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The effect of ketamine on blood pressure, heart rate, respiratory rate and intraocular pressure in patients undergoing ocular procedures

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ABSTRACT

Aim: to evaluate the effect of ketamine on blood pressure, heart rate, respiratory rate and intraocular pressure on patients undergoing ocular surgeries. **Method:** a prospective study conducted at Prince Ali Bin Al-Hussein hospital in Al-Karak city in the south of Jordan between July 2011 and July 2012. All patients who were scheduled for ocular surgeries under general anesthesia were included in this study. Patients who are younger than 10 years of age, or those with previous systemic medical diseases or glaucoma or taking long term medications were excluded from the study. All patients included in this study received no medication prior to ketamine injection which is given as intra venous injection using a dose of 3mg/kg. Blood pressure, respiratory rate, pulse rate and intra ocular pressure were measured immediately prior to injection and at 3,6 and 9 minutes after the injection. **Results:** Only one patient showed change in the heart rate at 6 and 9 minutes after receiving ketamine and this change was increase of about 25%. On the other hand one patient at 3 minutes and 2 patients at 6 and 9 minutes showed increase in blood pressure of about 10-15% and only 2 patients showed increase in respiratory rate at 3,6 and 9 minute of about 10%. Regarding intraocular pressure 4 eyes at 3 minutes and 6 eyes at 6 and 9 minute showed elevation of intra ocular pressure, however this elevation ranged between 2 to 4 mmhg (7-10%) and the intra ocular pressure remained within the normal range after elevation. **Conclusion:** Ketamine has no significant effect on intra ocular patients with no history of pre-operative elevation in intra ocular pressure and it is recommended to be used as anesthetic agent for diagnostic and short time ocular procedures.

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1.Introduction:

Ketamine which was developed in 1962 as a derivative of phencyclidine is one of the drugs that is widely used in medicine particularly anesthesia, it has many effects on human body like analgesia, anesthesia, hallucinations, increases blood pressure, and broncho-dilation.(1)however the main use of ketamine is for induction of general anesthesia and its maintenance.

It is considered a non-barbiturate anesthetic agent which has a formula of dl. 1-(o-Chlorophenyl)-2(methylamino) cyclohexanone hydrochloride.(2) It has an acidic PH and produces a dissociative anesthesia by acting on cortical and sub-cortical areas through non-competitive inhibition of NMDA receptors. (3)

The aim of this study is to evaluate the effect of ketamine on blood pressure, heart rate, respiratory rate and intraocular pressure on patients undergoing ocular surgeries.

2. Materials and Method

This is a prospective study conducted at Prince Ali Bin Al-Hussein hospital in Al-Karak city in the south of Jordan between July 2011 and July 2012. All patients who were scheduled for ocular surgeries under general anesthesia were included in this study. Patients who are younger than 10 years of age, or those with previous systemic medical diseases or glaucoma or taking long term medications were excluded from the study. All patients included in this study received no medication prior to ketamine injection which is give intra venous in a dose of 3mg/kg. Blood pressure, respiratory rate and pulse rate were measured immediately prior to injection and at 3,6 and 9 minutes after the injection. Simultaneously intra ocular pressure was measured using Schiötz tonometer after application of topical local anesthetic agent in the form of tetracaine. Finally the obtained results were analyzed and compared with that of other studies.

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3. Results

30 patients (60 eyes) aged between 10 and 55 years (mean 33 years) were included in this study, 53% of them were males and their weight ranged between 23 and 83 kg (mean 52 kg).

Table 1, 2,3 and 4 summarizes respectively the effect of ketamine on heart rate, blood pressure, respiratory rate and intraocular pressure.

Table 1

Time after injection	Patients with increase in heart rate	Patients with fall in heart rate	Patients with no change in heart rate
3 minutes	0%	0%	100%
6 minutes	3%	0%	97%
9 minutes	3%	0%	97%

Table 2

Time after injection	Patients with increase in blood pressure	Patients with fall in blood pressure	Patients with no change in blood pressure
3 minutes	3%	0%	97%
6 minutes	7%	0%	93%
9 minutes	7%	0%	93%

Table 3

Time after injection	Patients with increase in respiratory rate	Patients with fall in respiratory rate	Patients with no change in respiratory rate
3 minutes	7%	0%	93%
6 minutes	7%	0%	93%
9 minutes	7%	0%	93%

Table 4

Time after injection	Patients with increase in blood pressure	Patients with fall in blood pressure	Patients with no change in blood pressure
3 minutes	7%	0%	93%
6 minutes	10%	0%	90%
9 minutes	10%	0%	90%

Only one patient showed change in the heart rate at 6 and 9 minutes after receiving ketamine and this change was increase of about 25%. On the other hand one patient at 3 minutes and 2 patients at 6 and 9 minutes showed increase in blood pressure of about 10-15% and only 2 patients showed increase in respiratory rate at 3,6 and 9 minute of about 10%. Regarding intraocular pressure 4 eyes at 3 minutes and 6 eyes at 6 and 9 minute showed elevation of intra ocular pressure, however this elevation ranged between 2 to 4 mmhg (7-10%) and the intra ocular pressure remained within the normal range after elevation.

The elevation of blood pressure, heart rate, respiratory rate or intraocular pressure was not related to age, sex or body weight; in addition to that the increase in intraocular pressure was not significant and not related to systemic blood pressure level.

4. Discussion

Many studies were performed to evaluate the effect of ketamine on heart rate, blood pressure, respiratory rate and intraocular pressure. The outcome of those studies was variable. For example Crossen et al.,(4) and Dillong et al.,(5) reported a transient increase in intraocular pressure was seen in normal patient, while Kaul et al. (6) and Mathur et al.(7) reported that a significant increase in intra ocular pressure after ketamine administration was seen only in patients with pre-operative increase in intra ocular pressure. On the other hand Chandorkar et al.(8) found that ketamine produced a fall in intra ocular pressure of about 2-8 mmhg after the use of ketamine and they related it to vasoconstriction and decrease aqueous production.

Dave et al.(9) studied the effect of ketamine on blood pressure, heart rate respiratory rate and intraocular pressure; it was founded that 60% of patients showed an elevation of intra ocular pressure and no fall was recorded in blood pressure, heart rate, respiratory rate and intraocular pressure among patients.

In this study it was founded that only 10% of patients showed increase in intra ocular pressure and this increase was not significant and remained within the normal range, this increase could be attributed to the increase the extra-ocular muscles tone and decrease in out flow of the aqueous. So ketamine is considered as ideal anesthetic agent for diagnostic and short time ocular procedures

Regarding the effect of ketamine on blood pressure, heart rate and respiratory rate, ketamine showed that in majority of cases there was no change in those parameters and no case recorded any fall in any parameter and this finding is consistent with that found by other studies.(9)

5. Conclusion

Ketamine has no significant effect on intra ocular patients with no history of pre-operative elevation in intra ocular pressure and it is recommended to be used as anesthetic agent for diagnostic and short time ocular procedures.

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