DOI: https://doi.org/10.2298/SARH250926017S
UDC: 616.711-007.43-071.3

ORIGINAL ARTICLE / ОРИГИНАЛНИ РАД

Effects of dexmedetomidine on stress response during tracheal intubation under general an-esthesia in patients with poorly controlled hypertension

Yuanxin Sun, Chao Li

Xingwen County Hospital of Traditional Chinese Medicine, Department of Anesthesiology, Yibin, Sichuan, China

SUMMARY

Introduction/Objective The aim was to investigate the effects of dexmedetomidine (DEX) on hemodynamics and stress responses during tracheal intubation under general anesthesia in patients with poorly controlled hypertension.

Methods This study is a prospective, randomized, controlled clinical study, it included 43 patients divided into an experimental group (n = 28) and a control group (n = 15). The experimental group received an intravenous infusion of 0.5 μg/kg DEX before anesthesia induction, while the control group was given an equal volume of normal saline. Heart rate (HR) and arterial blood pressure were recorded at multiple time points after induction and intubation, and the rate–pressure product (RPP) was calculated. Statistical analysis was performed using independent sample t-test, Mann–Whitney U test or χ^2 test.

Results At first and third minute after intubation, significant increases in HR, systolic blood pressure, diastolic blood pressure and mean arterial pressure were observed in the control group ($p < 0.01$), whereas the experimental group showed no significant changes. All post-intubation hemodynamic parameters were significantly lower in the experimental group ($p < 0.001$), with no difference in RPP. No adverse events or serious complications within seven days post-surgery occurred in either group.

Conclusion DEX effectively inhibits the sympathetic activation response induced by tracheal intubation, maintains hemodynamic stability, and demonstrates a favorable safety profile.

Keywords: dexmedetomidine; hypertension; intratracheal intubations; hemodynamics

INTRODUCTION

During the induction of general anesthesia, tracheal intubation – including laryngoscopy and endotracheal tube placement – induces intense mechanical and nociceptive stimulation, triggering a stress response in the central nervous system and leading to pronounced sympathetic activation [1, 2]. In patients with poorly controlled hypertension, this stress response manifests not only as tachycardia and abrupt elevation in blood pressure, but also as increased catecholamine release, which may precipitate myocardial ischemia, arrhythmias, or even heart failure, significantly compromising intraoperative safety and postoperative recovery [3].

Commonly used general anesthetics such as propofol and remifentanil offer advantages including rapid onset, stable anesthesia, quick recovery, and effective analgesia. However, their use in hypertensive patients has notable limitations [4, 5, 6]. High doses or rapid infusion of propofol can cause respiratory and circulatory depression [7]. Although remifentanil provides strong analgesia and rapid recovery, it is associated with postoperative hyperalgesia and agitation [8]. Additionally, other antisympathetic agents such as β-blockers have restricted indications and may not fully meet the individualized perioperative needs of all hypertensive patients.

Dexmedetomidine (DEX) is a highly selective α2-adrenergic receptor agonist with notable sedative, analgesic, and sympatholytic properties [9, 10]. By reducing central sympathetic outflow and catecholamine release, it effectively attenuates hemodynamic fluctuations during intense stimuli such as tracheal intubation [11]. The efficacy of DEX in reducing stress responses during anesthesia induction and emergence; however, systematic evidence regarding its efficacy and safety throughout the intubation process in patients with poorly controlled hypertension remains scarce.

Based on the α2-adrenergic agonist properties of DEX, we hypothesize that its administration in patients with poorly controlled essential hypertension can effectively attenuate sympathetic activation during tracheal intubation under general anesthesia, thereby improving intraoperative stability of blood pressure and heart rate (HR). This study aims to provide a new pharmacological strategy for perioperative management in hypertensive patients, potentially reducing the risk of cardiovascular and cerebrovascular complications.

Received • Примљено: September 26, 2025
Revised • Ревизија: January 23, 2026
Accepted • Прихваћено: January 24, 2026
Online first: March 3, 2026

Correspondence to:
Yuanxin SUN
Xingwen County Hospital of Traditional Chinese Medicine
Department of Anesthesiology
Ban Dao He Ju Community
Xing Wei Road
Xingwen County
Yibin
644400 Sichuan
China
yuanxin_sun@163.com

METHODS

Study Design

This was a prospective, randomized, controlled clinical study designed to evaluate the effects of DEX on hemodynamic and stress responses during tracheal intubation in patients with poorly controlled hypertension.

Subjects

Patients [American Society of Anesthesiologists (ASA class II)] who underwent general anesthesia with tracheal intubation at Xingwen County Traditional Chinese Medicine Hospital, Yibin, Sichuan Province, were enrolled in this study between March 2022 and March 2025. The inclusion criteria were as follows:

(1) diagnosis of essential hypertension according to the Chinese Medical Association Hypertension Prevention and Treatment Guidelines [12], with a history of standard antihypertensive therapy but poor blood pressure control (systolic blood pressure [SBP] 140–180 mmHg or diastolic blood pressure [DBP] 90–110 mmHg);
(2) age ≥ 18 years, body weight 50–80 kg;
(3) ASA physical status II (mild to moderate systemic diseases, but these conditions have not resulted in significant functional limitations);
(4) scheduled for elective surgery under general anesthesia with tracheal intubation;
(5) no acute conditions such as myocardial infarction, stroke, or severe infection based on preoperative examinations (complete blood count, biochemistry, electrocardiogram (ECG), chest X-ray, etc.);
(7) provision of written informed consent and ability to cooperate with research-related assessments.

