

Improvements in one severe progressive multiple sclerosis patient quality of life after an intensity fluid dynamic treatment

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Abstract

Clinical case. A 49-year-old man (MM72) affected by Secondary Progressive Multiple Sclerosis (SP-MS) since 1998. On last 3 years, neurologists valued 9.0 the patient MM72's EDSS.

Methods. MM72 was treated by acoustic waves, modulated in frequency and power by the MAM device, according to an ambulatory intensive protocol. Patient's treatments schedule was organized in thirty cycles of DrenoMAM and AcuMAM, and manual cervical spinal adjustments. Before and after treatments, MSIS-29, Barthel, FIM, EDSS, ESS, and FSS questionnaires were administered to the patient.

Results. MM72 patient had improvements in all index score (MSIS-29, Barthel, FIM, EDSS, ESS and FSS) after 30 treatments by MAM plus cervical spine chiropractic adjustments. He showed a significative improvement of his disability and the restore of many functions. After MAM treatments, MM72's cognitive sphere improved of 370%. Furthermore, after 5 years of paraplegy, he regained his lower limbs and feet fingers movements with an increase of 230%.

Conclusion. We suggest ambulatory intensive treatments by fluid dynamic MAM protocol in SP-MS patients. Statistical analyses are in progress on a larger sample of SP-MS patients. *Clin Ter* 2023; 174 (3):224-230 doi: 10.7417/CT.2023.2524

Key words: Multiple sclerosis, Sound vibrations, Fluid dynamic MAM treatment

Background

Multiple Sclerosis (MS) affects approximately 130,000 people in Italy and about 3 million in the world is a leading cause of disability in young adults. Rehabilitation interventions are frequently used clinical strategies for improving or maintaining functional status. To date the pharmacological therapeutic approaches are based on the need to put a stop to an immune system that attacks the myelin sheath, which covers the neuronal axons, creating lesions that, with the passage of time, could create irreversible damage. In MS patients the brain and spinal cord eliminate deoxygenated

blood and toxins with great difficulty (1). This failure is due to hindered venous drainage for the narrowing or valvular flow blocks of the veins located outside the skull, especially in the neck, chest and abdomen. This hemodynamic condition is named cerebral spinal venous insufficiency CCSVI then multiple sclerosis has become also a vascular correlated disease (2). The reduced venous drainage has direct effects on the drainage of Cerebrospinal Fluid (CSF) surrounding the brain and spinal cord whose action is to protect them from trauma, to feed them and to drain toxic substances. The CCSVI is diagnosed through a specific EchoColorDoppler (ECD) assessment, which enables the identification of two types of flow block: one inside the vein for valvular anomalies and one external for compression of the veins caused by the surrounding tissue. The first one could benefit from endovascular treatment (angioplasty) (2), the second improves by a rehabilitative physical therapy (3). On 2011 we found the compression syndromes of the jugular and the vertebral veins, and we suggested a specific manipulation of the first cervical vertebrae with positive clinical results (4).

Until now, anatomy and physiology studies denied the lymphatic drainage system presence in brain, spinal cord, ears, and eyes. We hypothesize that eyes, ears and smell nerves are like compensatory expansion chambers in case of increased intracranial CSF pressure. Furthermore, the presence of the passage of CSF in the lymph nodal and lymphatic system, both peripheral and at the neck level, has been studied since 1935 (5).

At the same time, Speransky and Koh reported experiments showing drainage from the CSF and brain interstitial system in both cervical and peripheral lymphatic system (6). The most current research has shown that not only the brain is equipped with its own lymphatic system, but also that such a system consists of two anatomically and functionally distinct parts (7). A part of this system is a classic lymphatic system composed of true lymphatic vessels. The other, called glymphatic system is mainly built by astrocytes. These two brains draining systems are hypothesized be implicated in many neuro-immune diseases and neurodegenerative disorders such as multiple sclerosis, Parkinson's disease, and Alzheimer's disease (8).

