The Effect of Acepromazine on Electroencephalographic Activity in Normal Sedated Dogs

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Presented in abstract form at the Tenth World Congress of Veterinary Anaesthesia, Glasgow, Scotland, September 2009.

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KEY WORDS: Acepromazine, EEG, Dogs, Seizures

ABBREVIATIONS: EEG Electroencephalogram, MET Minimal electroshock seizure threshold, CNS, Central nervous system

ABSTRACT

Objective: To determine the effect of intravenous acepromazine on the electroencephalogram (EEG) of normal Beagle dogs.

Sample Population: Twelve healthy beagle dogs

Procedures: Dogs were sedated and the EEG recorded for 20 minutes. Acepromazine was then injected intravenously in either low or high dose with the order chosen randomly and EEG recording continued for 30 minutes. Each dog received low and high dose in the study and at least a week was allowed to elapse between doses.

Five dogs for the placebo group were chosen at random from the pool of dogs and received saline instead of acepromazine, with the same EEG recordings made.

Results: Multiple ANOVA and independent t-tests were used to analyze data in commercially available statistical software.[a,b] EEG activity was not altered significantly

by either low or high dose acepromazine administered intravenously.

Conclusions and Clinical Relevance: EEG activity is not altered significantly in normal dogs by the low or high dose of acepromazine used in this study.

INTRODUCTION

For many years, there has been concern about the use of acepromazine in seizure-prone human and veterinary patients.[1,2,3,4] In veterinary medicine, the mantra has been that acepromazine, the most frequently employed phenothiazine tranquilizer, lowers the seizure threshold and may trigger seizures, especially in seizure-prone patients.[5,6] The foundation for this belief is that neuroleptics, in general, and phenothiazines in particular, are thought to have pro-convulsant effects through some poorly understood mechanism.[1,7] Studies purportedly demonstrating phenothiazine's pro-convulsant effects have involved various methodologies, ranging from clinical studies to minimal electroshock seizure threshold (MET) techniques and in vitro techniques. [1,8,9,10,11]

In some experimental models and at some doses, some phenothiazines seemed to have pro-convulsant effects, though results were sometimes equivocal and depended on the drugs tested, doses employed, and the models in which they were tested [1,3,7,8] Acepromazine was not employed in any of these studies since it is not approved and not employed in human medicine, and is thus of little interest to medical researchers. On the other hand, there is evidence that phenothiazines, including acepromazine, have anti-convulsant properties, as determined by clinical and laboratory studies.[12,13,14] Certainly, different phenothiazines have different effects on the EEG so no generalizations can be made about the effect on the EEG of individual members of this group of compounds.[15] Perhaps for reasons of extreme caution, the view that acepromazine is pro-convulsant prevails in veterinary medicine, eclipsing all evidence to the contrary. In an attempt to examine more closely the central nervous effects of acepromazine at high and low doses in the dog, we conducted a controlled study of the qualitative and quantitative effects of intravenously injected acepromazine on the EEG of lightly sedated dogs. In this article we present the results of this study and our interpretation of their significance to veterinarians.

Our hypothesis is that acepromazine does not have an effect on the EEG waves in healthy dogs that is sufficient to generate seizures.

MATERIALS AND METHODS

Animals

Twelve Beagle dogs from the teaching colony at Tufts Cummings School of Veterinary Medicine were used in each of four trials. Ages ranged from 2 to 5 years and body weights from 6.8 to13.5 kg (15 to 29.7 lb). All dogs in the teaching colony are spayed or neutered and each received a thorough physical exam to make sure they were free from systemic disease prior to participation. The study was approved by the Tufts University Institutional Animal Care and Use Committee.

