

THE IMPORTANCE OF BRAIN IMAGING IN A CASE OF ERRONEOUS CLINICAL DIAGNOSIS

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Abstract: Positive neurological diagnosis is based on clinical and paraclinical arguments. We present the case of a patient who was diagnosed with Parkinson's disease in 2011 and treated as such; the diagnosis being strictly clinical and having as essential element the tremor of the upper right limb. In 2016, following the performance of computed tomography (CT) and nuclear magnetic resonance (NMR), right brain sequelae stroke diagnosis was established. Computed tomography and nuclear magnetic resonance imaging have the greatest importance amongst the diagnostic instruments available at present.

INTRODUCTION

Neurology is distinguished from the other medical specialties by the diversity of clinical signs and the need to locate the lesion. The disease identification starting from symptoms and signs defines the diagnosis.(1)

Neurological diagnosis is a complex act based on anamnesis data, the complete clinical examination and paraclinical explorations; for its determination, it is mandatory to run through three phases: syndrome diagnosis, topographic diagnosis and etiological diagnosis.(2)

The history (anamnesis) and the neurological examination provide information on the location (site) of lesions of the nervous system.(3)

Anamnesis represents the most important part of the neurological examination. Each clinician uses his/her own anamnesis investigation, frequently according to the particularities of the clinical case he/she faces.(4)

The computed tomography (CT) and nuclear magnetic resonance imaging (NMR) have the greatest importance amongst the diagnosis instruments available at present.(3)

The tremor represents the most frequent disorder of the motor control and consists in involuntary, rhythmic, oscillating, stereotypical movements of a body segment. The tremor is characterised by the amplitude and frequency of these movements, which differ according to the type of tremor. At the same time, one has to notice the conditions in which the involuntary movement appears, according to which it is classified in rest, posture and intention (or action) tremor.

The tremor can be physiological or pathological. The physiological tremor is accentuated by fear, emotions, muscle fatigue, coldness, and consumption of stimulants. The pathological tremor has various causes such as general diseases (thyrotoxicosis, pheochromocytoma, metabolic encephalopathies etc) or neurological diseases (Parkinson's disease, cerebellar lesions of various aetiologies, neuropathies, dystonias, essential tremor, etc).(5)

CLINICAL CASE

We present the case of a patient of 76 years old, under treatment at domicile for hypertension and Parkinson's disease.

She followed an inconstant treatment for both disorders with drugs she cannot mention.

The patient was diagnosed with Parkinson's disease in 2011 and treated as such, the diagnosis being strictly clinical and having as essential element the tremor of the right upper limb.

In 2016, she comes to our clinic claiming balance disorders and memory disorders.

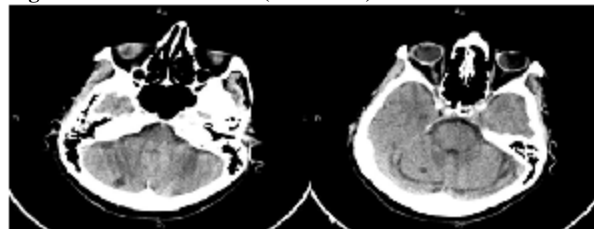
Upon objective examination: blood pressure 150/90 mmHg, ventricular rate 84 beats per minute rhythmically, without signs of cardiac and respiratory decompensation.

Neurologic examination: conscious, cooperating, oriented to time and space and to her own person, without signs of meningeal irritation, walking with large support base, examination of cranial nerves within normal limits, dysmetria at the finger to nose and heel to knee test on the right side, without superficial sensitivity disorders, brisk deep-tendon reflexes in the upper limbs, plantar coetaneous reflex - bilateral flexion.

Following the clinical examination, we reached the conclusion that it could be a cerebellar disorder, because the rest tremor is characteristic to Parkinson's disease, and the intention tremor was highlighted in finger to nose test.

My diagnosis suspicion was confirmed following the brain CT scan and the brain NMR native and with contrast substance, which indicated the existence of a right cerebellar sequellar stroke.

Figure no. 1. Native brain (cerebellar) CT scan



The CT examination report (figure no. 1) describes: Right cerebellar lacunar stroke with dimensions of 8 x 9 mm, and 4x5 mm respectively; without other hetero-dense lesions visible at CT at supra and infratentorial levels; without cerebral

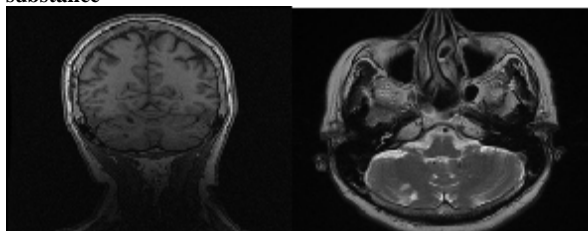
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or pericerebral hemorrhagic lesions detectable at native CT; the structures of the median line non-deviated; without mass effect; symmetrical cortical surface and good cortico-subcortical differentiation; ventricular system with normal dimensions and morphology; free basal cisterns and cerebellopontine angles; slight diffuse brain atheromatosis; without suspicious osteolytic or osteo-condensed focalised lesions or fracture lines; paranasal sinuses within normal limits, excepting the presence of a right maxillary mucocoele with pure fluid content and dimensions of 16x17 mm; minimum nasal septum deviation to the left (3 mm); moderate diffuse hypertrophy of the mucous membrane of nasal cavities, bilaterally. Conclusion: two chronic right cerebellar lacunar ischemic strokes.

