Focal, generalised epilepsy or both? – the double-edged sword of seizure semiology

Neligan A, Vivekananda U, Sander JW.

A 29 right-handed woman with no risk factors and no prior history of absence seizures or myoclonus was seen in a First Seizure clinic following a witnessed convulsion. There were no identified potential provoking factors such as preceding sleep deprivation, alcohol excess or drug misuse and no family history of epilepsy. The seizure occurred at an event with strobe lighting and was captured on closed-circuit television (CCTV). The patient recalled feeling uncomfortable and putting her hand over her eyes at the onset, and was witnessed turning her head to the left and lunging forward, following which her body turned to the left. Following this she fell backwards onto the ground, with bilateral convulsive movements lasting several minutes, following which she was confused and appeared frightened. It took her approximately 20 minutes to recover. Clinically, seizure semiology was consistent with a focal to bilateral tonic-clonic seizure, which was confirmed upon independent review of the CCTV recording by two epilepsy specialists.

Subsequently neuro-imaging (Siemens 3 Tesla MRI TLE Protocol) was normal. Routine EEG showed bursts of irregular spike and wave activity triggered by photic stimulation, supportive of a syndromic diagnosis of idiopathic generalised epilepsy (IGE). A 24-hour ambulatory EEG re-recording 12 months after the event showed similar discharges during sleep and wakefulness with evidence of photosensitivity. She has not had a recurrence in the 18 months of follow-up since the single seizure.

So, what is the syndromic diagnosis? Focal onset epilepsy with a single focal to bilateral tonic-clonic seizure but with a generalised epileptiform pattern on EEG?; generalised epilepsy manifesting as a single seizure with focal features?; or a dual diagnosis of focal and generalised epilepsies? More importantly, does this matter? Given the revised ILAE classification, she could now be diagnosed with epilepsy after a single seizure in the context of an abnormal EEG[1]. The question of whether or not she should be started on anti-seizure medication and how long she should be followed up in the absence of a seizure recurrence comes into play. The first scenario that this represents focal onset epilepsy (or seizure) but with a consistent pattern of generalised epileptiform pattern on EEG with photosensitivity is not a scenario often discussed or reported. The consistent pattern of generalised epilepsy with photosensitivity on two EEGs 12 months apart makes such a scenario unlikely.

The alternative scenario that this represents generalised epilepsy but with focal ictal signs mimicking focal epilepsy seems far more plausible. It is recognised that generalised epilepsies may imitate focal epilepsy[2, 3]. Most clinicians will be familiar with reports of focal abnormalities on EEGs in the context of an established clinical syndromic diagnosis of generalised epilepsy, particularly juvenile myoclonic epilepsy (JME), with focal EEG abnormalities reported in generalised epilepsies interictally[4] and, more rarely, intra-ictally[5]. Focal interictal abnormalities, such as intermittent focal slowing, asymmetric generalised epileptiform discharges and independent focal epileptiform discharges, have

been reported in up to about half of individuals in several series of generalised epilepsy mimicking focal epilepsy[2]. Studies of intra-ictal focal epileptiform discharges in generalised seizures are predictably rarer and typically reported in the context of video-EEG telemetry. In one study of 26 people with an EEG-confirmed diagnosis of JME, about a tenth of recorded generalised tonic-clonic seizures had lateralised ictal activity on the EEG[4]. In a video-EEG analysis of 302 myoclonic seizures in five individuals with JME, ictal EEG asymmetry was seen in four[5].

What may be less familiar to most clinicians is the well-recognised finding of focal ictal semiological features in generalised epilepsy, in particular, aversive seizures and rotatory/cycling seizures[2, 3]. The lateralising value of forced lateralised head version (with or without eye turning) in focal epilepsy was challenged decades ago, with it being pointing out that head version may occur in focal epilepsy originating in sites other than the frontal lobes and can occur in generalised seizures[6]. The occurrence of focal semiology in generalised epilepsies has been confirmed in multiple series. The observed semiological featus are focal myoclonus and clonus, head version, cycling movements, figure of 4-sign and asymmetric motor symptoms or hemiconvulsive seizures (Table 1)[4, 5, 7-9].