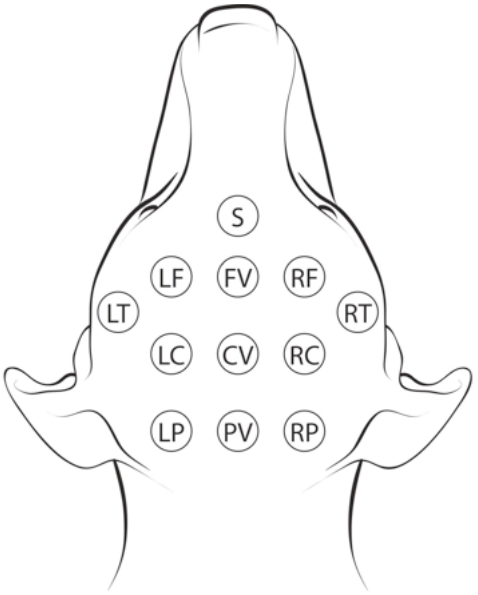
Experimental Design

The sample size of 12 dogs was determined by utilizing an online program[c] for calculating statistical power, confidence, and sample size. With a sample of 12 dogs, the power was calculated at 99% with a confidence interval of 95%. A random numbers table was generated by computer[d] to randomly assign dogs by date of study to either the low dose or high dose of acepromazine. At least 1 week elapsed before dogs were treated with the alternate dose so that each dog received both the low and high doses. Five dogs were chosen at random from the pool of dogs to form a placebo group and were sedated a third time to receive saline instead of acepromazine.

Sedation and Acepromazine Administration

Each dog was sedated with an intramuscular injection of hydromorphone (0.05 mg/kg [0.022 mg/lb]) and medetomidine (0.01 mg/kg [0.0045 mg/lb]). When sufficiently

Figure 1. *Electrode montage for the 8 bipolar derivations*[18]



sedated, the dogs were placed in sternal recumbency on a thickly padded table and the room lights dimmed. The eyes were lubricated, the ears plugged with soft cotton, a pulse oximeter probe placed on the tongue, and an intravenous catheter secured in a lateral saphenous vein. Throughout the study, heart rate, respiratory rate, and oxyhemoglobin saturation (SpO2) were monitored every 5 minutes and recorded until recovery. EEG waveforms were recorded for 20 minutes and acepromazine was then injected intravenously at either low dose (0.05 mg/kg [0.022 mg/lb]) or high dose (0.1 mg/kg [0.045 mg/lb]), with EEG recording continuing for another 30 minutes. At the conclusion of recording, atipamezole was injected intramuscularly (0.01 mg/kg [0.0045 mg/lb]) to antagonize the effect of medetomidine and dogs became alert and ambulatory within 3 to 5 minutes. The placebo dogs were treated in the same way, but received 0.9% saline (1 ml) intravenously instead of acepromazine. All dogs were monitored closely for several hours after recovery, and twice daily for two days after the study.

EEG Recording and Data Transformation

Recording and analysis of the waveforms was performed with an EEG software program[e] combined with a amplifier[f] in a quiet room. After sedation and intravenous catheterization, 13 sterile platinum iridium needles for EEG measurement were placed subcutaneously in positions on the scalp according to Figure 1, and connected to an amplifier which transmitted the waveforms to a computer.

The waveforms were studied initially for several minutes to ensure tracings were clear and if necessary the needles were adjusted slightly. Recording of the EEG then began and continued for 20 minutes before injection of acepromazine or saline and in a separate file for 30 minutes after injection. Event markers were used to note events such as eye movement or blink, body movement, muscle twitch, sigh, etc, so that these could be correlated with erratic sections of the waveform.

Analysis of the waveforms was done by a computer program.[g] Data were filtered with a band pass filter ranging from 0.5 Hz to 60 Hz and were sampled at a rate of 1,000 times per second. The EEG data were recorded and displayed with a common reference site (S). In order to establish waveforms representative of a localized response, a bipolar derivation was applied to the original recording. In a bipolar derivation, a bipolar pair was created by subtracting the recorded waveform at a particular site from the waveform recorded at an adjoining or nearby site. The derivation was applied in order to remove the common reference, with the displayed signals in the bipolar derivation considered more representative of local activity. A total of eight bipolar derivations were calculated.

The bipolar-derivation data were then segmented into consecutive epochs consisting of 1,024 data points (1,023 milliseconds duration), and a Fast Fourier transformation was used to convert the raw data in each individual epoch into a power spectrum. The power spectrum of the individual epochs were then averaged together.

