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INTRAOCCULAR PRESSURE IN NORMAL AND ANAESTHETIZED DONKEYS (With 2 Tables and 2 Figures)

By

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ضغط العين في الحمار السليمة والمخدره

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تم قياس ضغط العين بواسطة جهاز شوتز في عدد 15 حمار عيونها سليمة من الفحص الإكلينيكي مستخدماً فقط التخدير الموضعي للقرنية وكانت 27.5 ملم زئبق في العين اليمنى و 27.6 ملم زئبق في العين اليسرى . قسمت هذه الحيوانات إلى مجموعتين وتم قياس ضغط العين بعد حقن الكوملين والكلورال هيدرات لحيوانات المجموعة الأولى وبعد حقن الكوملين والثيوبنتال صوديوم لحيوانات المجموعة الثانية . ووجد أن معدل ضغط العين في المجموعة الأولى (28.1 ملم زئبق في العين اليمنى و 28.6 في العين اليسرى) . أما المجموعة الثانية فكان معدل ضغط العين 26.7 ملم زئبق في العين اليمنى و 26.5 ملم زئبق في العين اليسرى . ولقد ثبت أن ضغط العين ينخفض في كل من المجموعة الأولى والثانية من تأثير المركبات المحقونة ووجد أن تأثير الكلورال هيدرات يؤدي إلى إنتظام وإنخفاض ضغط العين لمدة أطول من تأثير الثيوبنتال صوديوم على ضغط العين .

SUMMARY

Intraocular pressures of 15 donkeys (30 eyes) with clinically normal eyes were measured with the Schiötz tonometer, using only topical corneal anaesthesia (37.5 mm Hg in the right eye and 37.6 mm Hg in the left eye). These donkeys were divided into two groups. Intraocular pressure was recorded after combelen and chloral hydrate in one group, and after combelen and thiopental sodium in the other. The average control intraocular pressure value was 38.1 mm Hg and 38.6 mm Hg in the right and left eyes respectively in the first group and 36.7 mm Hg and 36.5 mm Hg in the right and left eyes in the second group. Both combelen-chloral hydrate and combelen-thiopental combination produced ocular hypotony. Chloral hydrate produced a more prolonged uniform reduction of ocular pressure than did thiopental sodium.

INTRODUCTION

Intraocular surgical problems and corneal injuries require evaluation and treatment. General anaesthesia is often necessary for a thorough examination of the eye and the surgical repair of the cornea and intraocular structures.

A combination of combelen and chloral hydrate is frequently used for anaesthesia in donkeys (TANTAWY, 1980 and SAMY *et al.*, 1986). They claimed that the use of this combination in donkeys induced a state of deep general anaesthesia. WRIGHT and HALL (1971) recommended the use of the above mentioned anaesthetic combination as well as mixture of combelen and thiopental sodium in equine as a general anaesthetic.

Previous reports of intraocular pressure in clinically normal awake horses showed wide variations. COHEN and REINKE (1970) documented 24.5 ± 4.0 mm Hg, McCLURE *et al.* (1976) 28.6 ± 4.8 mm Hg and TRIM *et al.* (1985) 17.1 ± 3.9 and 18.4 ± 2.2 mm Hg in the left and right eyes.

The purpose of this paper is to study the normal intraocular pressure in donkeys and to determine the effect of some anaesthetic combinations on intraocular pressure.

MATERIAL and METHODS

Fifteen donkeys of different ages (3-13 years), sexes (9 males + 6 females) and body weights (85-150 Kg) were selected for this study. None of the animals exhibited clinical ocular disease. The animals were divided into two groups.

The first group (8 animals) were injected intravenously with combelen in a dose of 0.2 mg/Kg b.wt. Chloral hydrate in a dose of 6 gm/50 Kg b.wt. was administered intravenously 20 minutes after combelen injection. Intraocular pressure was recorded before as well as 15 minutes after combelen injection. It was also measured 5, 30, 60, 90 and 120 minutes after chloral hydrate administration.