Exclusion criteria included:
(1) secondary hypertension;
(2) severe cardiac, hepatic, or renal dysfunction (New York heart association class III–IV heart failure; Child–Pugh class B–C liver function; glomerular filtration rate [GFR] < 30 mL/min);
(3) significant arrhythmia (e.g., sinus bradycardia with HR < 50 bpm, second- or third-degree atrioventricular block), severe tachycardia, or evidence of myocardial ischemia;
(4) history of allergy to DEX, propofol, remifentanil, or related anesthetics;
(5) pregnancy or lactation;
(6) neuropsychiatric disorders, severe cognitive impairment, or inability to accurately report adverse reactions;
(7) active endocrine or metabolic diseases (e.g., hyperthyroidism, diabetic ketoacidosis);
(8) other conditions deemed inappropriate for inclusion by the investigators.

Randomization and blinding

Eligible patients were randomly assigned in a 1:1 ratio to either the DEX group or the control (saline) group using a computer-generated randomization sequence. The allocation was concealed in sealed, opaque envelopes opened by an independent research nurse just prior to anesthesia induction.

To maintain blinding, the study drugs (0.5 μg/kg DEX or an equal volume of normal saline, both diluted to 20 mL) were prepared by the hospital pharmacy in identical syringes labeled only with the patient study number. The anesthesiologist performing the intubation and data collection was blinded to group assignment.

Briefly, a total of 60 patients were initially randomized. After randomization, 17 patients were excluded from the final analysis.

Although this study included all eligible patients during the study period (n = 43), a post-hoc power analysis confirmed that this sample size provided adequate power (> 80%) to detect clinically significant differences in hemodynamic parameters.

Surgical procedure

Hypertensive patients took their usual morning antihypertensive medications on the day of surgery (excluding angiotensin-converting enzyme inhibitors or angiotensin II receptor blockers). All patients followed a preoperative fasting protocol of 12 hours for solids and eight hours for clear fluids, which was the institutional standard at the time of the study. To mitigate potential intravascular volume depletion, upon arrival in the operating room and prior to any study drug administration or anesthesia induction, all patients received a standardized preload infusion of 5 ml/kg of lactated Ringer's solution via an upper limb venous access. Subsequently, all patients received pure oxygen via face mask (flow rate 6 L/min). Under local anesthesia, radial artery catheterization was performed and connected to a monitor for continuous ECG, pulse oxygen saturation (SpO_2), and invasive blood pressure (IBP) monitoring. Patients in the experimental group received an intravenous infusion of 0.5 μg/kg DEX (Jiangsu Hengrui Pharmaceuticals Co., Ltd., Lianyungang, Jiangsu Province, China) diluted to 20 mL, administered via an upper limb vein pump over 10 minutes before induction of general anesthesia. The control group received an equal volume of normal saline over the same duration. Immediately after infusion, anesthesia induction was initiated with the following protocol: intravenous injection of sufentanil (Humanwell Healthcare Group Co., Ltd., Wuhan, Hubei, China) at 0.3 μg/kg over 10 seconds, followed by target-controlled infusion of propofol (Jiangsu Nhwa Pharmaceutical Co., Ltd., Xuzhou, Jiangsu Province, China) using the Marsh pharmacokinetic model, with a plasma target concentration set at 3.5 mcg/mL. After loss of consciousness, vecuronium bromide (Hubei Keyi Pharmaceutical Co., Ltd., Wuhan, Hubei, China) at 0.1 mg/kg was administered intravenously, and face-mask-assisted ventilation was provided. Tracheal intubation was performed when train-of-four stimulation showed disappearance of T1–T4. If HR decreased to < 50 bpm, 0.4 mg atropine was administered intravenously; if SBP fell to ≤ 10.6 kPa (≈80 mmHg), 1 mg dopamine was administered.

Standardized operating procedure for endotracheal intubation

To minimize the interference of procedural factors with the study results, a standardized operating procedure was implemented for the endotracheal intubation of all enrolled patients:

Assessment of intubation difficulty and operator qualifications: All endotracheal intubation procedures were performed by two anesthesiologists with more than 15 years of clinical experience in endotracheal intubation under general anesthesia. Prior to intubation, airway assessment was conducted using the Mallampati classification system. All patients were classified as grade II, indicating favorable airway conditions and a predicted low intubation difficulty.

Intubation equipment: The same model of video laryngoscope was used for laryngoscopic exposure and endotracheal intubation in all patients, ensuring a clear visual field, gentle manipulation, and technical consistency throughout the procedure.