Table A.1. *Descriptive Statistics for Alpha Waves Before and After Treatment with either saline or Two Doses of Acepromazine*

Analysis Variable : Alpha waves								
Time	Treatment	N Obs	N	Mean	Std Dev	Median	Minimum	Maximum
Pre	Saline	40	40	1.070	1.050	0.714	0.112	4.226
	Low Dose	96	96	1.467	1.307	1.113	0.098	6.149
	High Dose	96	96	1.347	1.267	0.910	0.066	6.031
Post	Saline	40	40	0.978	0.809	0.740	0.118	3.607
	Low Dose	96	96	1.687	1.660	1.174	0.121	8.735
	High Dose	96	96	1.583	1.826	1.042	0.085	9.948

Table A.2. *Mixed effects model results for Alpha Waves Before and After Treatment with either saline or Two Doses of Acepromazine*

Alpha Waves						
Predictor	Estimate	S.E.	D.F.	Overall Type 3 Test p-value	t-value for estimate	p-value for estimate
Time	--	--	--	0.09	--	--
Pre	*Ref*	--	--	--	--	--
Post	0.1732	0.0935	11	--	0.85	0.0908
Dose	--	--	--	0.01	--	--
Saline	*Ref*	--	--	--	--	--
Low	0.5235	0.1466	15	--	3.57	0.0028
High	0.4114	0.1466	15	--	2.81	0.0133
Electrode	--	--	--	<0.0001	--	--

Interictal Paroxysmal Discharges

The tracings over the entire recording time were reviewed visually. In agreement with international convention, the first named electrode becoming negative in respect to the second one was defined as an upwards deflection. Artifacts caused by eye movement or muscle twitches were marked with keys individually labeled for each of these events. Artifacts were removed from the evaluation. Interictal paroxysmal activity was classified as previously described: [21]

1. Spike (t=20-70 ms)
2. sharp wave (t=70-200 ms)
3. spike and slow-wave
4. multiple spike complexes
5. multiple sharp wave complexes
6. spike and slow-wave complexes, and
7. spindles.

The paroxysmal discharges were classified either generalized when present in all eight derivations or focal when predominant over a specific area. Based on visual review, focal discharges were assigned either to the frontal, central, or occipital cortical area. For all the paroxysmal events, a frequency per 10 minutes was calculated. The frequencies were averaged for the entire recording time, and for the interval before and after acepromazine injection.

Statistical Analysis

Statistical analyses were performed with commercially available statistical software.[a,b] Mixed effects models were used to determine the effect of acepromazine over time (before/after), adjusting for dose (saline, low or high dose) and electrode. Because the

Table B.1. *Descriptive Statistics for Beta Waves Before and After Treatment with either Saline or Two Doses of Acepromazine.*

Analysis Variable : Beta waves								
Time	Treatment	N Obs	N	Mean	Std Dev	Median	Minimum	Maximum
Pre	Saline	39	39	0.179	0.203	0.093	0.016	0.950
	Low Dose	96	96	0.216	0.174	0.159	0.021	0.717
	High Dose	96	96	0.225	0.217	0.164	0.011	1.407
Post	Saline	40	40	0.198	0.226	0.121	0.017	1.091
	Low Dose	93	93	0.331	0.328	0.192	0.023	1.496
	High Dose	96	96	0.291	0.282	0.188	0.021	1.401

Table B.2. *Mixed Effects Model Results for Beta Waves Before and After Treatment with either saline or Two Doses of Acepromazine*

Beta Waves						
Predictor	Estimate	S.E.	D.F.	Overall Type 3 Test p-value	t-value for estimate	p-value for estimate
Time	--	--	--	0.001	--	--
Pre	*Ref*	--	--	--	--	--
Post	0.0785	0.0180	11	--	4.37	0.0011
Dose	--	--	--	0.03	--	--
Saline	*Ref*	--	--	--	--	--
Low	0.0847	0.0281	15	--	3.01	0.0088
High	0.0673	0.0281	15	--	2.39	0.0302
Electrode	--	--	--	<0.0001	--	--

same dogs were used through the course of the study, we adjusted for repeated measures within dog. For dose and electrode, we report the overall Type III F-test for that factor. Each wave type (alpha, beta, delta, and theta) was analyzed separately. The tables below show the descriptive statistics for each wave type (calculated in the usual way), and the effect size for time and for dose in EEG units and the p-values for that effect for that wave type.

