



Review

Praxis induction. Definition, relation to epilepsy syndromes, nosological and prognostic significance. A focused review



Elza Márcia Yacubian ^{a,*}, Peter Wolf ^b

^a Department of Neurology and Neurosurgery, Universidade Federal de São Paulo, São Paulo, Brazil

^b Department of Neurology, Danish Epilepsy Centre, Dianalund, Denmark

ARTICLE INFO

Article history:

Received 26 November 2013

Received in revised form 11 January 2014

Accepted 15 January 2014

Keywords:

Praxis induction

Juvenile myoclonic epilepsy

Idiopathic generalized epilepsies

Reflex traits

System epilepsies

ABSTRACT

Purpose: There is increasing awareness that reflex epileptic mechanisms provide unique insight into ictogenesis in human epilepsies. Several of the described triggers have in common that they imply complex visuomotor coordination and decision-making; they are today regarded as variations of one principle, i.e. praxis induction (PI). This focused review considers PI from the aspects of history and delineation, clinical and electroencephalographic presentation, syndromic relations, prevalence, mechanisms of ictogenesis and nosological implications, treatment and prognosis.

Methods: We reviewed a series of published articles and case reports on PI in order to clarify clinical and electroencephalographic findings, treatment and outcome.

Results: Findings of both induction and inhibition by the same stimuli suggest widening the reflex epilepsy concept into a broader one of epilepsies with exogenous modification of ictogenesis. PI is closely related to juvenile myoclonic epilepsy (JME) where hyperexcitability and hyperconnectivity of the entire network of visuomotor coordination seem to provide the precondition for eliciting reflex myocloni in the musculature active in the precipitating task.

Conclusion: The conclusions on ictogenesis derived from PI support the concept of JME as a system disorder of the brain.

© 2014 British Epilepsy Association. Published by Elsevier Ltd. All rights reserved.

1. Background and definition

Over the last years, increasing awareness has developed that reflex epileptic mechanisms provide unique possibilities to study seizure generation (ictogenesis) in natural human epilepsies. Praxis induction (PI) is one of the reflex epileptic traits which have been in focus. It is defined as the precipitation of epileptic seizures or epileptiform EEG discharges (ED) by complex, cognition-guided tasks often involving visuomotor coordination and decision-making.

2. History and delineation

The term was first used by Daniele et al.¹ but there is an earlier literature presenting specific aspects of PI such as playing chess, card or other games,^{2–5} calculations,^{6,7} writing,^{8,9} drawing¹⁰ and decision making.¹¹ Inoue et al.¹² reviewed the literature and proposed to consider PI as a common denominator. They observed that the vast majority of patients suffered from idiopathic generalized epilepsy (IGE), particularly juvenile myoclonic epilepsy (JME).¹²

In 1980, Okuma et al.¹³ devised an EEG activation method which they termed neuropsychological EEG activation (NPA) protocol involving speaking, reading, writing, calculation, constructive acts as drawing figures and block design tests (Table 1). This NPA protocol was carried out when paroxysmal discharges had been induced in a simpler form of a 5 min NPA comprising reading silently and aloud, speaking, mental and written calculation, writing and spatial construction during routine EEG examinations.¹³ NPA was used by Matsuoka et al.¹⁴ and also in a group of patients with “graphogenic epilepsy”¹⁵ as well as in a large unselected patient group.¹⁶

Thinking-induced seizures¹⁷ according to some authors are another variant of PI whereas others consider them a separate entity.¹⁸ Since spatial thinking is central in thinking-induced seizures, any difference is probably gradual. However, Zifkin¹⁸ in this discussion pointed out that seizures induced by thinking without any motor component often provoke absences and generalized tonic–clonic seizures (GTCS) but no myoclonic seizures. These cases typically involve the solution of complex arithmetic tasks which could be explained by a network including bilateral parietal cortical areas¹⁹ but not more, unlike in PI. Guaranha et al.²⁰ confirmed that mere planning of precipitating actions was a trigger by itself, the difference being only quantitative. Induction by writing

* Corresponding author. Tel.: +55 11 5576 4136.

E-mail address: yacubian@terra.com.br (E.M. Yacubian).

Table 1
Detailed neuropsychological EEG activation protocol.¹³

(1) Writing	(5) Constructional praxis
1. Spontaneous writing	1. Spontaneous drawing
2. Dictation	2. Sketching maps
3. Copying	3. Copying figures
4. Spontaneous writing blindfolded	4. Matchstick pattern reproduction
5. Dictation blindfolded	5. Block design test (WAIS)
6. Dictation by food	6. Making plastic models
Each was examined for Japanese letters (Hiragana, Katakana, Kanji), Roman letters and English letters	(6) Other tests
(2) Speaking	1. Finger tapping
1. Spontaneous speaking	2. Fine movement of the finger (tremolo)
2. Reading aloud	3. Using a screw-driver
3. Repeating	4. Bourdon cancellation test
Each was examined in Japanese and English	5. Undoing puzzle rings
(3) Other verbal activation	6. Hand, eye and ear tests (H Head)
1. Reading silently	7. Finger gnosis tests
2. Visualizing letters	8. Dressing
3. Making sentences in the mind	9. Color classification
(4) Calculation	10. Humming
1. Calculation with hands	11. Singing
2. Mental calculation	
3. Calculation using an abacus	
4. Calculation using an electric calculator	
Each was examined for subtraction, addition, multiplication and division	
5. Uchida-Kraepelins psychodiagnostic test	

has been reported both with PI¹², with primary reading epilepsy (PRE)²¹ and separately.⁹ Because of the linguistic involvement its place can be debated. Likewise, seizures induced by video games are most often related to photosensitivity²² but may also involve visuomotor coordination. The significance of these overlaps will become apparent below.

