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Paradoxical Relief in the Diagnosis of Functional Seizures

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Introduction

Differentiating between epileptic seizures and functional seizures without video evidence is a common yet challenging presentation in several healthcare environments. Often, the absence of a witness description of the semiology of the seizure can make the diagnostic process even more difficult.

Post-ictally, epileptic seizures classically lead to prolonged lethargy, confusion and headache whilst functional seizures tend to have a much shorter recovery however in practice this may not always be clear.

Case reports have anecdotally reported that individuals with functional seizures can sometimes report a sense of relief after their seizures.[1] However, this has never been assessed prospectively in a large group of individuals with functional seizures or compared to those with epileptic seizures.

Aim

We aimed to explore the phenomenon of a sense of relief after seizures (paradoxical relief) as a diagnostic tool for functional seizures. We hypothesised that patients with functional seizures may be more likely to feel a sense of relief after seizures than patients with epileptic seizures.

Method

We prospectively asked 176 patients admitted to a tertiary video telemetry unit if they experienced paradoxical relief. The patients then underwent extended EEG, the gold standard for diagnosis of epileptic and functional seizures.

Patients with severe learning disabilities or those that were unable to understand or communicate were excluded from the study. Patients with a dual diagnosis of epilepsy and functional seizures were excluded from further analysis as they were often unable to differentiate functional seizures from epileptic seizures.

Results

Assessment of Seizure Diagnosis

Amongst patient's admitted to unit between 29/01/24 and 16/12/24, 176 patients participated in the study assessing paradoxical relief. Of these 176 patients, 166 were assessed with extended EEG, primarily using video telemetry (VT).

Of them, 92 patients had events captured whilst on EEG:

- 51 – Functional seizures
- 23 – Epileptic seizures
- 9 – Dual diagnoses (functional and epileptic seizures)
- 9 – Unclear

75 patients did not have events captured on EEG or an EEG study was not performed during their admission. These patients were given symptom-based diagnoses based on consensus decision making and their investigation results::

- 15 – Functional seizures (clinically established or probable as per ILAE criteria)
- 42 – Epileptic seizures (based on consensus diagnosis and presence of interictal epileptiform features)
- 7 – Dual diagnoses (functional and epileptic seizures)
- 9 – Unclear

Assessment of Paradoxical Relief

Paradoxical Relief was observed in 46 out of 66 patients with functional seizures and 10 out of 65 patients with epileptic seizures ($p<0.001$).

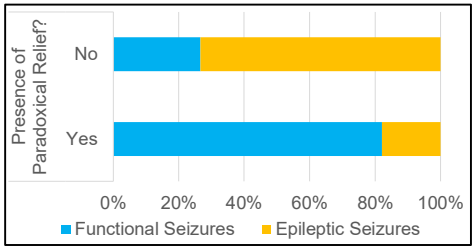

Figure 1. *Graph to show the proportion of patients with a diagnosis of functional seizures (n=66) and epileptic seizures (n=65) that experienced paradoxical relief.*

Using logistic regression, we found these significances remained after controlling for sex, age and presence of psychiatric comorbidity.

We calculated relevant statistical data on the presence of paradoxical relief in functional seizures as seen in **Table 1**. This supports that the presence of paradoxical relief can be valuable in the differentiation of functional seizures to epileptic seizures.

Odds Ratio	12.7 (95%CI:5.0 to 33.0)
Sensitivity	0.697
Specificity	0.846
PPV	0.821
NPV	0.733

Table 1. *Table to show statistical analysis of the presence of paradoxical relief inf functional seizures*

We calculated the probability of paradoxical relief in functional seizures to be approximately 69% and the probability of paradoxical relief in epilepsy to be approximately 15%. This gives a Bayes Factor of approximately 4.46 meaning the presence of paradoxical relief is around 4.5 times more likely in a patient with functional seizures than in a patient with epileptic seizures. **Figure 2** demonstrates how the implementation of asking about paradoxical relief can significantly affect the probability of a correct diagnosis.

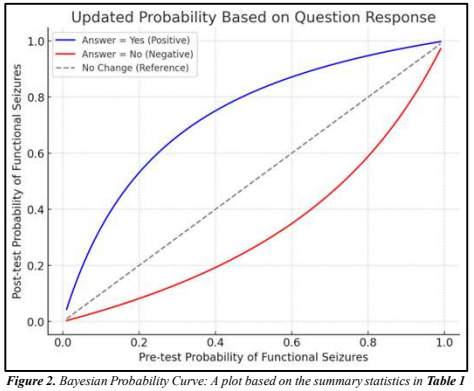

Figure 2. *Bayesian Probability Curve: A plot based on the summary statistics in* ***Table 1*** *of the updated probability of functional seizures as a function of pre-test probability, showing separate lines for positive and negative answers to the question of paradoxical relief.*

Patient Descriptions of Paradoxical Relief

We explored the phenomenon of paradoxical relief by encouraging patients to describe this sense of relief and what symptoms improved. Some of the comments made by patients with functional seizures are below:

"It is as if I feel earthed or fused again … whole again."

"Sometimes it feels like it needed to happen to get my energy back."

"This strange build up and strange taste has gone … I am kind of glad it has happened."

The presence of paradoxical relief may be useful in understanding the mechanism of functional seizures.

Conclusion

In conclusion, paradoxical relief is present in most individuals with functional seizures but not in patients with epileptic seizures. The single question of presence of paradoxical relief may be valuable in the diagnosis of functional seizures, especially where further investigation or collateral history is not available. The presence of paradoxical relief in patients with functional seizures may be useful to further our understanding of the mechanisms underlying functional seizures.

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References

1. Stone J, Carson AJ. The unbearable lightheadedness of seizing: wilful submission to dissociative (non-epileptic) seizures. J Neurol Neurosurg Psychiatry. 2013 Jul;84(7):822-4. doi: 10.1136/jnnp-2012-304842. Epub 2013 Mar 28. PMID: 23538071.