PAROXYSMAL MOTOR DISORDER DURING SLEEP: USE OF VIDEOELECTROENCEPHALOGRAPHY TO DISCRIMINATE BETWEEN EPILEPTIC OR NON-EPILEPTIC EVENT IN 3 CATS AND 1 DOG

Elsa Lyon, DVM [1,2], Thibaud Troupel, DVM, Dip ECVN [4], Nicolas Van Caenegem, DVM [4], Hervé Pochat, CEO [3],Stéphane Besnard, MD, PhD [2], Stéphane Blot, DVM, PhD, Dip ECVN [4], **Catherine Escriou, DVM, PhD [1]**

1 Unité de neurologie,CHUVAC, VetAgro Sup, Marcy l'Etoile, France 2 Vertex Laboratory, UFR STAPS Department, Caen, France3 Amset Medical, Saint-Maur-des-Fossés, France4 Unité de neurologie, CHUV-AC, ENVA, Maisons-Alfort, France

Contact : info@elyope.fr

Rationale

The diagnosis of paroxysmal events in sleep represents a significant challenge for the clinician, with the distinction of sleep-related epilepsy from non-epileptic sleep disorders often the primary concern.

In humans medicine non-epileptic motor disorders of sleep are common and take a wide variety of forms grouped into parasomnias, sleep-related movement disorders, and "others."

To date, in veterinary medicine non-epileptic motor disorders of sleep are poorly described and characterized.
We report a series of 4 cases (3 cats and 1 dog) presented for recurrent paroxysmal motor disorder during sleep where video electroencephalography (EEG) was a decisive and discriminating factor.

EEG material and method

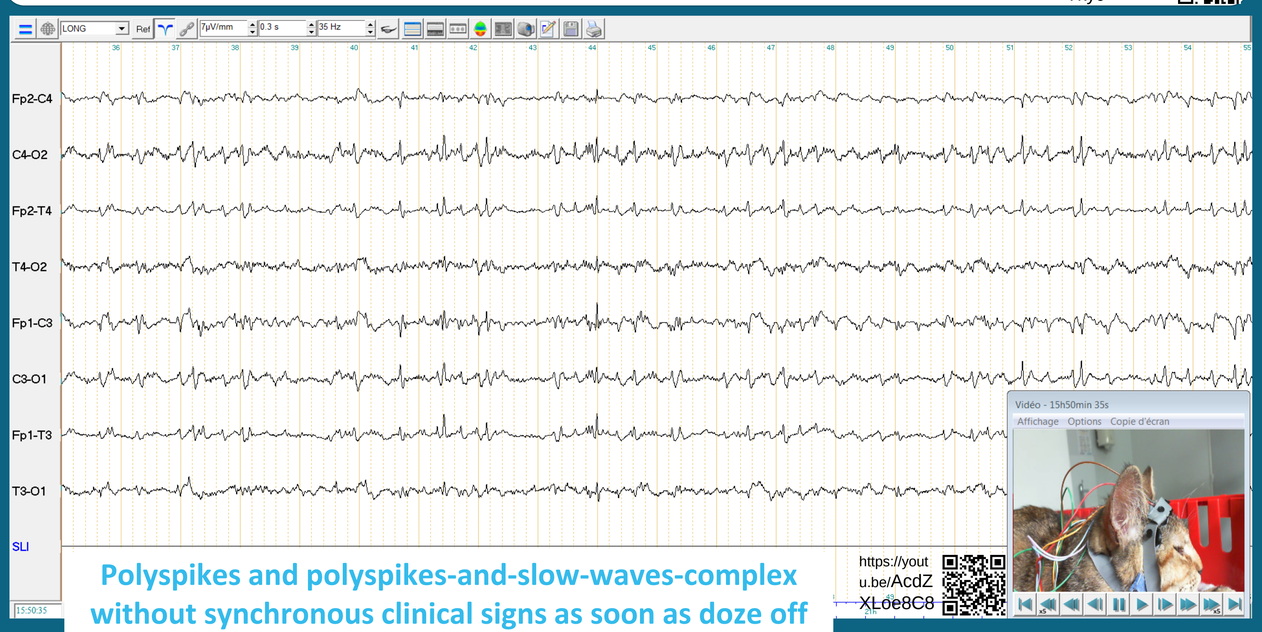
- Wired Deltamed® EEG device (Brainbox® 1042) with Coherence® software and synchronized webcam.
- 8 EEG surface electrodes, Ag/AgCl stud electrodes maintained with elastic straps, in which the electrodes were inserted and held in place by alligator clips of the electric cables or Ag cup electrodes affixed to the head using an electrodes EEG cap designed for cats and dogs.
- Electrode placement based on the proposal of Pellegrino and Sica and James and al.
- 2 EMG and 1 ECG electrodes and 1 respiratory belt.

