Cognitive processes in superior longitudinal sinus thrombosis: Case report

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Introduction: *longitudinal sinus thrombosis is a hard to detect disease, because it has various causes, and due to the polymorphism of its neurological manifestations; besides it is common in women, related to estrogen stimulus and other hormonal factors, but hardly likely under 40 years old.* ***Patient:*** *patient under 40 years old after having two episodes of ischemic cerebrovascular accident. The patient was evaluated one year later, after her lesion, her cognitive/functional state by using the Neuropsi Attention & memory battery and Mayo-Portland Adaptability Inventory (MPAI); the affected cognitive processes at a mild classification level were attention and concentration, executive functioning; the functional status reported by her spouse suggests affectation of clinical symptoms, such as irritability, rage aggressiveness, headaches, fatigue y reaction to milder symptoms and improper interaction. These symptoms were not reported by the patient, suggesting possible anosognosia in her adaptability process* ***Conclusion:*** *After a cerebral lesion process caused by a thrombotic affectation, cognitive/functional sequelae remained after spontaneous recovery, thus leading to rehabilitation processes.*

Key Words: *Neurobehavioral manifestation, brain thrombosis, cognitive processes.*

Introduction

Cerebral thrombosis is a neurologic problem caused by the death of a a determined area of the encephalon, due to lack of blood irrigation. It is caused by intra-arterial obstruction of the nutrient artery, because a clot was formed inside it[(1)]. It is deemed as rare and involves thrombotic occlusion of the veins and venous sinuses of the brain. It is a hard diagnosis disease, due to the polymorphism of its neurological manifestations and the diversity of diseases causing it[(2)].

Affectation starts when the blood vessel is occluded; poor irrigation causes a low feeding of the main energy substrata of the cells del SNC, which are oxygen and glucose. As an alternative, cells increase glucose/oxygen collection from the blood, but when the ischemia continues and blood irrigation is reduced to less than 30 m1/100 g of brain tissue/min, neurologic signs arise; when the ischemia lingers and the irrigation is reduced to less than 15 to 18 m1/100g of tissue/min, electrical activity is missing, thus causing functional/neuronal inactivity, but potentially

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reversible; if the flow does not go back to normal, physiological disorders occur in the cell membrane thus leading to brain death[3].

The affected area, the superior longitudinal venous sinus, is a vascular anatomic structure that longitudinally goes on the convex surface of the brain, from the anterior fossa to the occiput, the lumen of the superior longitudinal sinus is linked to the drainage areas of the cerebral veins and meninx; thrombosis of the superior longitudinal venous sinus is a rare clinical entity and hard to be diagnosed. Before access to imaging its prognosis was thought to be fatal. Tests, such as nuclear magnetic resonance and computerized axial tomography have allowed to prove it is more frequent than it was thought and with a proper handling, its prognosis is favorable in most patients[4].

Specifically, in the rate of cardiovascular episodes, such as myocardial infarction, cerebral stroke and venous thrombembolism (TEV), significant differences have been appreciated proving the idea that sex is a significant differentiating variable concerning risk of cardiovascular disease[5].

Females are associated to a higher thrombotic risk; this is mainly because of estrogen stimulus and other hormone factors[6]. From an etiological point of view, the main cause of this thrombosis is represented by hypercoagulability associated to pregnancy, puerperium and use of hormone contraceptives[7]. Additionally, epidemiological investigations, since 1960 have proven a causal relation between the use of under-the-skin contraceptives and increasing risk of cardiovascular disease[8], specially venous thromboembolic disease, reaching a figure 10 times higher than venous thromboembolic disease, compared with the rate reproductive health women have who did not use contraceptives.

Before this affection there are some determining variables. One of them is age. When the patient is under 40 years old is infrequent to have it. Every year, 1 out of 10 thousand young adults is estimated to have thrombosis and, in turn, during the same period of time, elderly people have 2 to 3 cases out of 1,000 people[9].

