Original research article

Intravenous Lornoxicam for Attenuation of the Cardiovascular Response to Laryngoscopy and Endotracheal Intubation

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ABSTRACT

Purpose: The purpose of this study was to determine the hemodynamic effect of intravenous lornoxicam during laryngoscopy and endotracheal intubation and to determine whether intravenous lornoxicam is effective in reducing the hemodynamic stress response to laryngoscopy and endotracheal intubation.

Methods: It was a double blind randomized control trial to investigate the effect of lornoxicam on the change in blood pressure, heart rate observed during laryngoscopy and tracheal intubation in 50 ASA class I and II patients. 50 patients with similar characteristics were divided into groups of 25 each. One group received lornoxicam, while the other received a placebo.

Results: Blood pressure and heart rate was recorded at various intervals during laryngoscopy and endotracheal intubation. It was observed that there was a significant attenuation in heart rate and blood pressure response to laryngoscopy and intubation for the lornoxicam group.

Conclusion: The use of IV lornoxicam during laryngoscopy and intubation can save lives since it significantly lowers the hemodynamic reactions to intubation when administered 30 minutes prior to the surgery.

Key Words: Blood Pressure, Catecholamine's , IV, Lornoxicam, Mean Arterial Pressure , Normal Saline, Placebo

Introduction

Laryngoscopy and intubation are associated with a transient cardiovascular stress response characterized by hypertension and an increase in circulating catecholamines. This was known as early as 1951 [1]. This is of little consequence to most of the patients, but increases morbidity and mortality in patients with coronary arterial disease, systemic hypertension, preeclampsia, increased intraocular pressure, and cerebrovascular pathologies such as tumors, aneurysms, or increased intracranial pressure. Several techniques, such as deepening anesthesia, omitting anticholinergic premedication, and pretreatment with vasodilators such as nitroglycerine, beta blockers, calcium channel blockers, and opioids, have been proposed to prevent or mitigate hemodynamic responses following laryngoscopy and intubation [2, 3]. The recent studies

aimed at controlling or attenuating the hemodynamic response to intubation and laryngoscopy focused on the effectiveness of lornoxicam at different dosing regimens [3]. The study's objective is to determine the hemodynamic effect of intravenous lornoxicam during laryngoscopy and endotracheal intubation and to determine whether intravenous lornoxicam is effective in reducing the hemodynamic stress response to laryngoscopy and endotracheal intubation.

Material and Method

It is a randomized, double-blind, placebo-controlled trial. A total of 50 patients participated in this study, which was divided into two groups. Group S (25 patients) and Group L (25 patients) were the placebo and lornoxicam groups, respectively. This randomized trial was carried out at the Department of Anesthesiology Government Medical College Kottayam. The study was done after approval from the institutional ethical committee. After obtaining ethical committee approval, 50 patients aged 30 to 50 years with ASA classes 1 and 2 who needed elective surgical procedures were enrolled in this study.

Inclusion criteria

1. Patients who required tracheal intubation for elective surgical procedures
2. ASA class 1 at class II
3. Age between 30 and 50 years
4. Weight of patience: 42 to 70 kg

Exclusion criteria

1. Anticipated difficult intubation
2. At risk of regurgitation or pulmonary aspiration
3. With renal or hepatic impairment
4. Receiving medications known to affect BP and HR
5. Allergy to NSAIDS
6. ASA physical status III or greater
7. Acid peptic disease, bronchial asthma, and coagulation disorders
8. Pregnancy and lactation

Plan of study

Following a routine pre-anesthetic checkup and the application of exclusion criteria, 50 patients with endotracheal incubations were about to undergo general anesthesia and were randomly assigned to groups. Group L was given lornoxicam 16 mg intravenously, 30 minutes before laryngoscopy and intubation after the test dose. Group S, the control group; this group received placebo (normal saline) intravenously 30 minutes before laryngoscopy and intubation. Premedication: Both groups received metoclopramide 10 mg, ranitidine 150 mg, and diazepam 5 mg tablets with a sip of water the night before surgery and in the morning of surgery. They are pre-medicated with intramuscular injections of morphine 0.1 mg per KG and promethazine 0.5 mg per KG one hour before surgery.