- EEG during 35 min to 76 min.
- No anesthesia, EEG under the most physiological conditions possible to obtain natural drowsiness and sleep and the clinical signs observed by owners.
- In the presence of the owner who can help to recognize the paroxysmal motor disorder and facilitate its pet well-being and sleepiness.
- Activation procedure: Intermittent Photic Stimulation .

Rita, 1 year-old neutered female DSH cat,

- **Daily paroxysmal episodes during sleep lasting a few seconds with ear twitching followed by a whole-body spasm with a jump**, then disorientation and breathlessness lasting 5-10 seconds, then return to normal or falling asleep.
- Behavioral comorbidities: house soiling, hallucination like behavior (try to catch inexistent things).
- **Neurological examination abnormal:** low reactivity, frequent face twitch, dilated pupils with partial light response and absent menace response.
- No treatment at the time of the EEG.

https://youtu.be/cYz7bIgTky0



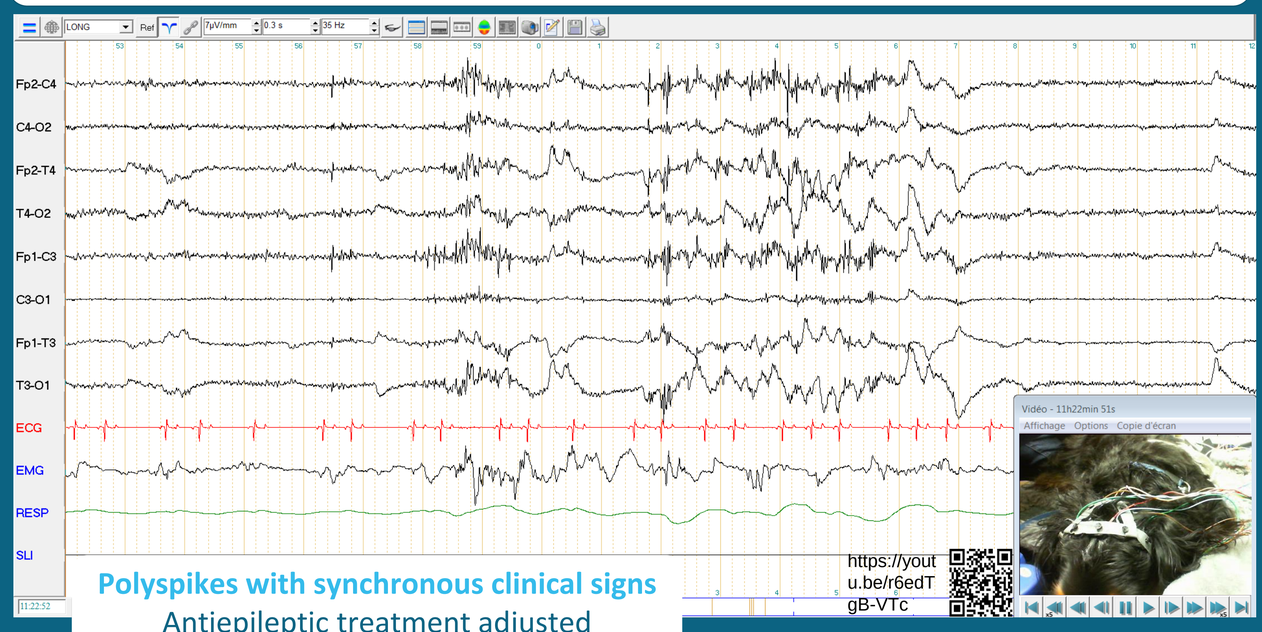
Polyspikes and polyspikes-and-slow-waves-complex without synchronous clinical signs as soon as doze off
Antiepileptic treatment (phenobarbital) initiated

https://youtu.be/AcdZXL6e8C8

Iona, 8 years-old neutered female long-haired dachshund dog,

- **Daily paroxysmal episodes (shivering, whole body jerk, myoclonus) during drowsiness or at the beginning of the sleep time lasting a few seconds leading to awakening since she was 2 years old.**
- History of 3 generalized seizures the first year, no recurrence with antiepileptic medication.
- **Neurological examination normal.**
- **Diagnostic of idiopathic epilepsy** (Tier 2 confidence level according IVTF).
- Partial response with antiepileptic medication (phenobarbital, levetiracetam, potassium bromide), antiepileptic treatment at the time of the EEG.