The second group (7 animals) received combelen intravenously in the same dose as in group I. Thiopental sodium in a dose of 10 mg/Kg b.wt. administered intravenously 20 minutes postcombelen injection. Intraocular pressure was first measured before drugs administration (control, time 0) and 15 minutes after combelen injection. After thiopental sodium injection intraocular pressure was also recorded at five-minute intervals until 50 minutes.

Form measuring IOP using Schiøtz tonometer the following steps had been performed:

The animals were in lateral recumbency and without any pressure at the neck that may impede venous return from the jugular vein. Both eyes of each donkey were topically anaesthetized with two to three drops of 1% novesine (Wander Ltd., Berne, Switzerland) approximately two minutes before they were tested. While the reaction from topical anaesthetic is quieting down, the Schiøtz instrument was checked for zero reading on the steel test block furnished with the instrument. Plunger freedom was checked with the finger tip. The thumb and fore finger of one hand hold the lids away from the eye and against the orbital rim, carefully avoiding any pressure that may be transmitted to the globe. With the thumb and fore finger of the other hand, the vertically held tonometer was brought to rest on the center of the cornea.

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Touching the lashes can stimulate blink so it must be avoided. Three Schiøtz tonometer reading were recorded from each eye. These readings were transformed into IOP (mm Hg) using calibration table for Schiøtz tonometry in dogs and averaged.

RESULTS

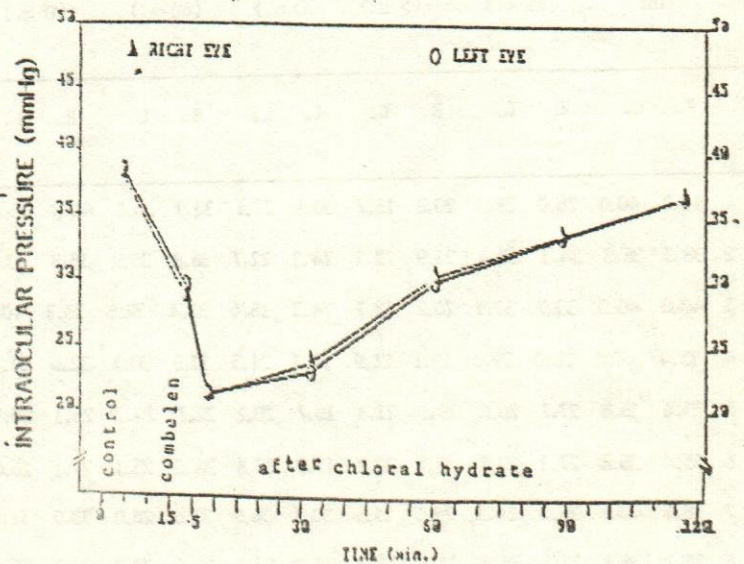
It was found that animals of the first group which received combelen and chloral hydrate intravenously showed the following changes in their intraocular pressure:

The mean control value of the IOP was 38.1 and 38.6 mm Hg in the right and left eyes respectively. All animals showed a decrease in the IOP 15 minutes after intravenous combelen injection. The mean value at this time was 28.7 and 29.7 mm Hg in the right and left eyes. After chloral hydrate administration the intraocular pressure decreased throughout the tested period of the study (120 minutes). The lowest value was 21.3 and 21.5 mm Hg in the right and left eyes respectively five minutes postinjection of chloral hydrate. The changes of IOP in this group are summarized in (Table 1 and Fig. 1).

In the second group which received combelen and thiopental sodium intravenously:

The mean intraocular pressure of the unanaesthetized donkeys (control value) was 36.7 and 36.5 mm Hg in the right and left eyes respectively. Fifteen minutes after combelen injection all animals showed reduction in the intraocular pressure where it had a value of 32.4 (right eye) and 30.8 (left eye) mm Hg. The decreased value was 23.1 and 22.0 mm Hg in the right and left eyes respectively recorded at 15 minutes after thiopental sodium administration. At the end of the study (50 minutes) the IOP value increased again and returned to the normal control value. The effect of the administered drugs on the intraocular pressure in this group are presented in (Table 2 and Fig. 2).