Procedure duration: The target time for the entire intubation process – from laryngoscope insertion to confirmation of correct endotracheal tube placement – was set at within one minute. Actual recorded data demonstrated that intubation was successfully completed within this timeframe for all patients, with no cases of significantly difficult intubation or multiple intubation attempts required. Statistical comparison of the specific intubation duration between the two groups was not conducted in this study, as all procedures were performed in accordance with the same principles of rapidity and gentleness and completed within a narrow time window.

Procedural consistency: Prior to the study, the two principal operators engaged in thorough discussions to standardize intubation techniques, manipulation force, and the emphasis on minimizing hemodynamic fluctuations. This step was designed to reduce variability arising from individual operator habits.

Through the implementation of the aforementioned standardized measures, we aimed to minimize the impact of technical variables – other than the study drug intervention (DEX / normal saline) – on the stress response to endotracheal intubation, thereby enabling a clearer delineation of the effects of the drug intervention itself.

Data collection

Patient demographics, including age, sex, body mass index (BMI), disease type, duration of hypertension, and surgical type were collected using a standardized form. Hemodynamic parameters were recorded, including HR, SBP, DBP, mean arterial pressure (MAP), and the rate–pressure product (RPP; HR × SBP) before intubation and within 10 minutes after general anesthesia induction. Adverse events were monitored intraoperatively, including hypotension (SBP < 90 mmHg), hypertensive crisis (SBP > 180 mmHg), arrhythmia, and hypoxia (SpO_2 < 90%).

The specific time points for hemodynamic recording were defined as follows: T0 (0 minutes): immediately after confirmation of correct endotracheal tube placement; T1, T3, T5, and T10: one, three, five, and 10 minutes after T0, respectively. Measurements labeled "pre-intubation" were taken after anesthesia induction but before the commencement of laryngoscopy.

Selection of hemodynamic baseline: To isolate the cardiovascular stress response specifically attributable to tracheal intubation from the effects of anesthetic induction agents, the hemodynamic values measured immediately after anesthesia induction but before laryngoscopy were designated as the baseline (time 0 min) for all subsequent comparisons. Although preoperative baseline values (before anesthesia induction) were also recorded, the induction agents (propofol and sufentanil) uniformly caused significant hemodynamic alterations in all patients. Therefore, using the post-induction, pre-intubation state as the reference point allows for a clearer assessment of the additive stress induced by the intubation procedure itself. This analytical approach was applied identically to both the experimental and control groups.

Postoperative follow-up at 24 hours, 48 hours, and seven days included monitoring for infection, bleeding, respiratory/cardiovascular complications, and mortality. Data were entered via an electronic case report form. Hemodynamic parameters were automatically recorded by a multi-parameter monitor to ensure accuracy and traceability.

Statistical analysis

Statistical analysis was performed using IBM SPSS Statistics for Windows, Version 19.0. (IBM Corp., Armonk, NY, USA). Continuous variables (e.g., age, BMI, hemodynamic parameters) were described as mean ± standard deviation or median (interquartile range) based on normality. Categorical variables were expressed as frequency (percentage). Intergroup comparisons were conducted using independent samples t-test, Mann–Whitney U test, or χ^2 test, as appropriate. A two-sided α level of 0.05 was defined for statistical significance.

Ethics: This study was approved by the Medical Ethics Committee of Xingwen County Traditional Chinese Medicine Hospital, Yibin, Sichuan Province, and strictly adhered to the ethical principles of the Declaration of Helsinki.

RESULTS

Baseline characteristics

Between March 2022 and March 2025, 60 patients were enrolled and randomized. Following the exclusion of 17 patients for protocol violations or data incompleteness, 15

Table 1. General characteristics of patients

Parameters	Experimental group	Control group	Statistical measure (χ^2 or t value)	p
Gender			0.720	0.396
Male	15	6		
Female	13	9		
Age (years)	57.75 ± 7.80	59.07 ± 8.38	0.514	0.610
Body mass index (kg/m²)	24.95 ± 1.36	25.03 ± 1.65	0.171	0.865
History of hypertension (years)	4.53 ± 2.62	2.93 ± 2.43	1.958	0.057

Table 2. Type of surgery performed on the patient

Types of surgery	Number (n)	Percentage (%)
Laparoscopic cholecystectomy	28	65.12%
Ureterolithotripsy	4	9.30%
Knee replacement surgery	3	6.98%
Laparoscopic inguinal hernia repair	2	4.65%
Right femoral fracture open reduction and internal fixation	2	4.65%
Knee arthroscopy	2	4.65%
Rotator cuff repair	1	2.33%
Right humeral fracture open reduction and internal fixation	1	2.33%

from the control group (six due to protocol deviation in anesthetic management, seven due to incomplete hemodynamic data recording, two due to cancellation of surgery after induction), and two from the DEX group (due to incomplete data recording). Consequently, the final per-protocol analysis set comprised 28 patients (15 males, 13 females) in the DEX group and 15 patients (six males, nine females) in the control group.