Averages of the interictal paroxysmal events were compared with nonparametric methods due to non-normal distribution. The comparison, before and after acepromazine injection, within a group, was performed with Wilcoxon Signed Rank test. The paroxysmal activity between the two treatment and saline groups was compared with a Kruskal-Wallis test. The comparison of the distribution of paroxysmal discharges on the surface of the skull was performed with a Chi-square test. The level of significance was set at $P < 0.05$.

Summary of EEG Analyses

RESULTS

Alpha waves

In Table A.1, it is interesting to note that the pre-treatment values for Low Dose and High Dose seem to be higher than for saline, although the difference among the three pre-treatment values is of borderline significance (p=0.086)

From Table A.2, which shows the results of the mixed effects model, alpha waves did not differ significantly (p=0.09) before treatment with acepromazine, adjusting for

Table C. 1. *Descriptive Statistics for Delta Waves Before and After Treatment with either saline or Two Doses of Acepromazine.*

Analysis Variable : Delta waves								
Time	Treatment	N Obs	N	Mean	Std Dev	Median	Minimum	Maximum
Pre	Saline	40	40	11.21	11.89	7.257	1.259	47.81
	Low Dose	94	94	17.87	19.27	11.60	1.628	103.1
	High Dose	94	94	16.61	20.89	7.768	0.484	106.3
Post	Saline	40	40	4.295	3.788	3.238	0.622	15.51
	Low Dose	96	96	6.080	5.865	3.797	0.415	29.81
	High Dose	96	96	4.996	5.224	2.955	0.261	24.25

Table C.2. *Mixed Effects Model Results for Delta Waves Before and After Treatment with either saline or Two Doses of Acepromazine*

Delta Waves						
Predictor	Estimate	S.E.	D.F.	Overall Type 3 Test p-value	t-value for estimate	p-value for estimate
Time	--	--	--	<0.0001	--	--
Pre	*Ref*	--	--	--	--	--
Post	-11.2787	0.9389	11	--	-12.01	0.0011
Dose	--	--	--	0.0456	--	--
Saline	*Ref*	--	--	--	--	--
Low	4.0468	1.4671	15	--	2.76	0.0146
High	2.8750	1.4671	15	--	1.96	0.0689
Electrode	--	--	--	<0.0001	--	--

dose and electrodes. The effect of acepromazine on alpha waves did vary overall (p=0.01) with both low dose (estimated effect=0.5235, p=0.0028) and high dose (estimated effect=0.4114, p=0.0133) having a significantly higher effect than saline. We also tested whether the effect of time varied by dose with interaction terms, but those terms were not significant (Type III test p=0.45) and were dropped from the final model. Alpha waves did vary significantly across electrodes (p<0.0001). In summary, both doses of acepromazine had a significant effect on alpha waves in dogs, although the two doses of acepromazine did not vary in their effect.

Beta waves

Two observations were deleted from the analysis. One observation in the saline pre-treatment group has a value of 3.186 and the next highest was 1.091. The other observation was in the low dose post-treatment group with a value of 6.198 and the next highest was 1.496. Both of these were considered to be anomalies and were deleted from the analysis. The resulting data (Table B.1) showed that the pre-dose levels are similar with similar standard deviations. The post-dose levels also had similar standard deviations.