youtu.be/ePVpfVILmeo



Polyspikes with synchronous clinical signs
Antiepileptic treatment adjusted

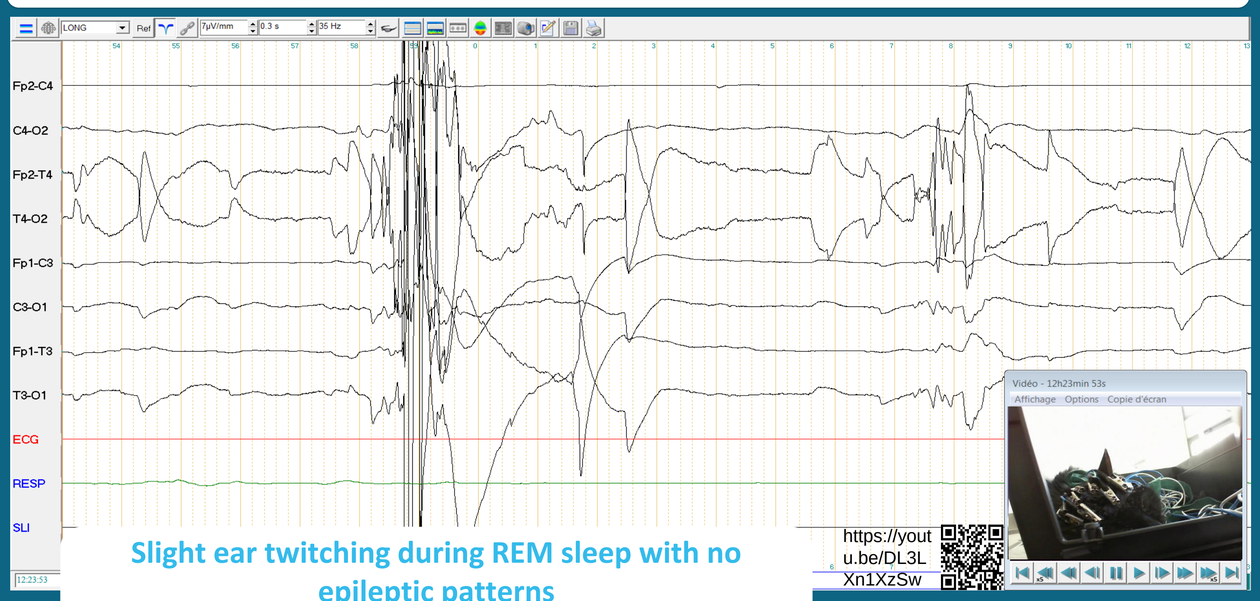
https://youtu.be/r6edTgB-VTc

Sleep related epilepsy

Human sleep related epilepsy represents 12 to 20% of epilepsies and is defined by nocturnal seizures that manifest solely during the sleep state such as Sleep Related Hypermotor Epilepsy (previously called autosomal dominant nocturnal frontal lobe epilepsy). Specific epileptic syndromes have also strong correlation with sleep such as Juvenile Myoclonic Epilepsy, West or Lennox-Gastaud syndromes, and Childhood Absence Epilepsy. In pets, classification of epilepsies is still at the beginning and specific association with sleep has not been studied although occurrence of seizures during sleep are well described.

Romy, 17 years-old neutered female DSH cat,

- **Daily paroxysmal episodes during sleep lasting around 5 minutes with fine face tremulations and eye twitching. No wake up and impossibility to awaken her during the bouts.**
- **Neurological examination normal.**
- No treatment at the time of the EEG.