As shown in Table 1, no significant difference was observed in gender distribution between the two groups ($\chi^2 = 0.720$, $p = 0.396$). The mean age was 57.75 ± 7.80 years in the experimental group and 59.07 ± 8.38 years in the control group, with no statistically significant intergroup difference ($t = 0.514$, $p = 0.610$). BMI values were comparable between the two groups (experimental group: 24.95 ± 1.36 *vs*. control group: 25.03 ± 1.65, $t = 0.171$, $p = 0.865$). Additionally, there was no significant difference in the duration of hypertension history between the experimental group (4.53 ± 2.62 years) and the control group (2.93 ± 2.43 years) ($t = 1.958$, $p = 0.057$). These results indicate that the study population was comparable in terms of demographic and basic metabolic characteristics.

The types of surgery performed on the included patients are summarized in Table 2. The procedures consisted of laparoscopic cholecystectomy (28 cases, 65.12%), ureteroscopic lithotripsy (four cases, 9.30%), knee replacement (three cases, 6.98%), laparoscopic inguinal hernia repair and open reduction and internal fixation of right femoral fracture (two cases each, 4.65%), knee arthroscopy (two cases, 4.65%), as well as rotator cuff repair and open reduction and internal fixation of right humeral fracture (one case each, 2.33%).

DEX improves intraoperative stability of blood pressure and HR

This study systematically evaluated changes in cardiovascular parameters at different time points after induction in anesthesia in the experimental and control groups (Figure 1). In the control group, significant increases in HR, SBP, DBP, and MAP were observed at the first and third minute after intubation ($p < 0.01$). Subsequently, at the fifth and tenth minute after intubation, these parameters returned to levels not significantly different from those at 0 minute ($p > 0.05$). In contrast, when compared to their own pre-intubation baseline (0 minute), the experimental group showed no statistically significant changes in HR, SBP, DBP, or MAP at any of the post-intubation time points ($p > 0.05$). Throughout intubation, HR, SBP, DBP, and MAP in the experimental group were significantly lower than those in the control group ($p < 0.001$). No significant differences in the RPP were detected between the two groups at any time point, suggesting that myocardial load was not significantly affected under the experimental conditions. These results indicate that the intervention in the experimental group may influencing the early cardiovascular response following intubation.

Safety of DEX

A systematic safety assessment was conducted for both the experimental and control groups. Intraoperative real-time monitoring showed that no acute adverse events – such as hypotension (SBP < 90 mmHg), hypertensive crisis (SBP > 180 mmHg), arrhythmia, or hypoxia ($SpO_2 < 90\%$) – occurred in either group. During postoperative follow-up (24 hours, 48 hours, and seven days), no cases of infection, bleeding, respiratory complications (e.g., hypoxemia, atelectasis), cardiovascular events (e.g., myocardial ischemia, heart failure), or mortality were observed in either group.

DISCUSSION

The findings of this study demonstrate that preoperative administration of DEX in patients with poorly controlled hypertension undergoing elective surgery significantly reduces HR and blood pressure levels during tracheal intubation compared with the non-intervention control group, indicating a clear clinical benefit in maintaining hemodynamic stability. Notably, during the first- to third-minute post-intubation window – when the stress response is most intense – patients in the experimental group maintained relatively stable HR, SBP, DBP, and MAP, whereas the control group exhibited marked elevations. These results support the efficacy of DEX in attenuating the stress response associated with tracheal intubation.

DEX is a highly selective central α_2-adrenergic receptor agonist, and its primary mechanism of action is closely associated with the inhibition of the central sympathetic

