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COMPLEX SENSITIVE-MOTOR REHABILITATION IN A PATIENT WITH ACUTE ISCHEMIC STROKE DURING ACTIVE SARS-COV-2 INFECTION: CASE REPORT

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ABSTRACT

Introduction. Stroke is one of the main reasons for acquired disability, and the past 2 years have demonstrated that COVID-19 is a major cause of thromboembolic accidents, which usually determine cardio-pulmonary infraction, as it has a higher incidence on larger blood vessels, but there are also numerous cases reported of stroke in patients after or, more rarely, during COVID-19 active infection. Material and Methods. We present the case of a 52 year old man diagnosed with stroke during hospitalisation for a moderate type of COVID-19(Coronavirus 2019), which after several days from admittance, was found with left hemiplegia in his chamber. A comprehensive sensitive-motor rehabilitation program has been established after two and a half months after discharge, as the deficit did not regress. Results and discussion. The evolution of the patient was favorable, with an improvement of the symptoms after treatment, especially the pain syndrome, but also on improved muscle tonus and slight muscle strength increase and improved disability scores The patient rehabilitation should continue for a longer period of time, as new cerebral pathways take time to be established. Conclusions. In patients with stroke, independent of the mechanism of occurring, complex sensitive-motor rehabilitation should be started as soon as possible, in good condition, so that the benefits outbalance the risks. Extra precautions should be taken in regards to patients with COVID-19 related stroke, as they are more inclined to have a thrombotic related development, even after fully medically recovering from the disease.

Keywards: COVID, stroke, rehabilitation

Introduction

Stroke is the main cause of acquired disability according to World Health Organization, and its prevalence continues to rise, as the global average age continues to increase (1). The cause and type of stroke has a great impact on the quality of post-stroke life, as the goal is not to have a repeated event. During the past 2 years since the pandemic started, a significant number of COVID-19 related strokes have been reported (2,3), with the apparent mechanism of occurrence determined by 3 main cardiovascular alterations: hypercoagulable state, vasculitis, and cardiomyopathy (4,5), but other pre-disease risk factors should not be disregarded. As such, special attention should be given to those patients that have previous stroke causing factors, as COVID-19 might amplify the thrombogenesis which could lead to a cardiovascular event, so beside cardio-respiratory function, the neurological status should also be monitored (6) during hospitalisation and even after, as the pro-coagulative status might remain a certain amount of time even after the infection has passed (7) An interesting find about stroke in COVID patients is that larger blood vessels tended to be clogged rather than the smaller ones (8,9), with an attaint on younger population when compared to pre-pandemic studies.

Material and method

We present a case of a 52 -year-old man, admitted to the Techirghiol Balneal and Rehabilitation Sanatorium for the motor deficit with left hemiplegia, pain in the left shoulder joint and left hip joint. The patient is former smoker (14 years total, quitted 7 years ago), occasional alcohol consumer, with good living conditions and currently retired from the armed forces. From the personal physiological and pathological antecedents, we recall right wrist fracture during childhood, with no permanent metallic material in place, appendectomy, therapeutically neglected dyslipidemia, hepatic steatosis, recurrent right basal pneumonia caused most probably by local bronchiectasis. On the 18th October 2021 he is admitted into a Covid modular hospital, presenting mild respiratory symptomatology and received antiviral and antibiotic treatment. On the 24th October he's condition worsens from a neurological point of view, as he is found collapsed on the floor of his unit, with motor deficit on the left side of the body and is transferred to an Emergency Hospital for further care. A head Ct scan reveals ischemic stroke in the middle cerebral artery territory, and a thoracic CT reveals multifocal areas of groundglass opacities and air space consolidation compatible with a viral Covid 19 pneumoniae, with a CO-RADS 5 score, and a moderate severity score of 15p out of 25. Biologicaly he had hepatic cytolysis syndrome, inflammatory syndrome. On the 25th October he's RT-PCR SARS COV 2 test came negative. On the 27th, another head CT scan revealed acute/subacute ischemic stroke in the right Internal Carotid Artery territory with right Internal Carotid Artery occlusion. He was discharged on the 1st of November had a favorable evolution under anticoagulant, and afterwards antiaggregant treatment, statins, liver protectors, kinetotherapy, but with the persistence of left limbs motor deficit.

He received the following recommendations:

- low salt and low lipid diet
- kinetotherapy for motor deficit rehabilitation
- neurological monitorisation as outpatient after 1 month
- continuous monitorisation by the family doctor
- Aspirin 75mg, Clopidogrel 75mg, Atorvastatin 20mg, Piracetam 800mg, Milgamma N, Fortifikat Forte

From neurological point of view, the motor impairment did not alleviate during the course of the next 2 and half months. Before admission, our medical facility's protocol is to request a series of bloodwork tests results from the patient, in order to conduct the rehabilitation therapies in a safe manner. The tests requested are targeted at the pro-coagulant status of the post-Covid patients, and only if the results are within safety margins, the patient may be admitted.

