*Research Article*

# Effect of Intravenous Paracetamol versus Lignocaine on Intraocular Pressure and Hemodynamic Response during Induction of General Anesthesia for Ocular Surgery

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## Abstract
Securing airway remains the most important aspect of safe anesthetic procedure. Through endotracheal tube is the perfect gold standard airway device, its placement is known to evoke stress response, predominantly in the form of tachycardia and systemic hypertension, exposing the susceptible patients but are more marked in patients with underlying hypertensive disease (Singh et al., 2017). The mechanism of increase in IOP is secondary to increased sympathetic activity. Adrenergic stimulation causes increase in IOP by causing vaso- and veno- constriction, and increase in centeral venous pressure, and by increasing the resistance to the outflow of aqueous humor in trabecular meshwork between anterior chamber and Schlemm's (Puja et al., 2017).

**Keywords:** Paracetamol, Intraocular Pressure, Hemodynamic

## Introduction
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The mechanism of increase in IOP is secondary to increased sympathetic activity. Adrenergic stimulation causes increase in IOP by causing vaso- and veno-constriction, and increase in centeral venous pressure, and by increasing the resistance to the outflow of aqueous humor in trabecular meshwork between anterior chamber and Schlemm's (Puja et al., 2017).
Various techniques have been examined for attenuating hemodynamic responses to laryngoscopy and tracheal intubation, including deeper anesthesia, and numerous drugs, such as beta blockers, calcium channel blockers, opioids, sodium channel blockers, vasodilators and alpha agonists (Ishiyama et al., 2006).

## Patients and Methods
After approval of university ethical committee and obtaining informed consent from all patients, this double blind prospective randomized study was conducted in El-Minia University Hospital during the period from January 2017 to October 2017. A total of adult patients, older than 18 years, of both sexes and American Society of Anesthesiologists grade I and II patients scheduled to undergo ocular elective surgery under general anesthesia with endotracheal intubation were included in the study.

**Study groups:**
Patients were divided randomly into three groups according to computer generated numbers, having 20 patients in each. Group assignment was done as per the administration of paracetamol or lidocaine as:

- Control group (Group C): received 200ml (saline) 30 minutes before induction and 10ml (saline in syring) 2 minutes before induction.
- Paracetamol group (Group P): received 200ml of (1gm paracetamol in saline) 30 minutes before induction and 10ml (saline in syringe) 2 minutes before induction. Paracetamol in the form of [Perfalgan (Bristol Myers Squibb)].

- Lidocaine group (Group L): received 200ml (saline 30 minutes before induction and 10ml of (1.5mg/kg lidocaine) intravenous in sterile syringe 2min before induction. Lidocaine in the form of [Lidocaine Hydrochloride Injection, USP (2%) (20 mg/ml), Brand Name –Xylocaine, 1000mg/50ml, Multiple Dose Plastic Fliptop Vial]

Study drug were prepared by the senior researcher, Perfalgan by adding the content of the bottle to 100ml saline, and lidocaine by putting the calculated dose in 10ml sterile syringe. Then they were encoded.

## Results

**Demographic data:**

The 3 groups were comparable with respect to age, gender, weight, ASA grade, type of surgery, duration of laryngoscopy and duration of surgery. All patients were successfully intubated within 30 seconds at the first attempt.

**Table (1): Demographic data in the study groups:**

| | Group C (n=20) | Group L (n=20) | Group P (n=20) | P value | | |
|---|---|---|---|---|---|---|
| **Age** | | | | 0.0069 | | |
| **Range** | (18-65) | (18-64) | (19-60) | **C vs L** | **C vs P** | **L vs P** |
| **Mean±SD** | 42±16.2 | 37.9±13.9 | 38.9±15.1 | 0.668 | 0.787 | 0.978 |
| **Gender** | | | | 0.803 | | |
| **Range** | 6(30%) | 7(35%) | 8(40%) | **C vs L** | **C vs P** | **L vs P** |
| **Mean±SD** | 14(70%) | 13(65%) | 12(60%) | 0.736 | 0.507 | 0.744 |
| **Weight** | | | | 0.617 | | |
| **Range** | (52-85) | (37-82) | (55-85) | **C vs L** | **C vs P** | **L vs P** |
| **Mean±SD** | 67.1±8.8 | 68±11.5 | 70.1±9 | 0.950 | 0.601 | 0.787 |
| **ASA** | | | | 0.248 | | |
| **ASA I** | 13(65%) | 17(85%) | 17(85%) | **C vs L** | **C vs P** | **L vs P** |
| **ASA II** | 7(35%) | 3(15%) | 3(15%) | 0.273 | 0.273 | 1 |
| **Time for laryngoscopy** | | | | 0.490 | | |
| **Range** | (10-24) | (10-26) | (12-24) | **C vs L** | **C vs P** | **L vs P** |
| **Mean±SD** | 16.6±4.3 | 18.1±4.8 | 17.1±3.2 | 0.471 | 0.924 | 0.706 |