The last option is that this represents the first presentation of focal epilepsy but with an underlying additional diagnosis of generalised epilepsy, i.e. a dual diagnosis of two separate seizure disorders. Whilst cases of a dual diagnosis, i.e. idiopathic generalised epilepsy and focal epilepsy, have been reported, the onset of one typically precedes the other by many years [10-12].

The final diagnosis was one of likely generalised epilepsy, presenting with a generalised seizure with false localising focal semiology. This underscores the caveat that whilst ictal motor signs are essential in the lateralisation of the epileptogenic zone in focal epilepsy[13], over- or sole reliance on the ictal semiology may result in an erroneous diagnosis of focal epilepsy in someone with generalised epilepsy.

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Key point:

Whilst important particularly in the lateralisation of the epileptiogenic zone in focal epilepsy, over or sole reliance on the ictal semiology may result in an erroneous diagnosis of focal epilepsy in someone with a generalised epilepsy.

References:

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Figure of 4 sign – for example left arm flexion and right arm extension implying lateralisation to the left hemisphere in a focal epilepsy
Focal myoclonus – exclusively left or right-sided
Focal clonic/hemiconvulsive seizures -ecxclusive
Forced eye head version – to the left or right
Rotatary/cycling seizures – typically lower limbs
Post-ictal hemiparesis – exclusively left or right sided
Post-ictal nose wiping -typically localises to the temporal lobe in focal epilepsy
Asymmetric seizure termination after a GTC – for example left-sided then right-sided termination

Table 1: List of false lateralising signs reported in video-EEG studies of generalised epilepsy

Figure 1A.

