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Neurological Lapsus as an Index of Psychic Processes over Developing Brain Activation: A Comprehensive Pre-Adolescent Case Report

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Abstract

There is a gap in current neuroscientific understanding regarding psychological disorders. This case report shows how psychic disorganization can provoke transient motor and language disregulation, as well as disorientation, suggesting a neurological lapsus in a preadolescent girl (10 years old). The reported episode is not explained by neurocognitive alteration, as her neuropsychological profile suggests a typical neurodevelopment in attention, speed processing, visuospatial praxia, visual and verbal declarative memory, working memory, verbal fluency, verbal and visual concept formation, and cognitive flexibility. A psychological analysis of the preadolescent's dissociation profile and symptoms evolution has been provided. The reported uncommon episode, in a still neuromaturational period of life, demonstrates the predominance of psychic organization over brain activation. Being suggested that body/mind influence can be bilateral, the study of psychodynamics ought to be updated and incorporated to neurosciences, beyond behavior and cognition.

Keywords: Psychological Disorders; Pre-Adolescent; Neurological Lapsus

Introduction

Neuropsychological interest has been massively focused in cognitive functioning, as the domain that studies how information processing occurs and how it is related to neurological functioning. Initially analyzing neurological disorders, neuroscientists have moved towards understanding the neural bases and circuits inherent to psychiatric major disorders, like schizophrenia.

Findings regarding neurocognitive correlates of schizophrenia and other personality disorders have led the field to assume that neurocognitive functioning, summed to the traditional analysis of disadaptive behavior, would be enough to explain psychic disorganization. This case report denotes a gap in current neuroscientific understanding, regarding psychological disorders. It shows how psychic disorganization can provoke transient motor disregulation, suggesting a neurological lapsus. Motor dysfunction associated to psychic aspects have been discussed by those who studied hysterias and conversion disorders, nowadays referred to as Functional Neurological Disorder [1,2]. This work exemplifies that the psychological- neurological association can occur in a direction not commonly accepted in neuroscience, granting predominance to psychic organization over biological activation.

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FND has been more reported to occur among female, and under vulnerability, like low income and conflictive families [3,4]. Few studies have reported FND cases in children [2,3,5]. They describe sudden appearance of symptoms, generally after a stressful situation. FND can be presented as sensory (hypoesthesia, hyperalgesia, paraesthesia or impaired senses) or motor dysfunction, be it a hypofunction (limbs paralysis, astasis, abasia, dysphonia, aphonia) or a hyperfunction (ataxia, tremors, other motor symptoms and seizures), for some days, weeks or months [3].

Clarifying about a neuroscientific assumption, this retrospective work aimed to provide a case report in which a single transient episode of neurological disregulation was not possibly explained by brain acquired injury nor neurological disorder. Instead, it was immediately preceded by psychic disorganization.

Patient Information and Clinical Findings

This is a retrospective and exploratory study, detailing the case report of a Brazilian female preadolescent, 10 years-old, mixed race (white and afro-descendant), low middle socioeconomic class, enrolled in the 6th grade. After presentation of the main objective and possible societal benefits of this work, free informed consent has been obtained from her mother, as well as free informed assent has been obtained from the preadolescent. She had been under psychological intervention at a private office, protected by the professional ethics code of the Brazilian board of psychologists [6], as well as the General Data Protection Law [7]. This report is focused on the characterization of an atypical episode, combined with the description of a few psychological sessions that had anticipated it. Previous information collected in her neuropsychological assessment 2 years before was also included in the qualitative analysis, summed to a posteriorly administered personality questionnaire, the Factorial Inventory of Personality [8], and based on Murray's theory of personology [9].

Psychological Assessment

Ann (fictional name), 10 years old, 6th grade at Middle School, was in psychotherapy for 5 months (in the last month, she moved from biweekly to weekly) due to changes in her family setting. Previously, two years before, Ann had been submitted to a neuropsychological assessment, due to her slowness and diminished concentration for school activities, which concluded that she had a typical neurocognitive developmental trajectory (Table 1). Ann showed superior performance in speed processing, concept formation (abstraction) and verbal comprehension, as well as medium performance in other executive functions, like working memory, episodic declarative memory, and sustained attention.