**Hemodynamics**

**Table (2): SBP changes in the study groups**

| SBP | Group C (n=20) | Group L (n=20) | Group P (n=20) | P value | | |
|---|---|---|---|---|---|---|
| **Baseline** | | | | 0.104 | | |
| Range | (99-148) | (90-144) | (95-134) | **C vs L** | **C vs P** | **C vs P** |
| Mean ± SD | 117.6±13.6 | 112.1±14 | 108.8±10.8 | 0.386 | 0.089 | 0.690 |
| **Induction** | | | | 0.033* | | |
| Range | (90-146) | (90-159) | (89-125) | **C vs L** | **C vs P** | **C vs P** |
| Mean ± SD | 117±16.6 | 106.5±16.4 | 105.7±10.8 | 0.029* | 0.019* | 0.865 |
| **1 min after intubation** | # | | # | <0.001* | | |
| Range | (129-221) | (90-131) | (109-150) | **C vs L** | **C vs P** | **C vs P** |
| Mean ± SD | 158.9±25.4 | 109.1±11.9 | 125.9±11 | <0.001* | <0.001* | 0.009* |
| **5 min after intubation** | # | | | <0.001* | | |
| Range | (112-209) | (44-131) | (64-160) | **C vs L** | **C vs P** | **C vs P** |
| Mean ± SD | 138.3±25.2 | 108.1±18.2 | 110.3±19.1 | <0.001* | <0.001* | 0.994 |
| **10 min after intubation** | | | | 0.001* | | |
| Range | (101-150) | (70-125) | (97-125) | **C vs L** | **C vs P** | **C vs P** |
| Mean ± SD | 121.2±15.1 | 106.4±14.4 | 108.5±6.8 | 0.001* | 0.007* | 0.866 |

**Table (3): DBP (mmHg) changes in the study groups**

| DBP | Group C (n=20) | Group L (n=20) | Group P (n=20) | P value | | |
|---|---|---|---|---|---|---|
| **Baseline** | | | | 0.180 | | |
| Range | (61-99) | (60-98) | (60-92) | **C vs L** | **C vs P** | **C vs P** |
| Mean ± SD | 77.8±10.2 | 74.5±12.5 | 71.4±9.4 | 0.600 | 0.154 | 0.636 |
| **Induction** | # | | | 0.382 | | |
| Range | (46-92) | (50-90) | (44-82) | **C vs L** | **C vs P** | **C vs P** |
| Mean ± SD | 71.4±12.9 | 68±11.7 | 66.2±10.7 | 0.644 | 0.359 | 0.880 |
| **1 min after intubation** | | | | <0.001* | | |
| | # | | # | **C vs L** | **C vs P** | **C vs P** |
| Range | (76-139) | (52-85) | (60-96) | <0.001* | <0.001* | 0.005* |
| Mean ± SD | 101.4±15.4 | 68.3±9.7 | 80.4±8.7 | | | |
| **5 min after intubation** | | | | <0.001* | | |
| | # | | | **C vs L** | **C vs P** | **C vs P** |
| Range | (66-123) | (52-92) | (54-107) | <0.001* | <0.006* | 0.616 |
| Mean ± SD | 89.2±13.4 | 73.5±10.7 | 77±11.5 | | | |
| **10 min after intubation** | | | | 0.022* | | |
| | | | | **C vs L** | **C vs P** | **C vs P** |
| Range | (61-100) | (56-90) | (54-82) | 0.256 | 0.017* | 0.429 |
| Mean ± SD | 76.2±9.1 | 71.8±10.1 | 68.3±6.5 | | | |

