Lack of effects of intramuscular medetomidine on intraocular pressure in clinically normal cats

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Abstract

Objectives This study aimed to determine the effects of intramuscular medetomidine on the results of tonometry in healthy cats.

Methods Sixteen healthy cats were randomly divided into two groups of eight cats. The first group was sedated with intramuscular medetomidine alone (100 µg/kg) and the second group received only saline (0.5 ml/5 kg). Intraocular pressure (IOP) values were measured immediately before (T₀) and after the injections at 15 mins (T₁₅) and 25 mins (T₂₅) in both groups.

Results Sedation with medetomidine did not cause a statistically significant change in the mean IOP values. The pretreatment mean ± SD IOPs in the treatment and control groups were 16.2 ± 3.1 and 15.9 ± 4.0 mmHg, respectively. In the medetomidine group the mean ± SD IOPs at T₁₅ and T₂₅ were 16.1 ± 4.1 (P = 0.9) and 14.6 ± 2.2 (P = 0.1).

Conclusions and relevance Based on this study in healthy cats, medetomidine may be a good choice as a sedative agent in uncooperative cats when IOP measurements are needed. Further investigations in cats with abnormal IOPs are warranted.

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Introduction

Sedation of uncooperative cats provides ideal conditions for optimal ophthalmic examination, with easy and complete access to the eye. It can also decrease stress associated with ocular examination and enhances safety for both the patient and examiner.¹

The effect of sedatives on intraocular pressure (IOP) has been well documented for dogs. Previous studies in dogs reported that intramuscular administration of acepromazine, chlorpromazine and medetomidine cause no significant changes in IOP values.²⁻⁵ It is not known whether sedation with intramuscular medetomidine would affect IOP in cats. The purpose of this study was to determine the effects of intramuscular medetomidine on the results of tonometry in healthy cats.

Materials and methods

The investigation was approved by the Iranian Society for the Protection of Animals based on Iranian Ethic codes (framework) for studies on laboratory animals. Sixteen healthy domestic shorthair cats were used. Prior to the study, complete physical examinations, complete blood counts and ophthalmic examinations (including Schirmer I tear test, applanation tonometry, biomicroscopy and indirect ophthalmoscopy) of both eyes were performed.

The cats were individually housed in an animal room under standard controlled environmental conditions for 4 days before the beginning of the study. A commercial dry food was offered once daily at 8:00 PM throughout the study. Water was given ad libitum for 24 h.

To allow the cats to become familiar with the tonometry procedure, tonometry was performed daily for 3 days prior to the start of the study.

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Food, but not water, was withheld for 12 h prior to the experiment. Cats were randomly assigned to medetomidine (n = 8) and control (n = 8) groups.

Baseline IOP values were recorded just before administration of sedative and saline in both groups. The cats in the medetomidine group received intramuscular (IM) medetomidine (SedaMed, Vetpharm Ltd; 100 µg/kg). The cats in the control group received intramuscular saline (0.5 ml/5 kg).

The IOP values were then measured 15 and 25 mins after IM medetomidine and saline administration in both treatment and control groups.

To obtain IOP values, the animals were placed in sternal recumbency with the head in a normal upright position. Prior to each IOP measurement, one drop of 0.5% proparacaine hydrochloride ophthalmic solution (Paracain; Sunways) was applied topically to each eye. IOP was estimated by applanation tonometry (Tono-Pen Vet; Reichert) in both eyes of all cats. The tonometer was calibrated electronically each day before the IOP measurements. In the present investigation, we only considered IOP measurements that were within 5% variance (5% displays on Tono-Pen).

Statistical analysis was performed using SPSS version 16.0 for Windows (IBM). Data were expressed as mean ± SD. Normality was tested by a one-sample Kolmogorov-Smirnov test (P >0.55) and thus IOP data (mmHg) were expressed as mean ± SD.

The mean and SD of the IOPs are depicted in Figure 1. There were no statistically significant differences between the mean IOP values for the right and left eyes in either treatment or control groups (P = 0.22 and P = 0.47, respectively). A mean IOP was calculated for each cat using the value from the left eye and the right eye at each time point. There was no significant effect of treatment (P = 0.9) and time (P = 0.4) on IOP values. In addition, the interaction of group and time had no significant effect (P = 0.49).

The mean ± SD baseline IOP values (T₀) for treatment and control groups were 16.2 ± 3.1 and 15.9 ± 4.0 mmHg, respectively. For baseline IOP values, there was no significant difference between treatment and control groups (P = 0.8).

In the treatment group, the subsequent post-treatment mean ± SD values were 16.1 ± 4.1 mmHg (15 mins; T₁₅), and 14.6 ± 2.2 mmHg (25 mins; T₂₅). There was no statistical difference between baseline values and post-treatment values after treatment with intramuscular medetomidine (P₁₅ = 0.9; P₂₅ = 0.1).

In control eyes, the mean ± SD values at T₁₅ and T₂₅ were 15.6 ± 2.7 and 15.7 ± 3.4 mmHg, respectively. There was no significant difference between baseline values (T₀) and post-treatment values in the control group (P₁₅ = 0.8; P₂₅ = 0.8).

Statistical comparisons between post-treatment values of treatment and control groups indicated no significant differences at 15 mins (P₁₅ = 0.7) and 25 mins (P₂₅ = 0.5).
Discussion
The results of the present study indicate that IM medetomidine does not affect IOP in healthy cats. Our results are in agreement with previous studies in dogs in which no significant changes were observed following treatment with medetomidine.4,5 In the present study, post-treatment IOP measurements were compared with baseline and negative control group IOPs.

The IOP values obtained during the study in both treatment and control groups in the cats presented were similar to the normal reported range in clinically healthy cats. The reported range for applanation tonometry in normal cats is 9–31 mmHg.6

Measurement of IOP is an important diagnostic test as IOP values are an important indicator of ocular health and disease state.7 If sedation is necessary for ocular examination in fractious animals or for more detailed ocular evaluation, it is important to consider the effects of pharmacological agents on the ocular examination tests.8

The effect of sedatives on IOP may vary between species as different effects have been observed in horses and dogs,2,8–12 and so species-specific information is important in the selection of sedatives.

α-2 adrenoreceptor agonists are potent sedatives and analgesic drugs. Medetomidine is the most widely used α2- agonist in small animals. It causes a dose-related sedative effect with a peak action 15–20 mins after IM injection.13

Several factors can influence IOP readings, such as extraocular muscle tone, scleral rigidity, and aqueous humor production and drainage.12,14 The possible effects of medetomidine on extraocular muscle tone or scleral rigidity are unknown. However, in the present study, no significant effect on IOP was observed.

Conclusions
IM medetomidine had no significant effect on the IOP of the healthy cats used in this study. Further investigations are warranted to see if this is also the case in cats with altered IOP.

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Conflict of interest
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