Regarding her psychological profile, Ann showed maximized affective needs (raw score: 296; percentile: 95-100) in a personality questionnaire, the IFP-II [8]. Those persons with high scores in this category present a strong need for affective bonding with friends, and important people, being loyal, offering and demanding protection, support, and admiration. They are people guided by feelings, fantasy and thoughts, tending to make judgments about others based on third parties' intentions, more than by thirds' acts [8]. Thus, Ann's personality profile is more prone to emotional dependence, with a passive approach to her needs, but engaging efforts to fulfil others' needs. Dissociative states are generally associated with some uncomfortable thoughts, beliefs or feelings that aren´t kept consciously, neither accepted nor expressed. It results in a psychological profile marked by incoherence. Following, some incoherent features emerged in Ann's psychotherapy have been analyzed.

Neuropsychological Test	Results	Classification
D2 [10]	Raw result: 297 | Pc = 60	Medium
	Total errors: 13 (4/5/4)	
	Net result: 284 | Pc = 70	
	Percentage of errors: 4,4 | Percentile = 60	
	Oscillation amplitude: 18 | Percentile = 30	
Color Trails Test [11]	Form 1: 60" | 0 error.	Medium
	Form 2: 136" | 1 error.	
	z = 0,5	
Symbol Search (WISC-IV) [12]	Raw score: 44 | Scalar score = 19 | 1 error.	Superior

Digit Span (WISC-IV) [12]	Forward: 6 / span: 4	Medium
	Backward: 6 / span: 3	
	Raw score: 12 | Scalar score = 8	
Rey-Osterrieth Complex Figure [13]	Figure A: Copy: 6:38" | Pc = 50	Medium
	Raw score: 32 | Pc = 60	
	Immediate Recall: 2:30" | Pc = 40	
	Raw score: 19,5 | Pc = 80	
	Delayed Recall: 1:31"	
	Raw score: 14,5 | Percentage of retention: 74	
Block Design (WISC-IV) [12]	Raw score: 30 Scalar score = 11	Medium
RAVLT [14]	List A: Trials 1 to 5: 6/9/10/13/13 | z = 0,5/0,8/1/2	Medium
	Imediate Recall: 10 | z = 1,6	
	Delayed Recall: 8 | z = 0	
	Recognition List A:14 | z = 2	
	List B: 2 | z = -1,7	
	Recognition List B:12 | z = 2,6	
Verbal Fluency	FAS: 8 (z = 0,5) / 10 (z = 1,8) / 3 (z = -1).	Medium
	Animals: 15 (z = 0,5)	
Similarities (WISC-IV) [12]	Raw score: 38 | Scalar score = 19	Superior
WCST-64 [15]	3 categories | Trials: 42	Superior Medium
	Correct Responses: 32 | 76%	
	Errors: 10 | 24% | Pc= 98	
	Perseverative Errors: 4 | 10% | Pc = 53	
	Conceptual Level Responses: 30 | 71% | Pc = 98	

Table 1: Ann's neurocognitive profile.

Despite had been Ann who asked for psychotherapy with her previous neuropsychologist, when questioned in initial sessions about her everyday life, she mentions that everything is going well, stressing that she enjoys life.

Interestingly, her dissociative profile is already manifested at this level, with incoherence between her speech and her feelings. When the psychologist would point out any fragility of hers, she would question, expressing disagreement. Thus, initially, Ann showed mechanisms of negation without consciousness regarding her dysfunctional feelings and beliefs.

Later on, guided by the psychologist, she progressed in reporting uncomfortable events, with increasing insights regarding her affective developmental trajectory. Thus, Ann was quitting her mechanisms of negation and validating her emotions and beliefs. She was expressing them verbally and implementing changes in her approach to uncomfortable sensations.

Her novel attitude, verbally expressing her genuine discomfort, began to generalize to her relationship with her mom. In her family context, Ann started to validate her own feelings and opinions. She also started to expose herself, reporting reprovable episodes to her mom, as well as allowing herself to cry and to receive her mom's emotional support.