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The lymphatic system is an organ system it consists of a large network of lymphatic vessels, lymph nodes, lymphatic or lymphoid organs, and lymphoid tissues. According to their structure, it is possible to classify the lymphatic vessels in capillaries, pre-collectors, collectors (both pre- and post-lymph nodes), trunks and ducts. Lymph nodes are kidney or oval shaped and range in size from 2 mm to 25 mm on their long axis. Each lymph node is surrounded by a fibrous capsule, which extends inside a lymph node to form trabeculae. The hilum is an indent on the concave surface of the lymph node where lymphatic vessels leave and blood vessels enter. The lymph enters the convex side of a lymph node through multiple afferent lymphatic vessels. After passing through the cortex, lymph then collects in medullary sinuses. All of these sinuses drain into the efferent lymph vessels to exit the node at the hilum. The acute inflammatory or traumatic block of a segment of the lymphatic system (lymphangitis) shows local edema, pain, heat and redness. In the case of a chronic segmental obstacle of the lymphatic system, it presents the lymphedema framework with its characteristic clinical and histological lesions. Our theory postulates that the presence of a hindered lymphatic drainage of our organs it is the pathogenic basis of their diseases. If we analyze the most frequent and known genesis of the lymphedema, like of the lower or upper limbs, it normally depends on the removal of the lymph nodes, on their neoplastic infiltration, on the traumatic or on surgical section of the main lymphatic ducts. Up today the lymph node has never been considered like a pump of the lymphatic system, we suppose that the lymph node could be a pump for the lymphatic system. The lymph node by its outside rigid structure and by unidirectional valves and muscular sphincters both in the afferent that in the efferent lymphatic vessels, could be a real aspirant-pressing pump with a muscular system of regulation of its in and out flow. The lymph circulates in its peripheral space and is pumped into the efferent lymphatic vessels by the pulsation of the central artery that compresses the peripheral space trough the dilatation of its medullary area. In line with our hypothesis that the hindered lymphatic discharge could be localized mainly at lymph nodes, except when some lymphatic trunks were cut or locked, we propose to decongest them by means of a specific vibratory stimulation of adequate modulation in frequency and power by Muscular Acoustic Modulator (MAM) device only on the lymph nodes. Are more than ten years that we use MAM positioned with cups (DrenoMAM) on the lymph node packages or directly by a manual probe (AcuMAM). We treated up to day, with very good results, many pathologies like ulcers and lymph stasis of lower limb, headaches and migraines, chronic pains and at present the neurodegenerative diseases We started treating by DrenoMAM at first the patients with water retention, the preliminary clinical results were very positive, with an effect detectable already at the first session on reduction of the lower limbs fatigue and increase in diuresis. After few other sessions we had the volumetric reduction of the lower limbs, the increase of resistance to work and improvement or disappearance, already from the first cycle (10 sessions), of the peripheral vasospasm with warming-up of the extremities. On the basis of such outcomes, in 2013 we introduced the use of DrenoMAM on patients with Multiple Sclerosis with positive clinical effects in their living and social activities (9) Our hypothesis was that such a strong effect on the tissue

drainage could also improve the conduction of the peripheral nervous fibres either by an anti-edema effect through the increased drainage of Lymphatic system, or by an effect on microcirculation, which was evident in the treated inpatients. (10) In MS patients the mechanical postural aspect on brain draining veins is very frequent and the MRI assessment of the cerebral-spinal fluid (CSF) can be used (11) to understand the effects of both treatments the spinal chiropractic adjustments and the fluid dynamic (MAM) treatment (12).

Rationale

The aim of this study is to evaluate the efficacy of the ambulatory intensive treatment named "Fluid dynamic MAM treatment" on outpatients with Secondary Progressive Multiple Sclerosis (SP-MS).

Case History

We report a case of forty-nine years old non-smoker man (MM72) affected from 24 years by multiple sclerosis, in secondary progressive (SP-MS) with a score of 9.0 in Expanded Disability Status Scale (EDSS)

Medical doctors diagnosed:

- In 1998, multiple sclerosis.
- In 2017, pulmonary embolism and DVT of lower limbs.
- In 2020, sclerosis cholangitis.
- In 2020, severe urinary tract infection.
- In 2020 osteoporosis

From the specific year to date, MM72 has started showing the signs/symptoms listed below:

- On a wheelchair since 2012.
- Intranuclear ophthalmoplegia in 2013.
- It's been 8 years 2014 that he requires help with all aspects of daily living
- Complete paralysis of the lower half of the body from 2017.
- Urinary incontinence with loss of bladder control and adult diaper use associated to intermittent catheterization from 2017.
- Use of patient's elevator from bed to wheelchair and vice versa from 2017.
- Bedridden all day in the last five years.
- Pyramidal left arm drift and both upper limbs incoordination from 2019.
- Dysarthria from 2019

Past Therapy

Interferon beta-1 a, interferon beta-1 b, and glatiramer acetate stopped in 2003 due to side effects.

Current Therapy

Apixaban, methyl B12, omega 3, vitamin D, probiotics, magnesium glycinate, bromelain.