Table 1 - Comparison between blood tests results 2 months apart

Blood test	At discharge from County Hospital	Before admittance in Techirghiol Sanatorium
ALT	314U/L	93U/L
AST	105U/L	36U/L
CRP	0.58 mg/dL	0.07 mg/dL
Glycaemia	103 mg/dL	97mg/dL
DD	1.21µg/ml	0.37µg/ml
LDH	566U/L	177U/L
Total Cholesterol	170mg/dL	168 mg/dL
LDL Cholesterol	113.4 mg/dL	107 mg/dL
HDL Cholesterol	35mg/dL	41mg/dL
Triglycerides	108 mg/dL	111 mg/dL
Creatinine	1.04 U/L	0.84U/L

The patient was admitted for a total of 12 day. At admittance, he was evaluated clinically, functionally (using the FIM - Functional Independence Measure, Barthel scale, IADL-Instrumental Activities of Daily Living, ADL-Activities of Daily Living index) and biologically, in dynamics to monitor the effectiveness of the neuromotor recovery program.

Clinical examination performed at admission shows:

-temporally-spatially oriented patient, auto and allopsychic, cooperative, MMSE (Mini mental state exam) 30/30 test, without signs of meningeal irritation;

-central facial palsy on the left side;

-maintains standing position with the help of a cane on his right side and another person for more than 10 minutes;

-is able to walk using the cane and help from another person;

-accomplishes transfer from lying to sitting only with help from another person;

-no swallowing impairment;

-no sphincter incontinence;

-left upper limb with forearm in pronation, elbow in 90° flexion, fingers in flexion; missing motor control at proximal, intermediate or distal level; hyper osteotendinous reflexes; Hoffman reflex present; spasticity 3 on Ashworth scale; no superficial sensitivity impairment;

-left lower limb with the foot in "equinovarus" posture; with proximal and intermediate motor control with a MRC score 3/5, and no distal motor control, hyper osteotendinous reflexes, Babinski reflex present, spasticity 3 on Ashworth scale; deep mio-artro-kinetic sensitivity impairment;

- left shoulder with pain when at maximum range of motion (passive movement).

The patient is evaluated functionally using specific functional scales: ADL(5p), IADL(3p), Barthel (60p), FIM (motor score-16 / 28: average functional impotence, cognitive score-12/14-small cognitive impotence, total FIM score 28/42-average functional impotence).

Considering the symptomatology and the clinical picture of the patient, the following therapeutic scheme is decided:

- Hidrokinetotherapy in clover tub at 35°C to assist joint mobility;
- Interferential current therapy, 2 anterior electrodes, 2 posterior electrodes, M 80Hz, S 0-100Hz for pain and muscular anti spastic;
- High intensity LASER therapy abarticular on left shoulder joint and left hip joint for spasticity, pain management, increased local blood supply;
- Paraffin wax therapy 42°C, 20 minutes, on left shoulder, left hand, left knee and left ankle for muscle relaxation and increased blood supply;
- Relaxing massage therapy on left side of the body to help with the spasticity, 10 minutes;
- Individual Kinetotherapy: global and analytic movements from Kabat diagonals on the left side, verticalization, transfer re-education, VibraMoove assistance(proprioception training);
- CellOxy hipo/hyper-oxic respiratory therapy with O2 concentration betweeen 11%-21%.

The patient underwent during his hospitalisation psychological and speech therapy.

The respiratory function was evaluated by spirometry and no respiratory dysfunction was found. Afterward, the CellOxy therapy was initialised, with the goal of increasing effort resistance. Firstly, 2 tests were performed to assess the patients resistance to hipo-oxic air in which it was measured the target SpO2 based on how well the blood oxygen saturation responded to different air composition. The target SpO2 was found to be 85%. The second test determined how long it took our patient to reach 85% SpO2 with optimal O2 of 11%, and the result was 665 seconds. Based on this parameters, a 4 cycle therapy was initialised (a cycle had 3 periods, one with normal O2, one with hypo O2 and one with hyper O2).

Table 2- Comparison between functional assessment scales between admission and discharge

Score/Scale	On admission	On discharge
Barthel Scale	60	70
IADL Score	3	4
ADL Score	5	6
FIM score	28	28
Fall risk score	5	5

Results and discussions

When admitting a patient who suffered from Covid, it is highly important to verify his blood tests, as the procoagulant status is a matter of concern, more so in our case which suffered an acute vascular event. As seen in Table 1, his blood results have greatly improved over his convalescence period and falling in the normal interval with a few small exceptions at the time of admittance During his stay the patient had a favorable evolution, with an improvement of the symptoms after treatment with pain alleviation, lower spasticity, improved muscle tonus, slight muscle strength improvement, but not enough to surpass the admittance grades, with improvement on the functional scores Barthel, IADL and ADL

as seen in Table 2. An improved mobility was noted, the patient being able to climb a stair, but with maximal support and assistance, an action that was impossible at the time of admittance. Also, a notable improvement was constated in regard with transfers, as he was able to move with minimal assistance from lying to sitting position. Another aspect of daily life that has improved was his ability to cloth himself, to a certain extent, with external help.

Conclusions

In patients with stroke, independent of the mechanism of occurring, complex motor rehabilitation should be started as soon as possible, in good condition, so that the benefits outbalance the risks (10). Our patient presented a stroke in conformity with a meta-analysis which indicated that larger blood vessels are predisposed to being clogged rather than smaller ones, which in turn poses more extensive attention on the cerebral cortex, making a more difficult rehabilitation process. Extra precautions should be taken in regards to patients with COVID-19 related stroke, as they are more inclined to have a thrombotic related development, even after fully medically recovered from the disease.

Declaration of conflict of interests. There is no conflict of interest for any of the authors regarding this paper.

Informed consent. This study was conducted in accordance with the declaration of Helsinki and with approval from the Ethics Committee of Balneal and Rehabilitation Sanatorium of Techirghiol from Romania. Written informed consent was obtained from the patient.

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