Building a more confident relationship with her mother, Ann reported to her mom for the first time an episode of self-mutilation (biting her arms) at school. On this day, Ann reported to her mom feelings of anger against people. She said that self-mutilation behaviors had been occurring occasionally for some years, but it was the first time her mom got informed about them. Her mom communicated it to the psychologist, and this episode was commented on at the next psychotherapy session. In this next session, in a drawing task, she chose to draw a flower, and her traces were strongly marked, indicating that she would be putting much strength into it. This antagonism between what a flower and a marked

trace would represent - delicacy or anger - might be another index of dissociative features in Ann's expression. After that session, Ann denied any consecutive self-mutilation episode.

Timeline

Some detailed information about moments close to the dysfunctional episode:

Day 1: After being late to a meeting with her friend, Ann left the car running desperately (feeling tired), looking for her friend.

Day 3: At the psychotherapy session, Ann began talking about the Day 1 episode, gaining insights about her fear of abandonment, possibly related with her strong need for affective bonding.

As a speech-thought dissociative pattern, Ann identified her tendency to say what people would like to hear, not what she would truly feel or think.

Throughout the session, Ann showed an effort to leave mechanisms of negation.

Day 4: As a discrete failure in her inhibitory mechanisms, Ann's thought became a spontaneous speech during a chat with her friends: "You wouldn't tolerate one day inside my mind." Thus, Ann got speech-feelings consonance. It promoted her awareness, followed by intense cryness.

Day 5: Ann was with the same friends. They were happy, singing, and jumping. Ann felt Dysfunctional dizzy and sat on the swing. She does not remember what she was thinking about while things were happening. She just started to cry a lot. Her friends started

Discussion

This case report suggests that psychological analysis is a potential resource to anticipate the identification of dissociative episodes. This work emphasizes the importance of knowing the psychic aspects that somatize and disorganize behavior. It also shows the influence of psychic processes on the neurological functioning. Our case must resemble the rarely observed association between psychological and orthopedic aspects, among children with conversion disorders. Under anesthesia, their member rotations and muscle spasms disappear, which suggests that dysfunctional mechanisms occur under consciousness despite preserved articulatory and muscle functioning [2].

Despite typical neurocognitive development, Ann presented a transient lapsus in motor inhibitory control right after a psychological stressor. FND-related altered activation has been identified in response monitoring brain regions like the mPFC, vmPFC, and ACC, which communicate with emotional processing brain structures, as the nucleus accumbens, amygdala, insula, periaqueductal gray, and orbitofrontal cortex [16,17].

So, this transient dysfunction suggests a lapsus in the neurological functioning of ventromedial cortical and subcortical structures. Fast reversibility and isolated presentation of these symptoms suggest the absence of acquired brain injury, neuroinfection, or other neurological disorder that would explain this episode of disrupted inhibitory control. A neurological examination would be recommended to discard neurological acquired injuries; however, its immediate precession by a psychological stressor and its fast recovery after affective support embase its characterization as a single-episode FND. In literature, a multimodal imaging analysis showed no differences in brain volumes, areas, or cortical thickness, as well as in fMRI tasks, between an FND patient and the healthy comparison group [18].

Unlike other child cases reported in literature, Ann presented a single episode with no recurrence for at least a month. Her emotional regulatory skills and techniques (she beneffited a lot from the strategy of "cutting" dysfunctional thoughts), combined with fast family support and the next-day psychological extra session, might have prevented her from experiencing novel episodes.

This study is original in its presentation of the child neurocognitive profile, which was under typical development, ruling out cognitive dysfunctions that would explain such phenomena of neurological lapsus - provoking motor dysfunction in a child. Neurocognitive studies are still scarce among FND adults, having reported cognitive alterations in a person with multiple personality disorder [19], another with previous anorexia nervosa or post-partum depression and panic disorder [18], and in a broad conversion disorder sample lacking a psychiatric screening [20]. Processing speed, attention, working memory, and language showed reduced performance among FND adults in other studies [21,22]. However, prolonged exposition to FND among participants in both studies, from 3-36 months to a mean of 80 months, might have contributed to these cognitive differences among adults. Most importantly, the observed statistical difference does not mean clinical difference, as the FND group mean has not shown to be more than one standard deviation higher or lower than the comparison group mean in either referred study. Thus, further analysis would consider if Ann preserved neurocognitive function a) was a protector factor against the symptom recurrence or intensification; or b) was a timepoint of a preserved neurodevelopmental trajectory that would become more affected later on, as observed in adult studies.