During MAM treatments, MM72 continued ongoing pharmacological and supplements.

Patient provided a signed informed consent to participate to the study. Five times a week, the patient received a draining massage of neck, head, and lower limbs, by MAM device. Two times a week, the patient had cervical spine manipulations. This protocol is named “Fluid dynamic MAM ambulatory intensive treatment” (see table 1 for details).

The first cycle was carried out in August 2022, it lasting two weeks, and it included 10 sessions. The second cycle was carried out in October 2022 it lasting four weeks, and it included 20 sessions.

Treatments

MAM treatment

The MAM massager device of Dimasan srl, by a plastic probe, transmits the acoustic MAM waves (modulated in power and frequency 0-2 bar, 0-50 Hertz) for the pain treatment. We hypothesized that the so immediately effect on the pain of the MAM massager device is because such particular sound modulation could re-activate the neuromuscular spindles of those fibres that are blocked in contracture.

DrenoMAM

The DrenoMAM treatment were done by the MAM device, in case of Multiple Sclerosis, the sequence follows this order: posterior, anterior. The set is composed by 8 cups of different size and a timer that sends every 10 sec a sequence of modulated acoustic waves, for a total of 10 min of treatment for each target area bilaterally. The posterior area includes: the sacral, the gluteal region, and the popliteal fossa. The anterior area includes: the inguinal and the medial region above and below the knee (Fig. 1). This sequence and the points of application aims to soundproofing the areas where there are more packages lymph nodes draining the pelvis and the lower limbs.

AcuMAM

This is a manual massage by MAM device probe with a specific sequence and time protocol to treat the shoulders, neck and head lymph nodes (Fig 2).

Table 1. Weekly fluid dynamic MAM protocol

1 st day	DrenoMAM + AcuMAM + Cervical adjustment
2 nd day	DrenoMAM + AcuMAM
3 rd day	DrenoMAM + AcuMAM
4 th day	DrenoMAM + AcuMAM + Cervical adjustment
5 th day	DrenoMAM + AcuMAM

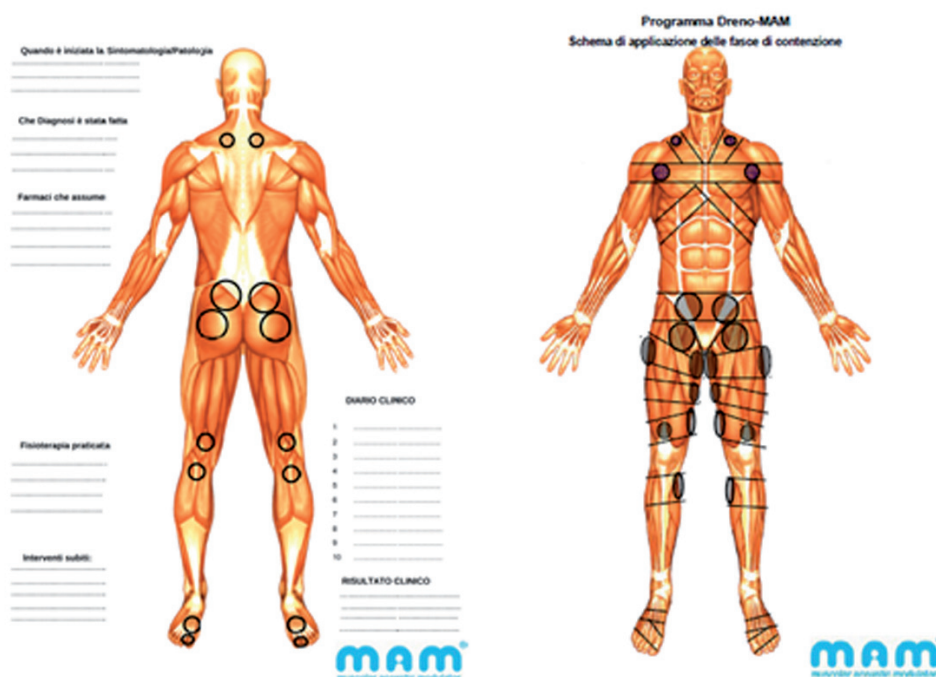


Fig. 1. Anterior and posterior sites of application of the cups for DrenoMAM treatment

