The Colored Pad Test: A Safe and Reliable Provocative Technique for Functional/Dissociative Seizures

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Background and aim

Functional/dissociative seizures (FDS), also known as psychogenic non-epileptic seizures (PNES), are paroxysmal, time-limited episodes of altered motor, sensory, autonomic behavior, or consciousness, that resemble epileptic seizures phenomenologically, but occur in the absence of ictal or postictal epileptiform activity on electroencephalographic (EEG) recordings [1]. Seizure induction using provocative techniques during video-EEG recording for diagnostic purposes has been shown to be a useful tool, though no universally accepted standard of care for seizure induction exists [2,3].

This study aimed to evaluate the effectiveness and safety of the induction/suppression test using colored cotton pads applied to the patient's neck.

Methods

We retrospectively reviewed induction/suppression test performed at our Epilepsy Centre in patients with suspected FDS between February 2016 and July 2024. The test consisted of applying a pink-colored cotton pad during the induction phase, accompanied by suggestion that it could trigger a seizure, followed by a blue-colored pad during the suppression phase, suggesting seizure interruption. The rates of positive induction test (T+) and positive suppression test (S+) were evaluated. Demographic clinical and neuropsychological (assessed using the SCL-90) characteristics patients were also compared between T+ and T- patients and S+ and S- patients.

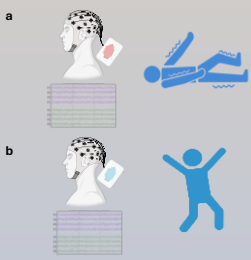

Fig. 1. (a) Induction procedure: first soaked pad application; **(b)** Suppression procedure: second soaked pad application.

Results

The study cohort included 130 patients, 71.5% of whom were female, with a median age of 37 years (IQR:20-52). The most frequent FDS types were hypermotor/generalized motor seizure (figure 2).

An FDS episode was recorded during the induction test in 82/130 (63.1%) patients. T+ and T- patients did not differ in terms of age, sex, age at onset, concomitant epileptic seizures, history of psychiatric disorders, and FDS type (p>0.05; table 1). T+ patients had a significantly lower schooling level than T- (median: 8 years-IQR: 8-12 vs 13 years-IQR: 8-16; p= 0.016; figure 3a). No significant difference in SCL-90 items were found, except for hostility (p= 0.030; figure 3b).

The suppression procedure successfully terminated induced FDS episodes in 79/82 (96.3%) of T+ patients within 60 seconds of patch application, with no case of a functional status epilepticus observed.

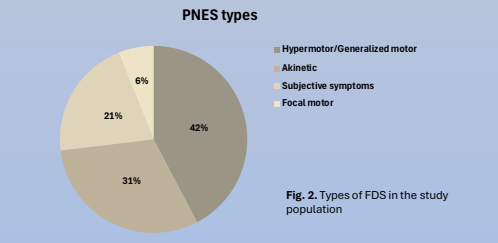

Fig. 2. Types of FDS in the study population

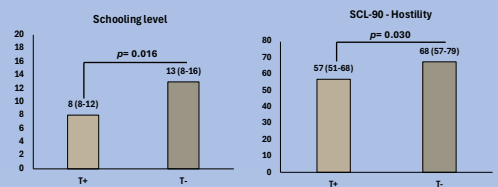

Fig. 3. The figure shows the difference between T+ and T- patients in schooling level **(a)** and SCL-90-Hostility item **(b)**

	Positive test (T+)	Negative test (T-)	p
Patients, n (%)	82 (63.1)	48 (36.9)	-
Sex: female/male, n (%)	62/20 (75.6/24.4)	31/17 (64.5/35.5)	0.179
Age, median (IQR), years	37.5 (19-52)	36.5 (22-52)	0.659
Concomitant epilepsy, n (%)	16 (19.5)	15 (31.2)	0.052
History psychiatric disease, n (%)	18 (21.9)	11 (22.9)	0.898
Age at PNES onset, median (IQR), years#	29.0 (16-45)	35.5 (20-50)	0.368
Type of PNES, n (%)			0.643
Hypermotor/generalized motor	38 (46.3)	17 (35.4)	
Akinetic	24 (29.3)	16 (33.3)	
Subjective symptoms	15 (18.3)	12 (25)	
Focal motor	5 (6.1)	3 (6.3)	
SCL90, median (IQR) *			
Somatization	76.2 (65.7-93.0)	65.2 (55.8-91.0)	0.111
Obsessive-Compulsive	68.0 (55.8-83.0)	71.3 (65.8-85.2)	0.410
Interpersonal Sensitivity	62.5 (46.8-79.6)	62.5 (49.0-73.9)	0.956
Depression	69.8 (55.8-82.9)	72.4 (68.0-85.5)	0.203
Anxiety	69.5 (60.8-83.8)	77.0 (55.4-84.5)	0.540
Phobic Anxiety	55.0 (50.4-78.1)	57.3 (47.0-70.7)	0.351
Paranoid Ideation	61.2 (55.6-79.2)	65.0 (54.6-82.0)	0.747
Psychoticism	64.4 (52.4-80.4)	64.4 (56.4-85.4)	0.987
Global Severity Index	71.0 (62.6-85.2)	76.2 (63.5-87.7)	0.605

Table 1. Demographic and clinical characteristics of T+ and T- patients

Conclusions

The induction/suppression test using colored cotton pads during video-EEG monitoring is a safe, effective, and ethically acceptable approach for diagnosing FDS, representing a practical alternative to prolonged video-EEG recording.

References

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