**Table (4): Complications occurred in the study groups**

| Complications | Group C (n=20) | Group L (n=20) | Group P (n=20) | P value | | |
|---|---|---|---|---|---|---|
| **Arrhythmia** | | | | 0.228 | | |
| No | 17(85%) | 20(100%) | 17(85%) | **C vs L** | **C vs P** | **C vs P** |
| Yes | 3(15%) | 0(0%) | 3(15%) | 0.231 | 1 | 0.231 |
| **Bradycardia** | | | | ------ | | |
| No | 20(100%) | 20(100%) | 20(100%) | **C vs L** | **C vs P** | **C vs P** |
| Yes | 0(0%) | 0(0%) | 0(0%) | ---- | ---- | ----- |
| **Tachycardia** | | | | ------ | | |
| No | 20(100%) | 20(100%) | 20(100%) | **C vs L** | **C vs P** | **C vs P** |
| Yes | 0(0%) | 0(0%) | 0(0%) | ---- | ----- | ----- |
| **Hypotension** | | | | 0.322 | | |
| No | 20(100%) | 18(90%) | 20(100%) | **C vs L** | **C vs P** | **C vs P** |
| Yes | 0(0%) | 2(10%) | 0(0%) | 0.487 | ----- | 0.487 |
| **Hypertension** | | | | ------- | | |
| No | 20(100%) | 20(100%) | 20(100%) | **C vs L** | **C vs P** | **C vs P** |
| Yes | 0(0%) | 0(0%) | 0(0%) | ---- | ----- | ------ |
| **Hypoglycemia** | | | | -------- | | |
| No | 20(100%) | 20(100%) | 20(100%) | **C vs L** | **C vs P** | **C vs P** |
| Yes | 0(0%) | 0(0%) | 0(0%) | ----- | ----- | ----- |

## Discussion

Laryngoscopy and ETT intubation is a painful procedure and causes transient rise in IOP, mean blood pressure and heart rate. Transient rise in intraocular pressure in patients with low ophthalmic artery pressure may jeopardize retinal perfusion and cause retinal ischemia as in patients with deliberate hypotension, arteriosclerotic involvement of retinal artery, patients with glaucoma. Increased IOP in a setting of open globe as open eye injuries, foregin body removal, cataract extraction, corneal laceration repair may cause extrusion of vitreous or drainage of aqueous with possible resultant blindness. In the same way transitory hypertension and tachycardia are of no consequence in healthy individuals but either or both may be hazardous to the patients with hypertension, mycordial insufficiency or cerebrovascular disease. The life threatening complications which can occure due to this response are left ventricular failure, myocardial ischemia and cerebrovascular accident. [Jewalikar et al.,].

Various pharmacological and non-pharmacological methods have been tried to limit the pressor responses and IOP changes following the insertion of endotracheal tube including use of deeper anesthesia, numerous drugs like beta blockers, vasodilators, calcium channel blocker, alpha 2 agonist like dexmeditomedine, opioids, Opioids are most commonly used drugs but are associated with side effects like nausea, vomiting, sedation and respiratory depression. These are also not cost effective. There has been a growing trend to find an effective substitute to minimize the sympathoadrenal pressor response to endotracheal intubation. [Kord Valeshabad et al., 2014].

Several previous studies have verified that lidocaine improves intraoperative and postoperative hemodynamic stability by stabilizing the changes in arterial pressure, heart rate and cardiac output. The mechanism behind these beneficial effects of lidocaine on hemodynamic stability is possibly due to; direct myocardial depressant effect, peripheral vasodilating effect and the effect on synaptic transmissions [Kim et al., 2006].

By focusing on paracetamol, although favorable effects of paracetamok on postoperative pain management have been well ocumented and there is few published evidence about its preventive effects on hemodynamic stimulation after tracheal intubation [Eremenko and Kuslieva, 2008].

## Conclusion

We concluded that IV lidocaine in a dose of 1.5mg/kg given 2 minutes before induction is more effective than IV paracetamol in a dose of 1gm given 30 minutes before induction in attenuating hemodynamic response and IOP change to tracheal intubation.

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