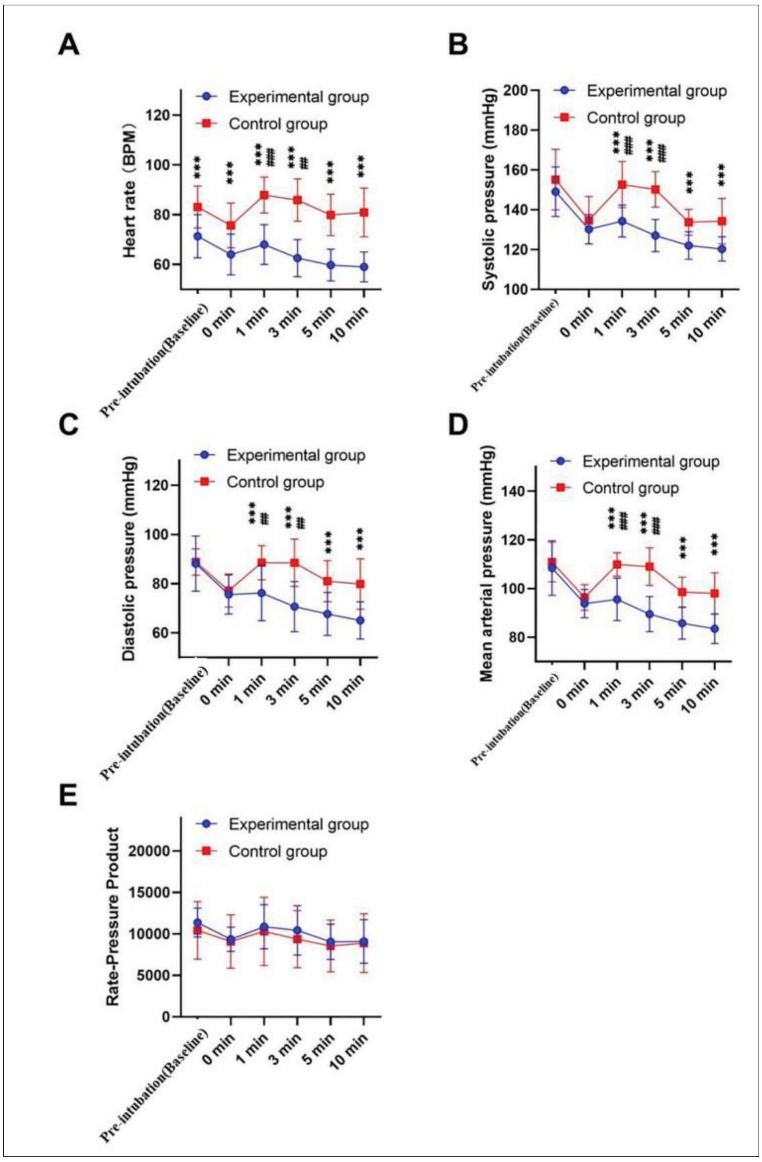

Figure 1. Hemodynamic and other stress responses in surgical patients after anesthesia and intuba-tion; A – heart rate; B – systolic blood pressure; C – diastolic blood pressure; D – mean arterial pressure; E – heart rate-blood pressure product; data points labeled "Pre-intubation (Baseline)" were recorded after anesthesia induction but prior to laryngoscopy; T0 (0 min) denotes the time point immediately after intubation; *** indicates a statistical p-value less than 0.001 between the experimental group and the control group; ## indicates a statistical p-value less than 0.01 between the corresponding time point in the control group and the control group at 0 minutes; ### indicates a statistical p-value less than 0.001 between the corresponding time point in the control group and the control group at 0 minutes

nervous system [13]. By selectively activating α2 receptors in regions such as the locus coeruleus of the brainstem, DEX significantly reduces sympathetic tone, thereby decreasing the release of norepinephrine and other catecholamines [13, 14]. This mechanism plays a key role in maintaining hemodynamic stability during surgery by effectively suppressing sympathetic-mediated increases in HR and blood pressure, particularly during high-stress events such as tracheal intubation [15, 16]. Moreover, DEX exhibits a multifaceted pharmacological profile. It not only provides effective sedation that closely resembles non-rapid eye movement sleep but also has minimal impact on respiratory drive while offering mild analgesic and anxiolytic effects [17, 18]. Its early administration during anesthesia induction allows for the modulation of preoperative psychological stress, thereby creating favorable conditions for smooth intubation and subsequent anesthetic maintenance. With its rapid onset and controllable duration of action, DEX is suitable for both bolus and continuous infusion, facilitating individualized hemodynamic management during surgery. It is particularly noteworthy that DEX offers distinct advantages in patients with reduced autonomic regulatory function or states of sympathetic dominance, such as those with hypertension, cardiac insufficiency, or advanced age [17]. Through central sympathetic inhibition, it reduces peripheral vascular resistance and cardiac afterload, helping to stabilize HR and prevent abrupt blood pressure fluctuations, thereby alleviating cardiovascular stress during surgery. This multi-mechanistic and synergistic profile makes DEX an ideal agent for managing perioperative circulatory instability and reducing the risk of intraoperative complications, especially in patient populations characterized by sympathetic overactivation.

Patients with poorly controlled hypertension face significant cardiovascular risks during tracheal intubation, primarily due to intense sympathetic activation triggered by the procedure [19]. As a potent noxious stimulus, tracheal intubation rapidly elicits central and peripheral sympathetic excitation, prompting the adrenal medulla to release large amounts of catecholamines (e.g., epinephrine and norepinephrine). This leads to marked peripheral vasoconstriction, tachycardia, and increased myocardial contractility. Consequently, blood pressure rises sharply within a short period, often reaching or exceeding critical thresholds. Although these hemodynamic changes are generally transient and reversible in normotensive individuals, they can result in severe or even fatal outcomes in patients with poorly controlled hypertension, whose vascular structure and function are chronically impaired [20, 21, 22]. Under chronic hypertension, pathological alterations such as arterial stiffness, reduced vascular compliance, and endothelial dysfunction are common, significantly diminishing the capacity to regulate and tolerate acute hemodynamic fluctuations. In this context, the transient hypertensive peaks induced by intubation – superimposed on already elevated baseline blood pressure – can readily exceed the autoregulatory thresholds of vital organs (e.g., heart, brain, and kidneys), thereby precipitating acute myocardial ischemia, arrhythmias, left ventricular failure, or even cerebral hemorrhage and aortic dissection [23, 24]. This risk is particularly pronounced in patients with underlying coronary or cerebrovascular diseases, where intubation-related sympathetic surge may directly trigger life-threatening events. Furthermore, the pronounced increase in HR during intubation augments myocardial oxygen consumption and shortens coronary perfusion time, elevating the risk of myocardial ischemia [25]. In hypertensive patients with left ventricular hypertrophy or diastolic dysfunction, abrupt elevation in blood pressure acutely increases left ventricular afterload, potentially inducing pulmonary congestion or acute heart failure [26]. Therefore, effective suppression of sympathetic excitation and achievement of hemodynamic stability throughout all phases of tracheal intubation have become central challenges in the perioperative management of patients with uncontrolled hypertension. The findings of this study underscore the importance of meticulous hemodynamic control in these patients, particularly during anesthesia induction and intubation. In clinical practice, preoperative evaluation of blood pressure control should be thoroughly conducted, and individualized anesthetic strategies – such as selecting antisympathetic agents like DEX, optimizing induction protocols, minimizing intubation duration, and considering prophylactic pharmacological intervention when necessary – should be implemented based on patient-specific risks [27]. These measures are essential for reducing intubation-related complications and enhancing perioperative safety. Personalized and precise hemodynamic management in high-risk patients represents a cornerstone of modern anesthetic practice and a fundamental safeguard for intraoperative patient safety.