Anesthetic technique

Participants in the study were asked to abstain from all food and liquids beginning at 10:00 p.m. Regular morning procedures include inserting an intravenous cannula and beginning a lactated Ringer's infusion in the holding area. Both groups were given an IM injection of 0.1 mg of morphine per kg and 0.5 mg of promethazine per kg 45 minutes before surgery. After obtaining the patient's and family’s informed consent, they will be randomly assigned to receive either an intravenous dose of lornoxicam or a placebo (IV normal saline) half an hour

before surgery. Medicine—intravenous lornoxicam or normal saline—administered by an anesthesiologist not associated with the study. A standard induction technique was used. Anesthesia was induced with propofol at a dose of 1.5–1.75 mg/kg upon arrival in the operating room and after preoxygenation using Bains' co-axial circuit. Succinyl choline was given at 2 mg/kg to facilitate tracheal intubation. Systolic and diastolic blood pressures, mean arterial pressure, heart rate, and ECG changes were recorded before and after the Intra Venus anesthetic was administered, as well as at 1, 3, 5, and 10 rots after laryngoscopy and tracheal intubation. During the observation period, systolic blood pressure and diastolic blood pressure, mean arterial pressure, and heart rate parameters were recorded.

Statistical Analysis

Data were analyzed using SPSS. Quantitative data were conveyed as mean ± SD and qualitative data were conveyed as frequency and percentage. An Independent sample t-test of significance was used when comparing the two means. The chi square test of significance was used to analyze proportions in between 2 qualitative parameters. P-value less than 0.05 was considered as significant.

RESULT

50 patients with similar characteristics were divided into groups of 25 each. One group received lornoxicam, while the other received a placebo. Two groups were perfectly matched in terms of number of patients, age, sex, weight, height, ASA physical status, duration, and laryngoscopy.

Table 1: Demographic characteristics

SN	Variables	Group S(NS)	Group L(Lornoxicam 16 mg intravenously)
1	**Age in years (mean±sd)**	32.5± 5.2	33.1± 4.4
2	**Gender** **Male** **Female**	 10 (40%) 15 (60%)	 12 (48%) 13 (52%)
3	**Weight in kg**	68.7±4.2	66.9±5.3
4	**Height in cm**	167.9±8.6	170±4.5
5	**ASA** **Class I** **Class II**	 11 (44%) 14 (54%)	 12 (48%) 13(52%)
4	**Duration of laryngoscopy in minutes mean(±SD)**	14.9(±1.7)	16.2(±1.2)
	Total	**25 (100%)**	**25 (100%)**

The mean age of the participants in Group S is 32.5 ±5.2, while it is 33.1± 4.4 in Group L. The majority of the participants were females in group S 15 and Group L 13. The mean weight of the participants in groups S and L was 68.7±4.2 kg and 66.9±5.3 kg, respectively. The mean height of the participants in group S 167.9 ±8.6 in group L 170± 4.5. Majority of the participants wear in ASA class II in group S 14 and group L 13. The mean duration of laryngoscopy 14.9 ±1.7 in group is and 16.2±1.2 . (Table 1.)

Table 2: Systolic blood pressure changes before and after laryngoscopy and intubation

Systolic blood pressure/ mmHg	Group L(Lornoxicam 16 mg intravenously)	Group S(NS)	P value

Before laryngoscopy	112.48	113.92	0.67
1 minute	121.6	135.92	0.0001
3 minute	116	127.92	0.021
5 minute	114.16	115.12	0.74
10 minute	113.12	114.64	0.57

Systolic blood pressure changes before and after laryngoscopy and intubation are analysed (table 2). The mean systolic blood pressure before laryngoscopy was 112.48 mmHg in group S and 113.92 mmHg in group L. At 1 minute mean systolic blood pressure, group L had 121.6 mmHg and group S had 135.92 mmHg. At 3-minute mean systolic blood pressure, group L is 116 mmHg and group S is 127.92 mmHg. At 5 minute mean systolic blood pressure, group L is 114.16 mmHg and group S is 115.12 mmHg. at 10-minute mean systolic blood pressure, group L (113.12 group L) and group S (114.64 group S). The study shows that in terms of percentage of rising systolic BP in both groups at 1 minute and 3 minutes, the p value is less than 0.05, which is 0.0001 at 1 minute and 0.021 at 3 minutes, which is showing statistical significance. It is showing that systolic BP before laryngoscopy after induction was comparable in both groups, but there was a definite reduction in the stress response in the lornoxicam group, and the difference was significant at 1 minute and 3 minute intervals. (Table 2)