Fig. (1): Showing the effect of combelen-chloral hydrate combination on intraocular pressure.



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Fig. (2): Showing the effect of combelen-thiopental combination on intraocular pressure.

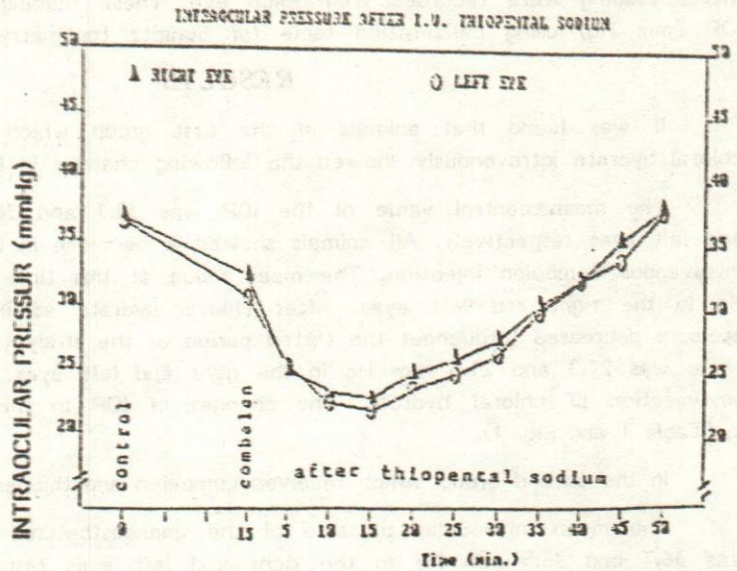


Table (1): Effect of intravenous injection of combelen and chloral hydrate on intraocular pressure in donkeys.

AN.	normal		combelen		chloral hydrate (intravenous injection)									
	(0)		(15 m.)		(5 m.)		(30 m.)		(60 m.)		(90 m.)		(120 m.)	
	R.	L.	R.	L.	R.	L.	R.	L.	R.	L.	R.	L.	R.	L.
1	41.7	40.0	26.0	26.0	20.2	18.7	30.1	27.1	33.9	36.8	40.0	35.4	38.3	38.3
2	38.3	38.3	34.1	35.4	21.9	22.1	24.3	22.7	36.8	33.9	38.3	40.0	40.0	38.3
3	40.0	40.0	33.9	33.9	20.2	18.7	24.3	16.4	31.4	32.6	38.3	40.0	40.0	40.0
4	35.4	40.0	28.0	29.0	19.1	21.9	22.7	21.3	32.6	30.1	32.6	31.4	35.4	36.8
5	35.4	36.8	27.1	26.0	19.1	21.3	18.7	20.2	22.7	24.3	25.1	29.1	33.9	36.8
6	35.4	36.8	27.1	27.1	19.1	20.2	17.9	17.8	24.3	25.1	27.1	26.0	36.8	36.8
7	38.5	40.0	26.0	24.3	29.0	25.1	30.1	36.8	32.6	28.0	33.9	31.4	32.6	31.4
8	38.1	36.8	27.1	35.6	22.1	24.3	21.9	22.1	29.4	28.3	33.7	33.6	36.9	36.7
x	38.1	38.6	28.7	29.7	21.3	21.5	23.8	23.1	30.5	30.0	33.7	33.6	36.9	36.7

Table (2): Effect of Intravenous Injection of combelen and thlopental sodium on Intraocular pressure In donkeys.