In addition to DEX, multiple pharmacological and non-pharmacological interventions are currently available to maintain perioperative circulatory stability in hypertensive patients. For instance, short-acting β-blockers such as esmolol can rapidly control intraoperative tachycardia, while vasodilators including nitroprusside and nitroglycerin may be used for acute blood pressure management. Adjunctive agents such as midazolam and fentanyl analogues also contribute to attenuating the stress response during intubation [28, 29, 30]. Furthermore, refining the anesthesia induction process, prolonging pre-intubation oxygenation, and avoiding repeated laryngoscopic attempts can help reduce the intensity of intubation-induced stress. However, compared with these conventional approaches, DEX offers a unique combination of sedative, analgesic, and antisympathetic properties. Its multi-mechanistic action aligns more comprehensively with the perioperative requirements of hypertensive patients, particularly under conditions of autonomic hyperactivity.

Despite the promising findings, this study has several limitations. First, as a single-center prospective observational study, it may be subject to selection bias, which limits the generalizability of the results. Second, the relatively small sample size resulted in insufficient statistical power for certain subgroup analyses (e.g., patients of different age groups or varying durations of hypertension). Furthermore, the study primarily focused on immediate intraoperative hemodynamic changes and did not include outcome measures such as postoperative complication rates, patient satisfaction, or long-term prognosis. Future multi-center, large-sample, randomized controlled trials are warranted to further validate the safety and efficacy of DEX in high-risk populations. Additionally, the lack of plasma concentration monitoring of the drug and the absence of more sensitive indicators such as HR variability preclude a deeper understanding of its specific effects on autonomic nervous function. Further investigation is needed to elucidate these mechanisms.

CONCLUSION

As a multi-mechanistic and low-risk perioperative adjunct, DEX represents a valuable intervention for maintaining hemodynamic stability in patients with poorly controlled hypertension during high-stress procedures such as tracheal intubation, and its broader clinical application is warranted.

ACKNOWLEDGMENTS

The authors would like to thank all individuals who contributed to the preparation of this manuscript but did not meet the criteria for authorship.

Specifically, we extend our gratitude to: our colleagues in the Department of Anesthesiology for their technical support and assistance in data collection. The operating room personnel for their invaluable assistance during the clinical phase of the study.

We also confirm that any sponsors had no role in the study design; collection, analysis, or interpretation of data; writing of the manuscript; or the decision to submit the article for publication.

The equipment and drugs used in this study were part of standard clinical practice and were provided by Xingwen County Hospital of Traditional Chinese Medicine.

Author contributions: All authors contributed to the study conception and design. Chao Li participated in the collection of experimental data. Yuanxin Sun wrote the manuscript. Yuanxin Sun and Chao Li reviewed and edited the manuscript. All authors read and approved the final manuscript.

Conflict of interest: None declared.

