Utility and limitations of home-made videos in differentiating functional seizures from other paroxysmal events. An Italian cohort study

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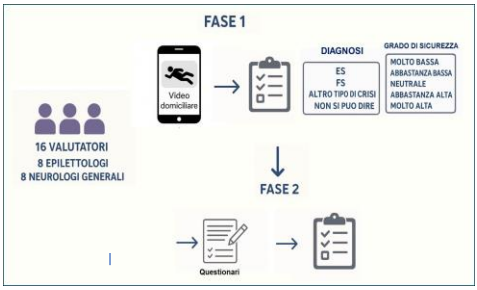
Background and aims

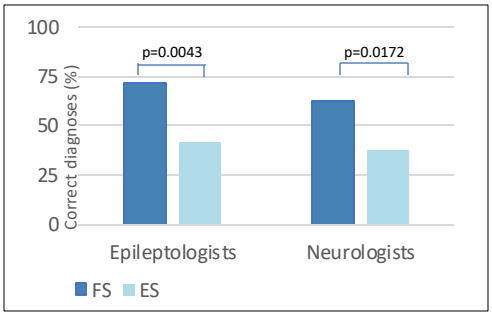
The differential diagnosis between epileptic seizures (ES) and paroxysmal non-epileptic manifestations, namely functional seizures (FS), represent a difficult challenge for clinicians. The **current gold standard** for differential diagnosis recommends recording attacks on **video with concurrent EEG and ECG monitoring**[(1)]; this examination, however, requires costly instrumentation and doesn't guarantee the record of a typical event[(2)]. The present study aimed at establishing if a home-recorded video alone can be an effective tool in the differential diagnosis of ES and other paroxysmal events and, secondly, at evaluating if the diagnostic accuracy of this approach is improved by the addition of information provided by structured questionnaires self-reported by patients and witnesses.

Methods

The observational, multicenter, prospective study involved 6 Italian epilepsy centers. All consecutive subjects > 14 years old with an established diagnosis of ES, FS or other paroxysmal events were asked to provide at least one **home-recorded video** of a typical event, recorded by an instructed family member/friend; the patients and family members/friends were also asked to fill out two distinct **self-reporting questionnaires.** For each home-recorded video, a random pair of blinded raters (one epileptologist and one neurologist) was asked to predict the correct diagnosis after viewing the video (**step 1**) and to repeat the same evaluation after analysing the questionnaires (**step 2**).



Results



94 home-videos provided by a total of 36 subjects (21 FS, 14 ES, 1 paroxysmal ataxia) were evaluated. Diagnostic accuracy at Steps 1 and 2 was not different between **epileptologists** and **neurologists.**

According to event type, **diagnostic accuracy in FS videos was significantly higher than in ES videos both for epileptologists (p=0.0043 at step 1, p=0.0301 at step 2) and neurologists (p=0.0172 at step 1, p=0.0104 at step 2).**

Among all signs identified by epileptologists, only **abrupt ending** of the seizure and **eyes closed** were distributed in a significantly different way between ES and FS; abrupt ending was detected only in ES videos (100% sensitivity), closed eyes and irregular movements were associated with FS (36% and 16% sensitivity respectively, 96% specificity).

Conclusions

Home-made videos represent an **effective screening device** before resorting to full video-EEG monitoring, which remains the procedure of choice in case of uncertainty; home-videos should therefore be included in the clinical-diagnostic arsenal in differential diagnosis between epileptic seizures and paroxysmal non-epileptic events, especially if FS are suspected. However, this approach needs to be investigated in larger cohorts and different cultural settings for further validation.

References

(1). LaFrance WC Jr, Baker GA, Duncan R, Goldstein LH, Reuber M. *Minimum requirements for the diagnosis of psychogenic nonepileptic seizures: a staged approach: a report from the International League Against Epilepsy Nonepileptic Seizures Task Force.* Epilepsia. 2013;54(11):2005-2018.

(2). Benbadis SR, LaFrance WC Jr, Papandonatos GD, Korabathina K, Lin K, Kraemer HC; NES Treatment Workshop. Interrater reliability of EEG-video monitoring. Neurology. 2009;73(11):843-846.