3. Description

Onset usually is in the second decade of life. Praxis-induced seizures typically start with a delay of some minutes of activity, occasionally more, as single or repetitive arrhythmic myocloni in muscles involved in the precipitating activity. A typical example is presented in Video 1. If the patient continues his activity they usually evolve into a GTCS, sometimes rather rapidly.

Supplementary material related to this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.seizure.2014.01.011>.

Spontaneous seizures occur rarely in 76% of patients.⁵ Occasionally, PI can commence later in life.^{23,24} Some familial cases have been described, e.g. two sisters with seizures exclusively induced by writing,⁹ and the genetic aspects seem not to differ from other patients with IGE.²⁵

4. Prevalence and syndromic relations

Matsuoka et al.¹⁴ performed NPA in 25 JME patients. Mental activities involving the hands (writing, calculation and drawing) precipitated seizures in 19 patients (76%). NPA was more effective in inducing ED (21 patients = 84%) than established activation methods such as drowsiness (17 patients = 68%), hyperventilation (10 patients = 40%) and photic stimulation (9 patients = 36%).¹⁴

All 25 cases reported by Goossens et al.⁵ had IGE with clinical patterns suggestive of either juvenile absence epilepsy or JME. These authors associated the occurrence of seizures to activation of the parietal lobe.

Senanayake²⁶ reported increase of ED and seizures with NPA in 148 JME patients. In twelve, >50% and in seven, all myoclonic seizures were precipitated by tasks involving problem solving,

calculation and spatial processing. He agreed with Goossens et al.⁵ that these patients presented regional hyperexcitability of the dominant parietal cortex.²⁶

Because of their clinical and EEG similarities, Inoue et al.¹² compared the clinical features of 32 PI patients with 132 unselected JME patients. They concluded that all PI patients with a specific diagnosis had IGE (JME 21, juvenile absence epilepsy 3, unspecified IGE 4); 4/32 had undetermined epilepsy. Of their 132 unselected JME patients, 19 (14%) had predominantly, and another 24 (18%) incidental reflex seizures. However, patients with predominant PI differed from the others by a male predominance of 3.7/1 (in agreement with Goossens et al.⁵; ratio 3:1) and a lower incidence of the photoconvulsive response, suggesting a dispositional difference within JME.¹² In a Brazilian series younger male patients were more prone to PI induction than older ones (25% up to age 30 versus 6% above) which was attributed to more frequent activities demanding fine finger movements such as game playing and computer manipulation by the younger generation.²⁷

According to Janz and Durner,²⁸ mental tasks involving hand movements, leading to psychic tension and demanding decision-making could provoke both myoclonic jerks and major seizures in JME.

Inoue and Kubota²⁹ reported PI in 27 of 213 JME patients (12.2%). They confirmed the following differences: slight male predominance (2.3:1); more absence seizures; no photosensitivity; higher amplitude of sensory evoked potentials (suggesting increased cortical excitability) and slightly less favorable treatment prognosis.²⁹

Matsuoka et al.¹⁶ in a multicenter study tested 480 unselected epilepsy patients with an enhanced NPA protocol for praxis-induced epileptiform activity and seizures. They found PI in 38 patients (7.9%), 36 of whom had IGE including JME. The most significant findings were with writing ($n = 26$, 68%), spatial construction ($n = 24$, 63.2%) and written calculation ($n = 21$, 58.3%). Of 45 JME patients ED were triggered in 22 (48.9%), by far the highest rate of all syndromes.¹⁶

Wolf and Mayer³⁰ reported on 62 JME patients who had answered a questionnaire addressing specific precipitation factors. PI was described by 19 (31%) comprising writing (7), decision-making (4), computer tasks and video games (6), calculations (6), thinking (8) and playing the piano (1). These authors, for the first time, emphasized another type of reflex myocloni in JME patients: the perioral reflex myoclonia (PORM) which were reported in 22 of the responses (35%).²⁹ In a follow-up study investigating 25 JME patients with video-EEG and using a modification of Matsuoka's NPA,³¹ PORM were found in nine patients (36%), and PI in six (24%); 4 manipulating with Rubik cube, 2 writing and 1, calculating).

Karachristianou et al.³² studied 30 JME patients with a NPA protocol and found EEG activation in 23 (76.6%) including manual tasks such as doodling figures in 18 (60%) or written calculations in 13 (43.3%), but also in non-manual activities like mental calculations in 15 (50%) and mental spatial manipulation in 15 patients (50%).

Among 75 Brazilian JME patients answering a questionnaire induction of seizures by hand activities and complex finger manipulations was known to 15 (20%)²⁷ whereas they considered stress (62 cases or 83%) and sleep deprivation (58 or 77%) by far the main seizure precipitants.

In a video-EEG NPA study, Guaranha et al.²⁰ described praxis induced discharges and/or myoclonic seizures in 22 of 76 patients (29%); puzzles in 19; written calculation in 9; writing in 6; drawing in 6).

It can therefore be concluded that PI is strongly associated with JME but also occurs in other types of IGE whereas it is very rare in other epilepsies. The prevalence figures in JME, however, vary

Download English Version:

<https://daneshyari.com/en/article/342071>

Download Persian Version:

<https://daneshyari.com/article/342071>

[Daneshyari.com](https://daneshyari.com)