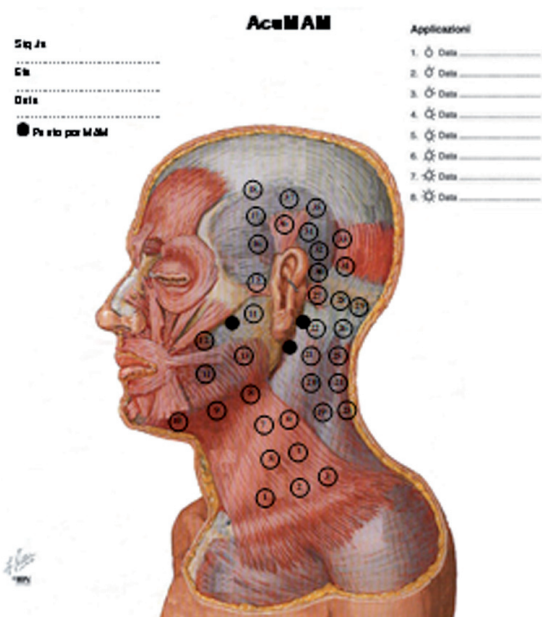


Fig. 2. Neck and head points to treat by MAM

Cervical adjustment

The patient received two weekly chiropractic sessions of spine muscles stretching by manipulations in accordance with Palmer, Sutherland and Makenzie procedures in four steps. In supine position: first step like for the opening of foramen magnum; second step like for the realignment of C1; third step like for realignment of C2. In upright position: fourth step like for realignment of other cervical vertebrae and cranial adjustment. After manipulation procedure the patients received one acoustic vibration treatment MAM device on treated areas to remove the muscular contractures (13).

Physiokinesis treatment

The patient had individual neuro-motor rehabilitation for forty minutes twice a week from the 20th to 30th treatment. The individual neuro-motor rehabilitation consists in passive and active aided mobilizations, stretching of the four limbs and spine, reinforcement and strengthening muscles, motion coordination exercises. The functional rehabilitation of gait and proprioceptive exercises were not possible in this patient.

Measures

Multiple Sclerosis (MS) is a chronic not curable and progressive disabling disease with multiple potential clinical intervention points during its course. It is therefore appropriate to have quality measures specific for this condition that span the course of the disease. International Organization of Multiple Sclerosis Rehabilitation Therapists (IOMSRT) says Evidence Based Medicine (EBM) is: "The conscientious, explicit, and judicious use of current best evidence in making decisions about the care of an individual patient."

Improving the quality of health care is essential in the practice of medicine. Fundamental to these efforts to improve quality is the ability to measure care because we cannot improve what we do not measure.

These measures are intended to be used by stakeholders to quantify the quality of care provided to patients with MS. Disease-specific quality measures in physiatry provide a framework that can assist clinicians in practice measurement and modification; these have the potential to benefit both subspecialist and generalist alike. The World Health Organization's International Classification of Impairments, Disabilities and Handicap (14) were used as the conceptual basis for the choice of the best outcomes to be measured. Assessment of neurological status (impairment) was determined by Kurtzke's Functional System Scale (FSS) and Expanded Disability Status Scale (EDSS). The FSS scale is composed of eight subscales, each measuring a specific function within the central nervous system. EDSS score is of 10 points, lower than 4 addresses impairment, while grades 4 to 10 are strongly dependent on disability and particularly locomotion. Although some criticisms have been expressed on psychometric properties of this scale not be sufficiently sensitive, it has been used in most clinical trials. Disability was assessed by the motor and the cognitive domains by Functional Independence Measure (FIM). The activities for daily living (ADLs) by Barthel Index. The underlying rationale for classifying an activity as "independent" or "dependent" is whether another person (a caregiver) is required and to what extent. There is good evidence to support the reliability and validity of the Barthel questionnaire to assess disability. In accordance with the guidelines, scores were consistently determined by actual performance of tasks on a daily basis, rather than each individual optimum performance. The Epworth Sleepiness Scale ESS is widely used in the field of sleep medicine as a subjective measure of a patient's sleepiness. The test is a list of eight situations in which you rate your tendency to become sleepy on a scale of 0, no chance of dozing, to 3, high chance of dozing.

In MM72 we assessed:

- quality of life by the Multiple Sclerosis Impact Scale (MSIS-29) (15)
- chronic fatigue by Fatigue Severity Scale (FSS) (16)
- disability by Functional Independence Measure (FIM) scale (17)
- activities for daily living (ADLs) by Barthel Index (18)
- We used the ESS scale to measure patient's sleepiness
- We used the EDSS to measure the neurological severity state

All the questionnaires were administered in this patient before, after 10th and 30th treatment sessions.