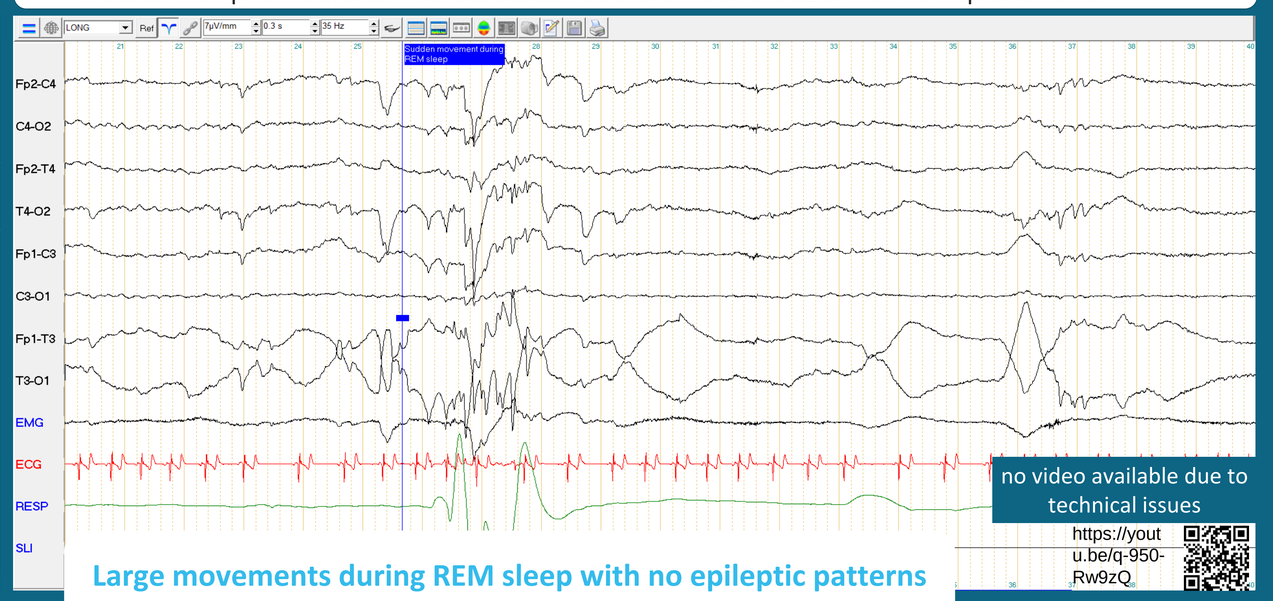
Slight ear twitching during REM sleep with no epileptic patterns
No treatment

https://youtu.be/DL3LXn1XzSw

Korosenai, 2 years-old neutered male DSH cat,

- **Daily paroxysmal episodes during sleep with jerking movements of the body and the limbs. No wake up and impossibility to awaken her during the bouts.**
- **Neurological examination normal except slight ataxia** (history of head and neck trauma).
- Treated with phenobarbital + levetiracetam at the time of the EEG with no improvement.

http://youtu.be/OOoq70eUuqQ



no video available due to technical issues

Large movements during REM sleep with no epileptic patterns
Antiepileptic treatment gradually stopped. Add on Melatonin

https://youtu.be/q-950-Rw9zQ

REM Sleep Behavior Disorder

REM Sleep behavior disorder (RBD) is classified as a parasomnia, which is defined as abnormal behavior that occurs during sleep due to loss of lower motor neuron inhibition responsible for normal REM associated atonia resulting in an absence of body paralysis and abnormal movements that can be very large.
Although the occurrence of spontaneous RBD in pets are not questioned, they are poorly characterized in veterinary medicine. Association with central nervous system lesions have been described but spontaneous unexplained cases in young animals are observed. Recently, association with neurodegenerative disorder or tetanus have been reported in dogs.

Clinical relevance

This case series illustrates:
- the decisive contribution of unsedated easy to use and facilitating natural sleep VIDEO EEG to discriminate between sleep associated epilepsy (SAE) and REM sleep behavior disorder (RBD)
- the occurrence of spontaneous RBD in cats
- the clinical presentation of RBD versus epilepsy in cats *(in our 2 RBD cases during the motor manifestation the cats remain asleep non-reactive to environmental stimuli, and it was not possible to awaken them at the opposite from the epileptic cat which wakes up at each crisis)*
- the possible association between head trauma and RBD as described in humans

Discrimination between SAE and RBD is mandatory as therapeutic considerations are dramatically different. Moreover, as RBD is associated with neuronal damage and could be an early sign of neurodegenerative disease, its recognition is essential.

Bibliography

https://youtu.be/Hov-MQTNZHA