No.	AN, Normal		Combelen		Thlopental sodium																			
	(0)	(15 m.)	(5 m.)	(10 m.)	(15 m.)	(20 m.)	(25 m.)	(30 m.)	(35 m.)	(40 m.)	(45 m.)	(50 m.)												
1	32.6	33.9	32.6	28.0	30.1	29.0	26.9	26.0	25.1	23.4	29.0	24.2	30.3	28.0	30.1	29.0	33.9	31.4	35.4	31.4	36.8	32.6	36.8	36.8
2	35.4	34.1	32.6	30.3	31.4	29.0	28.0	23.4	28.0	23.4	29.0	27.1	30.3	29.0	31.4	29.0	33.9	32.6	35.4	35.4	35.4	33.9	36.8	36.8
3	35.4	33.9	32.6	32.6	22.7	24.6	22.7	22.7	22.7	22.7	23.4	23.4	24.2	24.3	24.2	25.1	25.1	27.1	27.1	29.0	31.4	32.6	34.1	35.4
4	40.0	41.7	36.8	38.3	32.6	32.6	29.0	28.0	28.0	29.0	28.0	27.1	29.0	26.9	29.0	24.2	31.4	35.4	31.4	40.0	36.8	38.3	38.3	40.0
5	40.0	38.3	35.4	32.6	26.0	31.4	26.9	26.9	26.0	23.4	24.2	23.4	27.1	21.9	32.6	31.4	38.3	32.6	38.3	32.6	40.0	33.9	40.0	38.3
6	35.4	35.4	26.9	28.0	16.1	16.0	15.8	15.8	15.9	15.7	20.7	19.1	19.6	22.1	24.2	23.4	26.0	25.1	28.0	26.9	33.9	33.9	41.7	38.3
7	38.3	38.3	30.1	26.0	15.8	15.7	15.8	15.8	16.2	16.2	20.2	21.9	22.1	21.3	22.7	22.7	25.1	25.1	31.4	31.4	34.1	32.6	39.3	38.3
x	36.7	36.5	32.4	30.8	25.0	25.5	23.6	22.6	23.1	22.0	24.9	23.7	26.1	24.8	27.7	26.4	30.5	29.9	32.4	32.4	35.5	34.0	39.0	37.7

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DISCUSSION

Intraocular pressure may have significant diagnostic value in many ocular conditions. Schiøtz tonometer, used to measure intraocular pressure, is the most popular for veterinary use. It is not complicated, is relatively easy to use and is inexpensive (BRYAN, 1965). Schiøtz tonometry is less suitable for large domestic animals than for small ones. Even though calibration tables are not available for each species (SLATTER, 1981).

The average control value for the intraocular pressure in 15 donkeys showing no signs of clinical ocular disease was 37.5 and 37.6 mm Hg in the right and left eyes respectively when only topical novesine was employed. These values were similar to those recorded in horses by COHEN and REINKE (1970) and McCLURE *et al.* (1976) although they used electronic MacKay-Marg tonometer. This indicates that approximate results can be obtained by using Schiøtz tonometer and canine Calibration tables. The steps for measuring intraocular pressure mentioned in materials and methods are necessary to make an accurate reading with Schiøtz tonometer.

In this study, it was found that the intraocular pressure decreased after thiopentone sodium injection. This result is in agreement with that observed by COUCH *et al.* (1979); THOMPSON *et al.* (1982) and MOBAREK (1988). It is believed that the main effect of thiopental is the depression of the central controlling areas for intraocular pressure, although increased facility for aqueous drainage has also been shown to occur (STONE & PRIJOT, 1955 and KORNBLUETH *et al.*, 1959).

MUIR *et al.* (1977) measured an increase in arterial blood pressure in horses after intravenous injection of xylazine, 1 mg/Kg. and ketamine, 10 mg/Kg. A similar increase in intraocular pressure in dogs was recorded by GELATT *et al.* (1977) after xylazine and ketamine anaesthesia at the same dosages. They attributed the change in intraocular pressure to the increase in arterial blood pressure.

Combelen and chloral hydrate (group 1) and combelen and thiopental sodium (group 11) produced ocular hypotension in all donkeys. Although blood pressure was not measured in this study, it is well known that the action of chloral hydrate and thiopental sodium on the circulatory system are myocardial depression and fall in blood pressure. Moreover, there is a hypotensive action of tranquillizer in general (WRIGHT and HALL, 1971).

An increase in the intraocular pressure due to the use of some anaesthetic agents during ophthalmic surgery may result in catastrophic expulsion of intraocular contents through incised cornea.

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