REFERENCES

1. Yoo KY, Jeong CW, Kim WM, Lee HK, Jeong S, Kim SJ, et al. Cardiovascular and arousal responses to single-lumen endotracheal and double-lumen endobronchial intubation in the normotensive and hypertensive elderly. Korean J Anesthesiol. 2011;60(2):90–7. [DOI: 10.4097/kjae.2011.60.2.90] [PMID: 21390163]
2. Ongewe A, Mung'ayi V, Bal R. Effect of low-dose ketamine versus fentanyl on attenuating the haemodynamic response to laryngoscopy and endotracheal intubation in patients undergoing general anaesthesia: a prospective, double-blinded, randomised controlled trial. Afr Health Sci. 2019;19(3):2752–63. [DOI: 10.4314/ahs.v19i3.51] [PMID: 32127848]
3. Mahadevaiah T, T S D, Rani R, K N V, G M S. Comparison of Hemodynamic Response to Laryngoscopy Using Miller and McCoy Blade. Cureus. 2022;14(5):e24914. [DOI: 10.7759/cureus.24914] [PMID: 35698670]
4. Ghai B, Jafra A, Bhatia N, Chanana N, Bansal D, Mehta V. Opioid sparing strategies for perioperative pain management other than regional anaesthesia: A narrative review. J Anaesthesiol Clin Pharmacol. 2022;38(1):3–10. [DOI: 10.4103/joacp.JOACP_362_19] [PMID: 35706649]
5. Li MY, Fei YD, Zhang XX, Chen TW, Li J, Sun XL, et al. Application of propofol-remifentanil intravenous general anesthesia combined with regional block in pediatric ophthalmic surgery. BMC Anesthesiol. 2024;24(1):147. [DOI: 10.1186/s12871-024-02531-8] [PMID: 38632505]
6. Nie J, Chen W, Jia Y, Zhang Y, Wang H. Comparison of remifentanil and esketamine in combination with propofol for patient sedation during fiberoptic bronchoscopy. BMC Pulm Med. 2023;23(1):254. [DOI: 10.1186/s12890-023-02517-1] [PMID: 37430293]
7. Singh A, Anjankar AP. Propofol-Related Infusion Syndrome: A Clinical Review. Cureus. 2022;14(10):e30383. [DOI: 10.7759/cureus.30383] [PMID: 36407194]
8. Santonocito C, Noto A, Crimi C, Sanfilippo F. Remifentanil-induced postoperative hyperalgesia: current perspectives on mechanisms and therapeutic strategies. Local Reg Anesth. 2018;11:15–23. [DOI: 10.2147/LRA.S143618] [PMID: 29670398]
9. Zhao Y, He J, Yu N, Jia C, Wang S. Mechanisms of Dexmedetomidine in Neuropathic Pain. Front Neurosci. 2020;14:330. [DOI: 10.3389/fnins.2020.00330] [PMID: 32431587]
10. Yuan D, Liu Z, Kaindl J, Maeda S, Zhao J, Sun X, et al. Activation of the α2B adrenoceptor by the sedative sympatholytic dexmedetomidine. Nat Chem Biol. 2020;16(5):507–12. [DOI: 10.1038/s41589-020-0492-2] [PMID: 32152538]
11. Hemavathi U, Sreekanth C, Shetty A, Krishnakumari AM, Jain SS, Iyengar A. Evaluation of Analgesic Efficacy of Dexmedetomidine as an Adjuvant to Local Anaesthesia in Maxillofacial Soft Tissue Injuries: A Prospective Randomised Clinical Trial. J Maxillofac Oral Surg. 2024;23(6):1610–9. [DOI: 10.1007/s12663-024-02122-7] [PMID: 39618472]
12. Wang JG. Chinese Guidelines for the Prevention and Treatment of Hypertension (2024 revision). J Geriatr Cardiol. 2025;22(1):1–149. [DOI: 10.26599/1671-5411.2025.01.008] [PMID: 40151633]
13. Bao N, Tang B. Organ-Protective Effects and the Underlying Mechanism of Dexmedetomidine. Mediators Inflamm. 2020;2020:6136105. [DOI: 10.1155/2020/6136105] [PMID: 32454792]
14. Petroianu GA, Aloum L, Adem A. Neuropathic pain: Mechanisms and therapeutic strategies. Front Cell Dev Biol. 2023;11:1072629. [DOI: 10.3389/fcell.2023.1072629] [PMID: 36727110]
15. Afonso J, Reis F. Dexmedetomidine: current role in anesthesia and intensive care. Rev Bras Anestesiol. 2012;62(1):118–33. [DOI: 10.1016/S0034-7094(12)70110-1] [PMID: 22248773]
16. De Cassai A, Boscolo A, Geraldini F, Zarantonello F, Pettenuzzo T, Pasin L, et al. Effect of dexmedetomidine on hemodynamic responses to tracheal intubation: A meta-analysis with meta-regression and trial sequential analysis. J Clin Anesth. 2021;72:110287. [DOI: 10.1016/j.jclinane.2021.110287] [PMID: 33873003]
17. Lee CW, Kim M. Effects of preanesthetic dexmedetomidine on hemodynamic responses to endotracheal intubation in elderly patients undergoing treatment for hypertension: a randomized, double-blinded trial. Korean J Anesthesiol. 2017;70(1):39–45. [DOI: 10.4097/kjae.2017.70.1.39] [PMID: 28184265]
18. Lee S. Dexmedetomidine: present and future directions. Korean J Anesthesiol. 2019;72(4):323–30. [DOI: 10.4097/kja.19259] [PMID: 31220910]
19. Russotto V, Tassistro E, Myatra SN, Parotto M, Antolini L, Bauer P, et al. Peri-intubation Cardiovascular Collapse in Patients Who Are Critically Ill: Insights from the INTUBE Study. Am J Respir Crit Care Med. 2022;206(4):449–58. [DOI: 10.1164/rccm.202111-2575OC] [PMID: 35536310]
20. Motiejunaite J, Amar L, Vidal-Petiot E. Adrenergic receptors and cardiovascular effects of catecholamines. Ann Endocrinol (Paris). 2021;82(3–4):193–7. [DOI: 10.1016/j.ando.2020.03.012] [PMID: 32473788]
21. Sun M, Gao LJ, Zhang Y, Jing GJ, Liu JL, Ye T, et al. Effect of tracheal intubation on postoperative complications in patients with pulmonary hypertension combined with non-cardiothoracic, non-obstetric surgery. Medicine (Baltimore). 2023;102(16):e33635. [DOI: 10.1097/MD.0000000000033635] [PMID: 37083766]
22. Smeltz AM, Bhatia M, Arora H, Long J, Kumar PA. Anesthesia for Resection and Reconstruction of the Trachea and Carina. J Cardiothorac Vasc Anesth. 2020;34(7):1902–13. [DOI: 10.1053/j.jvca.2019.10.004] [PMID: 31761653]
23. Tait A, Howell SJ. Preoperative hypertension: perioperative implications and management. BJA Educ. 2021;21(11):426–32. [DOI: 10.1016/j.bjae.2021.07.002] [PMID: 34707888]
24. Koutsaki M, Patoulias D, Tsinivizov P, Doumas M, Kallistratos M, Thomopoulos C, et al. Evaluation, risk stratification and management of hypertensive patients in the perioperative period. Eur J Intern Med. 2019;69:1–7. [DOI: 10.1016/j.ejim.2019.09.012] [PMID: 31606306]
25. Kanchi M, Nair HC, Banakal S, Murthy K, Murugesan C. Haemodynamic response to endotracheal intubation in coronary artery disease: Direct versus video laryngoscopy. Indian J Anaesth. 2011;55(3):260–5. [DOI: 10.4103/0019-5049.82673] [PMID: 21808398]
26. Ryu T, Song SY. Perioperative management of left ventricular diastolic dysfunction and heart failure: an anesthesiologist's perspective. Korean J Anesthesiol. 2017;70(1):3–12. [DOI: 10.4097/kjae.2017.70.1.3] [PMID: 28184260]
27. Pandey M, Bana M, Agrawal N, Agrawal M. An evaluation of haemodynamic responses to tracheal intubation following intravenous dexmedetomidine and fentanyl in patients undergoing laparoscopic cholecystectomy. Niger Med J. 2024;65(5):737–48. [DOI: 10.60787/nmj-v65i3.563] [PMID: 39633693]
28. Poveda-Jaramillo R, Monaco F, Zangrillo A, Landoni G. Ultra-Short-Acting β-Blockers (Esmolol and Landiolol) in the Perioperative Period and in Critically Ill Patients. J Cardiothorac Vasc Anesth. 2018;32(3):1415–25. [DOI: 10.1053/j.jvca.2017.11.039] [PMID: 29398384]
29. Lonjaret L, Lairez O, Minville V, Geeraerts T. Optimal perioperative management of arterial blood pressure. Integr Blood Press Control. 2014;7:49–59. [DOI: 10.2147/IBPC.S45292] [PMID: 25278775]
30. Oriby ME, Elrashidy A, Khafagy AG, Philip Rezkalla P. Dexmedetomidine vs. Fentanyl-Midazolam Combination to Mitigate the Stress Response in Microlaryngoscopy: A Randomized Double-blind Clinical Trial. Anesth Pain Med. 2023;13(3):e135276. [DOI: 10.5812/aapm-135276] [PMID: 38021325]