Table 3: Systolic blood pressure changes before and after laryngoscopy and intubation

Diastolic blood pressure/ mmHg	Group L(Lornoxicam 16 mg intravenously)	Group S (NS)	P value
Before laryngoscopy	68.08	69.2	0.48
1 minute	72.52	81.44	0.0001
3 minute	66.24	76.4	0.001
5 minute	64.44	70.64	0.007
10 minute	64.96	70.32	0.001

In pre-laryngoscopy, group L had a mean diastolic blood pressure of 68.08 mmHg, and group S had a mean diastolic blood pressure of 69.20 mmHg. At 1 minute mean diastolic blood pressure, group L was 72.52 mmHg, and group S was 81.443 mmHg. At 3 minute mean diastolic blood pressure, group L was 66.24 mmHg and group S was 76.4 mmHg. At 5-minute mean diastolic blood pressure in group L: 64.44 mmHg and group S: 70.64 mmHg. At 10 minute mean Diastolic blood pressure group L 64.96 mmHg group S 70.32 mmHg. The percentage of rise and DBP in both groups at 1 minute, 3 minutes, 5 minutes, and 10 minutes is statistically significant; the p value is less than 0.05 at 1 minute, 0.001 at 3 minutes, 0.07 at 5 minutes, and 0.0001 at 10 minutes.

Before laryngoscopy, diastolic blood pressure was not comparable in both groups. After laryngoscopy, there was a definite rise in diastolic BP in the placebo group, and the difference was significant at 1 minute, 3 minutes, 5 minutes, and 10 minute intervals. (Table 3)

Table 4: compares in the changes in mean arterial pressure (MAP) for both the Groups

MAP(Mean) mmHg	Group L(Lornoxicam 16 mg intravenously)	Group S (NS)	P value
After induction	82.88	84.1	0.46
1 minute	88.88	99.75	0.13
3 minute	82.82	93.57	0.0001

5 minute	81.01	85.47	0.0007
10 minute	81.01	85.09	0.01

The mean arterial pressure is calculated using the formula
MAP = DBP + 1 / 3 is(S BP - DBP)
Where DBP is equal to diastolic blood pressure, SBP=Systolic blood pressure
The mean arterial pressure was definitely lower in group L, and the difference was significant for 3 minutes, 5 minutes, and 10 minutes. After induction, the mean arterial pressure in group L was 82.88 mmHg and 80.41 mmHg in group S (P = 0.46). At 1 minute, group L had an arterial pressure of 88.88 mmHg and group S had an arterial pressure of 99.75 mmHg (P = 0.13). At 3 minutes, arterial pressure in group L was 82.82 mmHg and 93.87 mmHg in group S (P value = 0.001). The mean arterial pressure at 5 minutes was group L 81.01 mmHg and group S 85.47 mmHg (P value 0.07). The mean arterial pressure at 10 minutes for group L was 81.01 mmHg, and for group S WAS 80 5.09 mmHg (P value 0.01) . (Table 4)

Table 5. Heart rate changes

Heart rate bpm (Mean)	Group L(Lornoxicam 16 mg intravenously)	Group S (NS)	P value
Pre Laryngoscopy	82.72	87.04	0.54
1 minute	95.84	114.16	0.001
3 minute	89.6	112.76	0.0001
5 minute	83.76	101.4	0.000
10 minute	84	91.96	0.003

Heart rate followed the same path as DBP. The increase in heart rate was significantly lower in group L, and the difference was significant at the 1 minute (p = 0.001), 3 minute (p = 0.001), 5 minute (p = 0.00), and 10 minute (p = 0.003) intervals. (Table 5)

Discussion

Lornxicam is a non-steroidal anti-inflammatory drug of the oxicam class with analgesic and anti-inflammatory properties. It acts by inhibiting synthesis of prostaglandins via inhibition of cyclooxygenase but does not in inhibit 5 lipoxygenase. Lornoxicam may be administered orally, intramuscularly, or intravenously. After Intramuscular injection, maximum plasma concentration is achieved approximately after 20 to 25 minutes. The absolute bioavailability after IM injection is 97%. It is found in plasma in unchanged form and as hydroxylated metabolites. It is extensively metabolised in the liver to the inactive metabolite 5-hydroxylonoxicam. With a mean elimination half-life of 3 to 4 hours, 51 percent of the drug is excreted through the faeces and 42 percent through the kidneys. Lornoxicam is a drug with very good tolerance and a very low incidence of adverse effects. The most common among them is gastrointestinal disturbances, headaches, dizziness, and allergic reactions are less common adverse reactions [4].
Lornoxicam counteracts the diuretic effect of furosemide. It may decrease the effect of ACE inhibitors, increase lithium peak concentration, and decrease renal clearance of digoxin. Hence, it should be administered with caution to patients receiving the above-mentioned drugs.