After a thrombosis episode, some degree of neuronal affectation may be found, thus causing imbalance in cognitive processes. Therefore, it is stated that: accidents in the upper section of the middle cerebral artery cause aphasic disorders, mainly affecting verbal functions, reading comprehension and other aspects related with speech[10].

Under this scenario, after a thrombosis it is necessary to perform full examination of the patient which allows to determine the cognitive affectation levels in order to determine the damage and to reduce the rehabilitation process in those affected competencies or skills, as a favorable evolution has occurred when early diagnosis and treatment is made[11].

Taking into account these considerations, the next clinical case is analyzed, considering the risk factors and other conditions and environmental features influencing its study.

Clinic Case

32-year-old female patient, who had a consistent 15-day clinical picture for severe generalized cephalea and previous episodes of upper longitudinal sinus thrombosis. In her medical history she was reported to go to the hospital, because of a severe holocraneal pulsating migraine, nausea, photophobia, drowsiness y general muscle weakness, . She was admitted to the intensive care unit. She had a history of holocraneal pulsating migraine since she a was a child, ischemic cerebrovascular accident on the right side, caused by delivery parturition complications, and as a risk factor, use of Jadelle under the skin contraceptive.

As a consequence of ischemic cerebrovascular accident, the patient, lost movement on the right side of her body and progressively fully lost body movement. When she was admitted to hospital she could not mover on her own, as she could only move her eyes; but she had a good recovery process, which let her leave the intensive care unit after eight days.

When the initial physical examination was made, she had bradylalia and 8, in Glasgow coma scale classification. The simple craneal computerized axial tomography showed left parietal subcortical hypodensity- hiperintensity of the superior longitudinal sinus, the magnetic resonance showed venous thrombosis of the superior longitudinal sinus and venous

infarctions with hemorrhagic transformation of the parieto-occipital bilateral joint, mainly right side. The control computerized axial tomography showed a void on the bilateral parietal cortex, mainly right side. Lab results were negative for thrombophilia and autoimmune diseases, but in these high C-protein and antithrombin III were found.

A neuropsychological examination after one year, after the spontaneous/instant recovery period was made in order to determine sequelae ; so, processes were appraised by using Neuropsi test, a neuropsychological assessment instrument which allows to appraise cognition processes in psychiatric/neurologic patients and various medical conditions See complementary Table I; in order to assess life quality the Mayo-Portland Adaptability Inventory (MPAI) was applied, which allows to make clinical assessment of personal dimensions of those people who had acquired cerebral lesion.

Results And Discussion

When analyzing neuropsychological evaluation, with respect to each area, the results are as follows: Regarding attention and concentration, i.e. the cognitive process which allows us to to be oriented to relevant stimuli and to be able to process them in order to respond accordingly, which is used on a daily basis in various attentional sub-processes for each activity to be performed[12], the only aspect within a severe range is detection of total digits; regarding executive functions, to be defined as the set of cognitive skills necessary to control and self regulate our own behavior that is related to complex cerebral functions[13], affectation was detected during categories formation with severe performance, and also in the stroop of interference times and the stroop de interference success; when talking about coding, a mild range of difficulty of the pairs associated to coding of average volume was identified, slowing down thinking processes; regarding evocation a mild affectation was found for both the associated pairs with full evocation, as in logical average evocation memory for histories, thus generating a difficulty for the patient to access her memoirs when she tried to verbalize them. Next, tabulation of the test is described with total scores and scores per areas, identifying that normalized scoring from 1 to 3 is equivalent to a severe range; from 4 to 6 is mild-moderate; from 7 to 13 is normal; and from 14 to 19 is classified as high normal, matching the aforementioned (Table II).

Added to these results, we have the Mayo-Portland Adaptability Inventory (MPAI), where after applying the survey on a list of items regarding the 30 functions generally affected by cerebral lesions, a score is assigned and the adaptability degree is classified, i.e. from the point of view both of the patient and also from a relative thereof (Table III).