It also highlights the importance of differentiating between alterated and dysfunctional brain states. Lack of functionality can also be transient, with a high influence of emotional distress, like psychological violence. This discrimination is imperious for precise differential diagnosis. Thus, this

work highlights that brain functioning can be under the influence of psychosocial factors, assuming its vulnerability to interferences, under a dysfunctional mode.

The fast reversibility of the neurological symptom seems to indicate dynamic mechanisms involving brain functioning, mainly inhibitory neurotransmitter systems. Thus, the regulation of inhibitory neurotransmitter systems, mainly GABAergic and serotoninergic, seem to be potentially influenced by psychic disorganization. In fact, recent research has found that children and adolescents with FND have lower GABA/Cr and NAA/Cr ratios in the supplementary motor area [23]. Regarding serotonin, the preferred recommendations for pharmacological FND treatment, even in the absence of overt psychopathology, are selective serotonin reuptake inhibitors and serotonin norepinephrine reuptake inhibitors [24], which suggests that serotonin system disturbance might be implicated in FND pathobiological features.

Also, these transient neurological changes might interplay with neurodevelopmental mechanisms. At this age (10 years old, 8 months old), there is an almost global peak of cortical thickness, observed in a parieto-prefrontal direction, from 7 to 11 years-old [25], which is an index of neurocognitive optimization. On the other side, at this preadolescent period, the white matter and the subcortical nuclei are in linear, synchronic, and homogeneous development.

Also, the precental sulcus and neural sources associated with motor skills will later in adolescence pass through a replacement for more frontal regions [26]. It remains to be understood whether there is a differential dysfunctional interference of psychic disorganization over brain activation at this lifetime period. It is long studied that severe psychic disorganizations, like schizophrenia, tend to be established in late adolescence, probably denoting a psychological vulnerability under a moment of intensive neurodevelopmental changes.

Ann showed an exchange of symptoms that suggests a transition between self-mutilation, repetitive movements, and motor inhibitory control dysfunction. Self-mutilation has been mentioned as associated with motor conversion disorders [3]. So, the psychological dynamics underlying obsessive, compulsive, motor tics, and conversion disorders should be well understood, in order to predict the impact of psychic reorganization over motor organization. Insecure attachment and dissociation have been proposed to be psychologically predisposing vulnerabilities to psychogenic nonepileptic seizures [1]. There is a broad spectrum of cognitive, affective, and social underlying dynamics that ought to be better understood in order to provide effective psychological treatment for children and adolescents.

A limitation of this study resembles a limitation in the field, which is the lack of more validated and authorized neuropsychological tests in Brazil. Another limitation is that the main informant, Ann, had difficulties remembering the dysfunctional episode circumstances.

Conclusions

This case report highlights the predominance of psychic organization over brain activation and regulation. Current neurocognitive understanding does not explain Ann's dysfunctionality and demands an update on psychodynamic comprehension. In fact, this single and simple case report demonstrates that the nature of human experience relies not only on the biological aspect. There is a psychic organization that can be dissociated from the biological organization, resulting in atypical behavior and, consequently, in neurological lapses. Ann's case denotes that the psychological organization is not totally identified through what is observed - the behavior – nor through the analysis of the cognitive processes anticipating or underlying such behavior. A broad spectrum of covert psychological phenomena remains to be well understood, beyond thoughts, beliefs, cognition, and feelings. For example, Csikszentmihalyi M [27] has advanced on it with a healthy approach, proposing a description of optimal experiences (flow). Thus, recognizing that psychological phenomena have a different nature but some dynamics or mechanisms share commonalities with biological phenomena seems to be a necessary step towards ontologically and epistemologically valid neuroscientific results.

Author Contributions

Nayara Mota: all.

Conflicts of Interest

The author declares there were no conflicts of interest regarding this manuscript's authorship or publication.

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