From Table B.2, which presents the mixed effects model results for beta waves, after eliminating the two extreme values as indicated in Table B.1, we see that beta waves differed significantly (p=0.001) between before and after treatment with acepromazine, adjusting for dose and electrodes. The effect of dose on beta waves

Table D.1. *Descriptive Statistics for Theta Waves Before and After Treatment with either saline or Two Doses of Acepromazine*

Analysis Variable : Theta waves								
Time	Treatment	N Obs	N	Mean	Std Dev	Median	Minimum	Maximum
Pre	Saline	40	40	3.095	3.263	1.995	0.357	12.97
	Low Dose	96	96	4.184	4.048	3.126	0.349	20.39
	High Dose	96	96	3.898	4.022	2.284	0.144	20.06
Post	Saline	40	40	1.915	1.569	1.441	0.257	6.684
	Low Dose	96	96	2.645	2.407	1.696	0.206	11.65
	High Dose	96	96	2.282	2.283	1.456	0.139	10.69

Table D.2. *Mixed Effects Model Results for Theta Waves Before and After Treatment with either saline or Two Doses of Acepromazine*

Theta Waves						
Predictor	Estimate	S.E.	D.F.	Overall Type 3 Test p-value	t-value for estimate	p-value for estimate
Time	--	--	--	<0.0001	--	--
Pre	*Ref*	--	--	--	--	--
Post	-1.5091	0.2055	11	--	-7.34	0.0011
Dose	--	--	--	0.0138	--	--
Saline	*Ref*	--	--	--	--	--
Low	1.0932	0.3224	15	--	3.39	0.0040
High	0.7690	0.3224	15	--	2.39	0.0307
Electrode	--	--	--	<0.0001	--	--

did vary overall (p=0.03) with both low dose (estimated effect=0.0847, p=0.0088) and high dose (estimated effect=0.0673, p=0.0302), having a significantly greater effect than that of saline. We also tested whether the effect of time varied by dose with interaction terms, but those terms were not significant (Type III test p=0.13), indicating that the effect of acepromazine did not vary by treatment over time and thus the interaction terms were dropped from the final model. Beta waves did vary significantly across electrodes (p<0.0001). In summary, acepromazine did have a significant effect on beta waves in dogs, but that effect did not vary by dose.

Delta waves

Four observations were deleted from the analysis. Two observations in the low dose pre-treatment group had values of 159.139 and 158.858 and the next highest was 103.084. The other two observations were in the high dose pre-treatment group with a value of 178.487 and 165.472, and the next highest was 106.331. These four values were considered to be anomalies and deleted from the analysis. The resulting data showed that the pre-dose levels are reasonably similar with similar standard deviations. The post-dose levels also had similar standard deviations.

From Table C.2, which presents the results from the mixed effects model for delta waves, after eliminating the four extreme values as indicated in Table C.1, we see that delta waves did differ significantly (p<0.0001) between before and after treatment with acepromazine, adjusting for dose

and electrodes. The effect of dose on delta waves did vary overall (p=0.05) with low dose (estimated effect=4.0468, p=0.0146) significantly different and high dose (estimated effect=2.8750, p=0.0689) borderline different from that of saline. We also tested whether the effect of time varied by dose with interaction terms, but those terms were not significant (Type III test p=0.13), indicating that the effect of acepromazine did not vary by treatment over time and, thus, the interaction terms were dropped from the final model. Delta waves did vary significantly across electrodes (p<0.0001). In summary, acepromazine did have a significant effect on delta waves in dogs, but that effect did not vary by dose.

Theta waves

All values were included in the analysis. The data showed that the pre-dose levels are reasonably similar with similar standard deviations. The post-dose levels also had similar standard deviations. There were no obvious extreme values.

From Table D.2, we see that delta waves did differ significantly (p<0.0001) between before and after treatment with acepromazine, adjusting for dose and electrodes. The effect of dose on delta waves did vary overall (p=0.01) with both low dose (estimated effect=1.0932, p=0.0040) and high dose (estimated effect=0.7690, p=0.0307) significantly different from that of saline. We also tested whether the effect of time varied by dose with interaction terms, but those terms were not significant (Type III test p=0.76), indicating that the effect of acepromazine did not vary by treatment over time and, thus, the interaction terms were dropped from the final model. Theta waves did vary significantly across electrodes (p<0.0001). In summary, acepromazine did have a significant effect on theta waves in dogs, but that effect did not vary by dose.