In it there is evidence that by using this tool the relative expresses, adaptability issues reflected in irritability, rage, aggressiveness, headaches, fatigue, reaction to mild symptoms and inadequate interaction thus hindering activities, from 25 to 75% of the time; although perception is as low or void by the patient, who

Table I. Neuropsi Classification, assistance and memory

Total score	Normalized score	Range
Total, assistance and executive functions	75	MILD
Total, memory	90	Normal
Total, assistance and memory	84	MILD

Table II. Cognitive Results

	Subscales and maximum score	Normalized score	Classified Score
	Total Orientation (7)	10	Normal
Assistance and executive functions	Progression Digits (9)	8	Normal
	Progression Cubes (9)	8	Normal
	Matching Visual Detection (24)	15	Normal high
	Digits Detection total (10)	3	Severe
	Successive Series (3)	7	Normal
	Categories Formation (25)	1	Severe
	Verbal/Semantic Fluency (Reclassified) (4)	8	Normal
	Phonological Fluency (reclassified) (4)	14	Normal high
	Total non verbal fluency (reclassified) (4)	12	Normal
	Total Motor Functions (20)	8	Normal
	Stroop Time Interference (reclassified)	3	Severe
	Stroop matching interference (reclassified)	1	Severe
Memory	Digits regression (8)	10	Normal
	Cubes regression (8)	10	Normal
	Curve memory coding average volume (12)	10	Normal
	Coding Associated Pairs Average Volume (12)	6	Mild moderate
	Logic Memory average coding histories (16)	9	Normal
	Complex Figure/Rey-Osterreith Coding (12/36)	16	Normal high
	Coding Faces (4)	12	Normal
	Total Faces Recognition (2)	11	Normal
	Total Verbal Memory verbal, per keys (12)	10	Normal
	Total Recognition Memory (12)	8	Normal
	Associated pairs full Evokation (12)	6	Mild moderate
	Logic Memory Average Evokation histories (16)	6	Mild moderate
	Complex Figure/Rey-Osterreith Evokation (12/36)	10	Normal
	Total Spontaneous Memory (12)	11	Normal

Table III. Adaptability Inventory.

	Capabilities	Adaptation	Participation	Normalized score	Classified Score
Patient:	1	9	0	10	Good adaptability
Familiar	4	23	2	27	Good adaptability

states to have a very mild affectation and a high adaptability degree, thus indicating a potential anosognosia.

Conclusion

When studying cognitive processes in a case of superior longitudinal sinus thrombosis it is important to highlight that cognitive functions are the base of knowledge and it includes basic items such as perception and attention and other as advanced as thinking. The case is exceptional, because of the low frequency this type of affectation appears in a patient under 40 year old, as 1 young adult out of 10,000 is estimated to have one thrombosis per year: however, in case of elderly people, incidence is 2 to 3 patients out of 1,000 during the same period[15]; besides, despite during the tests performed some cognitive aspect were found to have severe affectation, the patient did not suffered any language development or any other functions which may influence her daily life, thus allowing her to have a normal life, despite she had an ischemic cerebrovascular accident. Concerning spontaneous recovery of the patient, it is important to highlight medical assistance, as when the internal hemorrhage appeared this situation has to be urgently solved, before diagnosing cerebral thrombosis, because a lingering shock situation worsens spontaneous of traumatism[16], therefore prompt assistance increases spontaneous recovery likelihood, and age factor is also favorable, in this specific case, due to neuroplasticity factor[17]. Despite she had a significant recovery, she still requires professional support for improving attention, concentration, and specially, executive functions.

These symptoms are usually related with cerebrovascular episodes on the right side of the brain[18], as the patient suffered affectation in both hemispheres, this affectation is self explained: Frequent sequelae after a cerebrovascular accident on the right side is anosognosia, lack of perception of the neurologic functional deficits depicted by[19], such lack of self consciousness make patients suffering this affectation reject the treatment, as they are not conscious of their deficits. Apart from this, anosognosia degree has been found not to be directly related with the size and location of the lesion: therefore, influence from previous personality is not discarded. But this condition is deemed as treatable by using therapeutic intervention aimed to: control negation, control of justifications and adjustment of statements.

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