Figure no. 2. Brain NMR - native and with contrast substance



Brain NMR - native and with contrast substance examination report (figure no. 2) describes: no changes of signal at the level of cerebral parenchymas suggestive for an acute vascular substrate or suspect pathological lesions; Right cerebellar cortico-subcortical stroke in chronic stage; small left cerebellar arteriovenous malformation, with dimensions of approximately 2 mm; nodular and post-nodular demyelinating lesions, with topography in bilateral occipito-temporo-fronto-parietal white matter associating periventricular signal changes with leukoaraiotic substrate; the anatomic structures of the median line in normal position; symmetrical, normally dimensioned ventricular system; free basal cistern spaces; no signal anomalies with pathological significance at the level of cranial nerves; right maxillary retention cyst with dimensions of 14/15 mm. Conclusion: Right cerebellar sequellar stroke; supratentorial demyelinating lesions, Fazekas 1; small left cerebellar arteriovenous malformation.

DISCUSSIONS

A correct neurological diagnosis needs thorough theoretical notions of neurologic semiology. Taking into consideration that the patient was initially diagnosed with Parkinson's disease, one should have taken into account that, for the positive diagnosis of the disease, Romanian Neurology Society recommends the criteria "UK Parkinson's Disease Society Brain Bank Clinical Diagnostic Criteria" unanimously accepted at present on an international level.

Confirmation criteria:

- bradykinesia and at least one of the following:
- muscle rigidity
- tremor with frequency of 4-6 Hz
- postural instability (not caused by a primary visual, cerebellar vestibular or proprioceptive dysfunction)

Support criteria (at least 3 for Parkinson's disease defined):

- unilateral onset
- rest tremor
- progressive evolution
- persistent asymmetry (more accentuated on the onset side)
- excellent response to levodopa, l-dihydroxyphenylalanine (l-DOPA)

- severe chorea induced by l-DOPA
- responsiveness to l-DOPA at least 5 years
- clinical evolution ≥ 10 years

Exclusion criteria:

- repeated strokes with gradually evolutive Parkinson's syndrome
- history of repeated traumatic brain injuries
- defined history of encephalitis
- oculogyric crises
- neuroleptic treatment at the onset of symptoms
- sustained remission
- strictly unilateral symptoms after 3 years
- supranuclear sight palsy
- cerebellar signs
- early severe vegetative affectation
- early severe dementia with language, memory and praxis disorders
- Babinski sign
- CT: brain tumour/communicating hydranencephaly
- negative response to high doses of Levodop (if a malabsorption syndrome is excluded)
- exposure to methyl-4-phenyl-tetrahydropyridine (MPTP).(6)

The tremor can be a normal exaggeration of a movement, a primary disorder or symptom within a cerebellar disorder or Parkinson's disease. The diagnosis is usually clinical. The treatment depends on the etiology. The tremor can be of rest, posture and intention. The rest tremor has maximum intensity during rest and decreases during activity, being frequently a symptom of Parkinson's disease. Intention tremor is maximum during movement towards a target, as in finger to nose test. This type of tremor suggests a cerebellar disorder (as a rule).(7)

Within the examination of the cerebellum functions, the following are tested:

1. the possibility to maintain the orthostatic position with minimum support base.
2. the walk, which can be unsecure, irregular, with large support base, as in a drunk person (drunk walking), suggesting cerebellar ataxia. The steps are irregular, unsecure, disorderly.
3. upper limbs:
 - a) the finger to nose test, by which we ask the patient to lead, from a distance, the index finger on the tip of the nose, movement that is usually performed without difficulties, with precision and without hesitations. If there are lesions affecting the coordination, the patient will not lead the finger directly on the tip of the nose, but he/she will get over it or will not touch the proposed objective (dysmetria, usually with hypermetry). Within this test, one can also highlight a tremor accentuating upon target approaching, on both of its sides, called intention tremor.
 - b) marionette test: the patient is asked to perform rapid pronation and supination movements, which are normally symmetrical. A cerebellar suffering will determine slowness and decomposition of movements on the lesion side (dysidiadochokinesia, adiadochokinesia).
 - c) with the same significance, one can perform the windmill test: we ask the patient to perform the windmill in both directions, noting an eventual difference between the execution of the two limbs. A worn motor deficit can determine a lower speed of test execution on the respective side, miming a

- cerebellar lesion.
4. lower limbs: the patient, in dorsal decubitus, is asked to lead a heel on the knee of the other leg, as fast as possible (heel to knee test). In healthy patients, the movement is firm, sure, without hesitations. In the case of some lesions, the patient gets over the proposed target and can have intention tremor at this level, too. To obtain more precise information, the patient can be asked to descend with a heel on the shin of the other leg, as fast and correctly possible, noticing an eventual deviation from the initial direction of movement.
 5. the trunk:
 - a) the patient is asked to rise from dorsal decubitus without arm support. Normally, the patient fastens by the heels the bed plane and rises without unbalancing. Cerebellum lesion will determine the patient rise the heels from the bed plane and to unbalance, having the tendency to fall on one side.
 - b) in orthostatism, the patient is asked to lean back (the examiner being placed behind the patient). Normally, when leaning back, to maintain the centre of gravity within the support base, the patient bends the knees; the patient with cerebellar affectionation does not do this and there is the risk to fall if he/she is not caught (cerebellar asynergy = Anton-Babinski test).
 6. speech: can be jerky, hesitating, irregular as intensity, by the affectionation of breathing self-regulation and its integration to speech.
 7. writing: changes, in the sense of occurrence of a macrography, with big, irregular letters. We can ask the patient to make parallel lines between some reference points that we give and we can acknowledge that the patient cannot stop the movement, frequently crossing over the line drawn by us.(8)

CONCLUSION

The therapeutic plan must be based on a correct diagnosis for the favourable prognosis of the disease.

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