Interictal paroxysmal discharges

Over a total recording time of 145 units of 10 minute intervals 355 interictal paroxysmal discharges were recorded (2.44 events/10 minutes). Of these events, 98.3% were focal and 1.7% were generalized discharges. Single spikes represented the most common wave form (91.25%). Other infrequent paroxysmal discharges included sharp waves (3.1%), multiple spike complexes (0.6%), spike and slow-wave (3.1%), spike and slow-wave complexes (0.6%), and spindles (1.4%). Of the focal paroxysmal discharges, 75% were predominately over the occipital area, 10.7% over the central and 14.3% over the frontal part of the brain. There was no paroxysmal discharge pattern mainly centered over the temporal areas. There was no statistically significant difference between the treatment groups and the paroxysmal discharge pattern.

The results for the frequency of interictal paroxysmal discharges before and after treatment with acepromazine are summarized in in Table E. The localization of the paroxysmal discharges over the cortical area did not change after the injection in any of the dogs. Interestingly, the saline group showed a weakly significant increase (p=0.043) of paroxysmal activity within the second 30 minutes of recording compared to the first 20 minutes. Within the same time frame, there was no difference in the low and high dose treatment groups before and after acepromazine injection. No significant difference was found when comparing low and high dose treatment groups with the saline group before and after acepromazine injection.

DISCUSSION

Our study showed that EEG waveforms in the alpha, beta, delta, and theta frequency range of dogs changed significantly between pre- and post-administration of acepromazine. We found a significant effect of acepromazine enhancing the power derivative for each waveform. There was no significant difference between the effects of low or high dose acepromazine on the EEG.

Changes over time in delta wave activity suggest gradual awakening as a result of metabolism and elimination of the baseline sedative drugs rather than an effect of the treatments themselves. The dogs were

initially sedated with an intramuscular injection of hydromorphone and medetomidine to facilitate electrode placement and prevent movement during recording of the EEG. This dose was not repeated. Peak effect of these drugs on EEG would be expected to occur approximately 10 to 15 minutes after intramuscular injection, thereafter slowly waning during the course of the study. Twenty minutes of baseline recording was conducted before either low dose or high dose acepromazine was administered. The sedation caused by this drug would be expected to be evident as a further change in the EEG waveforms.

Alpha waves, characteristic of the wakeful state, would be expected to be decreased by sedation. As we did not record alpha wave activity prior to sedation, we were unable to demonstrate this effect. The increase in alpha wave activity after acepromazine administration was thus unexpected. That said, phenothiazines have been found to have varied effects on the EEG depending on the drug and study. [15]

In one study, chlorpromazine, a supposedly pro-convulsant phenothiazine, was shown to produce a decrease in alpha wave activity as might be expected.[16] However, chlorpromazine-type drugs have also been classified by their ability to increase alpha activity.[17, 18] In humans, sedation that is light enough to only relax individuals may enhance alpha waves.[15] On the other hand, deepening the sedative level may account for acepromazine's effect on alpha waves. Increased activity in the alpha range is seen in deeply unconscious, comatose humans in a state referred to as "alpha coma."[19] Patients in alpha coma display a pattern of alpha activity similar to that observed in the waking, eyes-closed, relaxed state.

Beta waves are more evident during periods of concentration and focus. In this study, the dogs were sedated and lying quietly so beta wave activity would be expected to be reduced compared to the conscious state. Paradoxically, once again, beta wave activity increased after acepromazine injection. A similar EEG change has been noted following administration of promethazine, another compound in the phenothiazine family of drugs.[15] It is unclear what this change means in terms of CNS function under these conditions.