Mechanism of stress response attenuation by lornoxicam [5]

1. Decrease serum catecholamine levels while obtaining a cardiovascular sympathetic response during laryngoscopy and tracheal intubation.
2. Increase endogenous opioids, dynorphins, and beta endorphins

3. Prostaglandin inhibition, which cuts off visceral somatic nociceptive afferents that contribute to the stress response during laryngoscopy.

It was reported that IV 8 mg lornoxicam was equianalgesic with 20 mg morphine (6). 50 mg of pethidine, while 16 MG of lornoxicam had a superior analgesic effect compared to 100 mg of tramadol [7], was comparable to 100 micrograms of fentanyl for intraoperative analgesia in mild to moderate daycare ENT surgeries (8).
The hemodynamic stress response to laryngoscopy and intubation is supposed to be initiated by the sympathetic nervous system, which starts within 5 seconds of the laryngoscope pressing on the base of the tongue. It reaches the baseline value between 5 and 10 minutes after intubation. In the present study, an attempt has been made to determine the efficacy of intravenous lornoxicam 16 mg given 30 minutes before laryngoscopy and intubation in attenuating the hemodynamic stress response.

The results showed that lornoxicam attenuated the pressor response to tracheal intubation, as measured by systemic blood pressure and diastolic blood pressure, and also reduced the tracheal irritation associated with laryngoscopy and endotracheal intubation.
Raid w. Maussa et al. (2008 conducted a study with the aim of demonstrating the effect of pre-operative administration of CAM and hemodynamic changes during laryngoscopy and tracheal intubation in the elderly. It was also a double-blind placebo-controlled study, with participants divided into two groups and given either lornoxicam (8 grams) or a placebo half an hour before surgery. Systolic and diastolic pressure, mean arterial pressure, and heart rate were recorded before and after administration of the intravenous anesthetic and also at 1, 3, 5, and 10 minutes after tracheal intubation.

The study result demonstrated that preoperative administration of lornoxicam attenuated the hemodynamic response to laryngoscopy and tracheal intubation in the elderly. In agreement with other results, the cardiovascular response to laryngoscopy and tracheal intubation is well established in the literature. Tsubaki and colleagues reported a marked increase in the circulatory and catecholamine responses with direct laryngoscopy [9]. The hemodynamic response to direct laryngoscopy was compared with that of the intubating laryngeal mask and the trachilight device (Laerdal Medical Corporation, Wappingers Falls, NY, USA) in a study by Kihara and colleagues. Their results showed that HR increased compared to pre-operative baseline values in all groups, but both systolic and diastolic blood pressure increased after tracheal intubation for 2 minutes, with the highest value Shribman and college reported that laryngoscopy alone or associated with tracheal intubation produces an increase in arterial pressure and catecholamine levels, while tracheal intubation significantly increases HR [10]. Kahl and colleagues reported that direct laryngoscopy produces a marked stress response secondary to major distension of supraglotic tissues. [11]. Ankier and colleagues performed a pharmacokinetic study in elderly volunteers aged between 66 and 79 years. They administered A 4 mg of lornoxicam once daily for 9 days and reported a shorter elimination half-life of 2.5 hours compared to young subjects and no accumulation after multiple doses. Because of a lack of previous literature on the effect of lornoxicam during induction of anesthesia in the elderly, fentanyl micrograms per kg were used, although it would have been more informative if narcotics had been omitted completely. Also, measurement of serum catecholamine would have been useful; this could be considered a limitation for the present work. Conclusion IV Lornoxicam given half an hour before the procedure significantly reduces hemodynamic responses to intubation and thus proves to be a lifesaving drug during laryngoscopy and intubation.

Conclusion:
Lornoxicam, when administered intravenously 30 minutes before the procedure, significantly reduces the hemodynamic reactions to intubation, making it a life-saving medication during laryngoscopy and intubation.

Conflict of interest: nil

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