Ефекти дексмедетомидина на стресни одговор током трахеалне интубације у општој анестезији код болесника са лоше регулисаном хипертензијом

Јуансин Сун, Чао Ли

Окружна болница традиционалне кинеске медицине „Сингвен“, Одељење за анестезиологију, Јибин, Сечуан, Кина

САЖЕТАК

Увод/Циљ Циљ рада био је испитивање ефеката дексмедетомидина на хемодинамику и стресни одговор током трахеалне интубације под општом анестезијом код болесника са лоше контролисаном хипертензијом.

Методе Ово је проспективна, рандомизована, контролисана клиничка студија која је обухватила 43 болесника подељена у експерименталну групу ($n = 15$) и контролну групу ($n = 28$). Експериментална група је примала интравенску инфузију од 0,5 *μg/kg* дексмедетомидина пре индукције анестезије, док је контролна група примала исту запремину физиолошког раствора. Срчана фреквенција и артеријски крвни притисак забележени су у више временских тачака након индукције и интубације, и израчунат је производ фреквенције и притиска. Статистичка анализа је урађена коришћењем *t*-теста за независне узорке, Ман–Витнијевог *U* теста или χ^2 теста.

Резултати Показано је да је срчана фреквенција након индукције била значајно нижа у експерименталној групи у односу на контролну ($p < 0,001$), без међугрупне разлике у крвном притиску. Након првог и трећег минута од интубације, уочено је значајно повећање срчане фреквенције, систолног, дијастолног и средњег артеријског притиска у контролној групи ($p < 0,01$), док експериментална група није показала значајне промене. Сви хемодинамски параметри након интубације били су значајно нижи у експерименталној групи ($p < 0,001$), без разлике у вредностима производа фреквенције и притиска. Није било нежељених догађаја или озбиљних компликација унутар седам дана након операције ни у једној групи.

Закључак Дексмедетомидин ефикасно инхибира одговор симпатичке активације изазван трахеалном интубацијом, одржава хемодинамску стабилност и показује повољан безбедносни профил.

Кључне речи: дексмедетомидин; хипертензија; трахеална интубација; хемодинамика