Delta waves are rarely seen in awake animals, and are more prominent in sleep. We hypothesized that delta wave activity would increase after administration of acepromazine, indicating a deepening level of sedation. This change was indeed what we found and mirrored the findings of others in response to phenothiazine administration.[20]

Theta waves occur during wakefulness, but may also occur during day dreaming. Epileptic seizures occur less during wakefulness and paradoxical sleep, conditions during which hippocampal theta rhythm is most common.[21] Our finding that theta wave activity increased after administration of acepromazine suggests entry into a relatively seizure-resistant state as the enhancement of hippocampal theta rhythm is thought to exert a seizure-resistant effect.[21]

In veterinary medicine, interictal and paroxysmal discharges have been reported in epileptic dogs [22,23,24] . Interictal paroxysmal discharges are defined as transient EEG events, which have an abrupt onset, attain maximal development rapidly, and terminate suddenly. [21] Most of the EEG signals are produced by the cortex. Abnormalities in the cortex are recorded as focal EEG changes, whereas subcortical alteration results in more generalized discharges, which are produced through projections of ascending fibers from the subcortical areas to the cortex.[25,26] Bipolar and prolonged recording used in this study provide more precise localization of paroxysmal discharges [21].

In the classical understanding of the interpretation of EEG recordings focal interictal paroxysmal discharges in dogs are evidence of an epileptogenic focus. In two studies of EEG recordings in epileptic dogs sedated with propofol the incidence of paroxysmal discharges was 12.5% and

27%.[27,28] In a large study of 125 dogs with focal and/or generalized seizures sedated with medetomidine and propofol focal and generalized interictal paroxysmal discharges were recorded in 25% of the dogs.[29] In a study of healthy beagle dogs sedated with propofol and the muscle relaxant rocuronium bromide, no paraoxysmal discharges were observed, even after photic stimulation and hyperventilation intended to provoke epileptiform activity.[30] In contrast, paroxysmal discharges were recorded in 6% of healthy Finnish Spitz dogs sedated with medetomidine alone.[31] In our study performed in beagle dogs free of seizure activity, we observed mainly focal paroxysmal discharge most often over the occipital area with a frequency of 2.44 events per minutes. This finding was unexpected because recording settings with band pass filter ranging from 0.5 Hz to 60 Hz, indemnification of artifacts during initial EEG recording, and a review of the paroxysmal discharge data twice were expected to eliminate non-epileptic wave forms produced by the muscles during subdermal needle placement . Possible contributors to the increased occurrence of paroxysmal discharges in our study included the possible pro-convulsive effect of medetomidine[32,33] also used in our study and the lack of antiepileptic properties of propofol[34,35,36,37] given for sedation for EEG recording in previous trials.

In our study, the injection of a low or high dose of acepromazine did not change the frequency of paroxysmal discharges. The frequencies compared every 10 minutes and also the averages pre- versus post-treatment frequency of paroxysmal discharges were statistically not different. Interestingly, there was an increase in paroxysmal discharges in the control group. The increase in frequency happened after 20 minutes and was steady over the remaining 30 minutes of recording time. This phenomenon cannot be explained by arousal with increased spike activity only since the recording time and recovery from sedation occurred after 50 minutes in all dogs independent of the treatment group. Acepromazine might potentially suppress paroxysmal discharges, but further investigations in dogs treated with muscle relaxants have to be done to confirm this finding.

Taken together, our findings do not indicate a pro-convulsant effect of acepromazine and may suggest an anti-convulsant action. Visual assessment of EEG waveforms after acepromazine did not show any EEG pattern characteristic of seizure activity, and none of the dogs showed clinical evidence of seizures immediately after or during the next several days while being monitored.

In summary, according to the results of this present study, acepromazine does not appear to produce EEG changes typical of seizures and may be safe to employ in dogs with no prior history of seizures. This supports clinical observations that the use of acepromazine does not increase the likelihood of seizure activity in dogs predisposed to these events.[14] Further investigation of the effects of acepromazine in dogs with a history of seizure is warranted.

FOOTNOTES

a) IBM SPSS for Windows version 22, Armonk, NY

b) SAS version 9.3, SAS Institute, Cary, NC

c) http://www.stat.uiowa.edu/~rlenth/Power/index.html, Dr. Russ Lenth, University of Iowa

d) Microsoft Excel 2010

e) Neuroscan version Scan 4.3, Compumedics USA, Charlotte, NC

f) SynAmp 2, Compumedics USA, Charlotte, NC

g) Scan Edit, Compumedics USA, Charlotte, NC

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