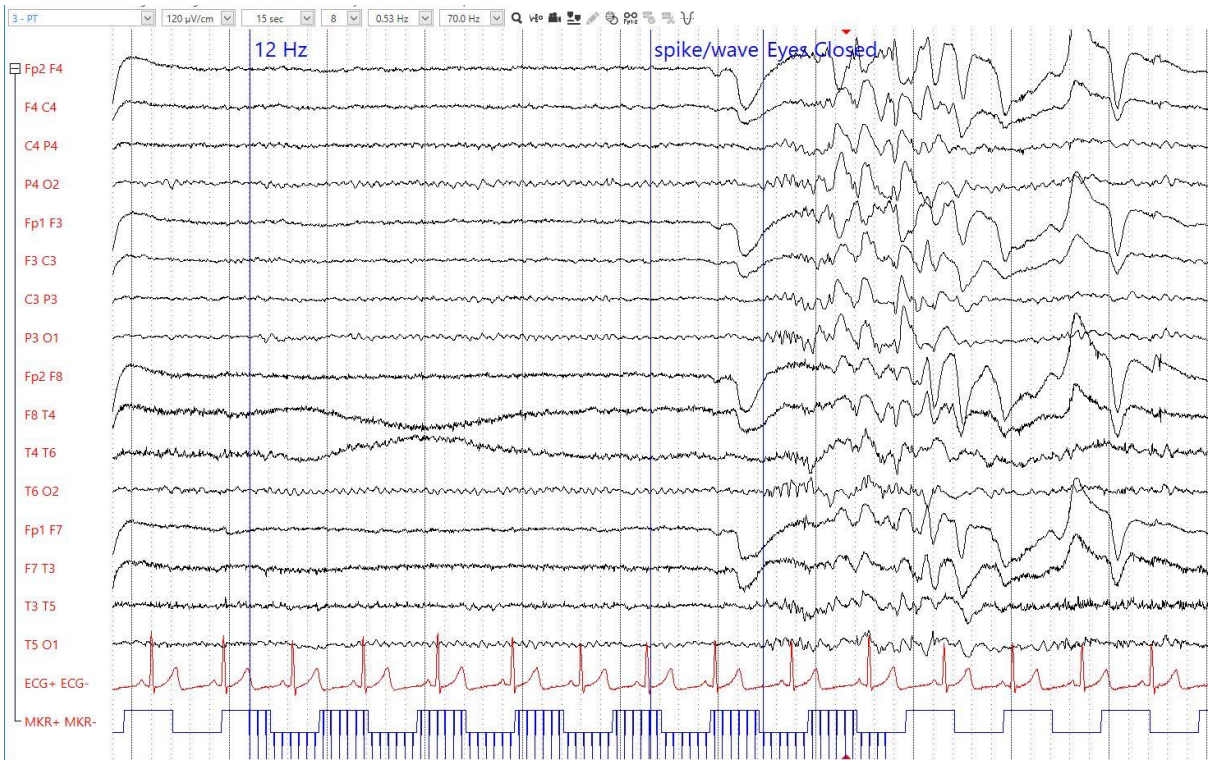

Figure 1B.

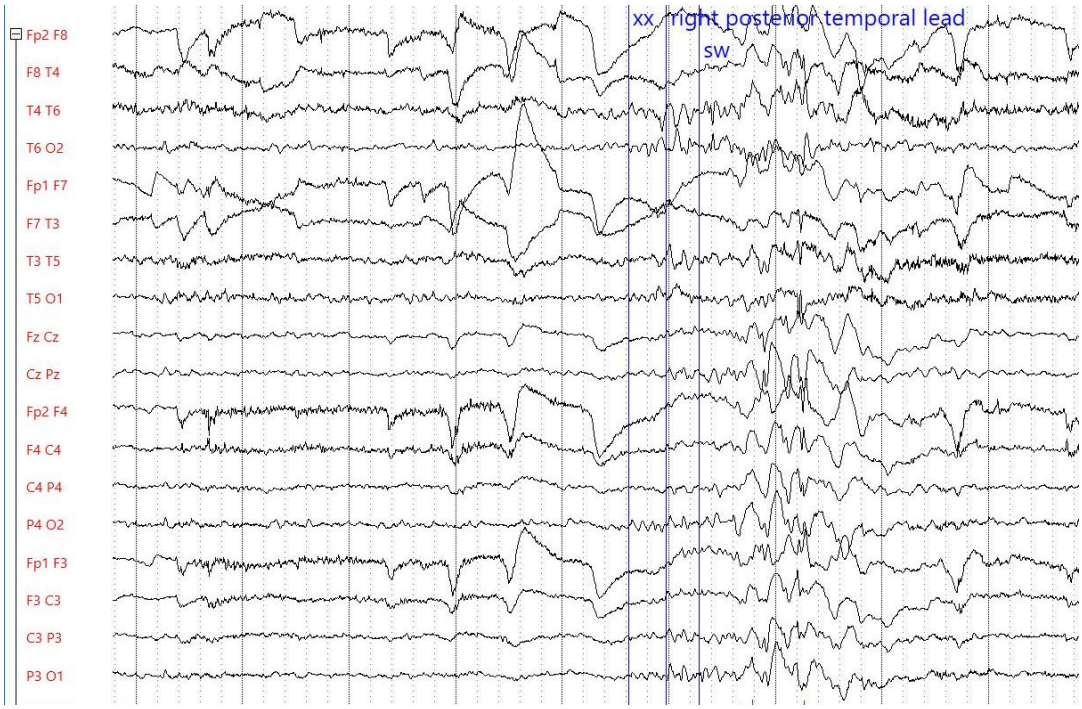

Figure 1C.

The first EEG trace (Figure 1A) demonstrates generalised 4-5Hz spike and slow wave activity (red box) that was associated with eyelid closure. The second trace (Figure 1B) demonstrated the same spike and slow wave activity (red box) following 12Hz photostimulation. The third trace (Figure 1C) performed nine months after demonstrated persistence of generalised spike and slow activity in keeping with a genetic generalised epilepsy.