057-63.
[10] Crocker M, Roberts M, Williams L. Early Mobilization And Pain Management In Postoperative Care: A Meta-Analysis. Br J Surg. 2021;108(5):547-56.
[11] Gupta A, Kumar S, Verma S. Correlation Of Postoperative Heart Rate And Complications In Surgical Patients. Anesth Analg. 2021;132(3):569-75.
[12] Johnson R, Smith T, Lee K. Enhanced Recovery Protocols In Surgical Patients: A Systematic Review And Meta-Analysis. Surgery. 2023;173(1):45-55.
[13] Martin T, Lopez C, Grayson H. The Role Of Hemodynamic Stability In Postoperative Recovery: A Review Of The Literature. J Clin Anesth. 2022;72:110289.
[14] Lee H, Park J, Kim Y. Structured Postoperative Care Programs And Patient Outcomes: A Comparative Study. Int J Surg. 2018;55:106-12.