Results

Along treatments, we measured patient pathological state by using validate index/score tests (see table 2 for details). Changes in index/score values showed an improvement in clinic and pathological profile (see table 2 for details).

In Expanded Disability Status Scale (EDSS) neurologists' judgement passed from "helpless bed patient; can communicate and eat" to "essentially restricted to bed much of day; has some effective use of arm(s); retains some self-care functions".

Barthel Index increased from lowest degree "0" (completely disability patient) to "4" (self-feeding with help; can sit and moving by wheelchair; occasional bowels accidents).

Multiple Sclerosis Impact Scale (MSIS-29) total score decrease the from "82" (pathologic over "70") to "56" with an improvement of 32%.

Fatigue Severity Scale (FSS) total score decrease the from "63" (pathologic over "36") to "24" with an improvement of 38%.

Epworth Sleepiness Scale (ESS) total score decrease the from "19" (pathologic over "10") to "5" with an improvement of 72%.

Functional Independence Measure (FIM) motor subtotal score increase the from "13" (possible minimum score "13" to a maximum of "91") to "17" with an improvement of 31%.

Functional Independence Measure (FIM) cognitive subtotal score increase the from "9" (possible minimum score "5" to a maximum of "35") to "33" with an improvement of 370%.

Functional Independence Measure (FIM) total score increase the from "22" (possible minimum score "18" to a maximum of "126") to "50" with an improvement of 230%.

Data showed in table 2 demonstrated an improvement in MM72 clinical profile with some effects in mobility and more effects on social and cognitive behaviour.

Discussion

Historically, MS care is focused on rehabilitation and symptomatic management; however, this focus broadened with the development of Disease-modifying Therapies (DMTs), resulting in pharmacologic treatments that effectively reduce relapses and potentially slows the progression of disability. Consequently, DMTs often dominate many discussions regarding MS care, regardless of the fact that they do not reverse disability or restore function, arguably the primary goal of those with MS. Comprehensive, multi-disciplinary care goes beyond the management of DMTs in MS treatment plans and strives to improve

patient outcomes, functionality, and quality of life, goals that will likely prove to hold considerable importance as health care reimbursement transitions from a fee-for-service to a value-based paradigm. It is therefore likely that achieving improvement in some of the outcomes delineated in the American Academy of Neurology's (AAN) quality measures for MS will necessitate involvement of rehabilitation specialists. In 2015 the systematic review of the literature (1970–2013) and classified articles using American Academy of Neurology criteria highlights the paucity of well-designed studies, which are needed to evaluate the available MS rehabilitative therapies. Inpatient exercises (3 weeks) followed by home exercises (15 weeks) possibly is effective for improving disability (19). In the 2015 the Simka review summarises current knowledge on the lymphatic system of the brain. It has long been believed that the central nervous system is characterised by the lack of a lymphatic system and that the role of the lymphatic system is played by cerebro-spinal fluid (CSF). Recently, research has shown that not only is the brain equipped with its own unique lymphatic system, but also that this system consists of two anatomically and functionally distinct parts. One part of this system is a classic lymphatic system, i.e., the structure composed of genuine lymphatic vessels. The other, so-called glymphatic system is primarily built by astrocytes. The newly discovered lymphatic system of the brain is likely to play a substantial role in the pathogenesis of many neuro-immune and neurodegenerative disorders, such as: multiple sclerosis, Parkinson's disease, and Alzheimer's disease (20). On the basis of this rational and of our previous experience, we used specific spine manipulations and treatment for body tissue drainage by MAM device. In 2016, Sandroff says in his Systematic, Evidence-Based Review of Exercise, Physical Activity, and Physical Fitness Effects on Cognition in Persons with Multiple Sclerosis: "Collectively, there is insufficient well-designed research to definitively conclude that exercise, physical activity, and physical fitness are effective for improving cognition in MS" (21). The AAN systematic review could have, to a greater extent, highlighted the problems created by these methodologic issues and barriers to higher-level research in rehabilitation and argued for solutions that may ultimately influence funding agencies. The question is how to full-fill this need for well-designed trials in rehabilitation. Organizations such as the AAN, CMSC, and IOMSRT have a role in developing and disseminating clearly defined interventions, appropriate endpoints, and effective outcome measures. Collaboration with organizations specific to neurologic rehabilitation, such

Table 2. Score/index measured before, during, and after treatments

Date	EDSS	Barthel index	MSIS-29	FSS	ESS	FIM motor score	FIM cognitive score	FIM total score
28/08/2022	9.0	0	82	63	19	13	9	22
09/09/2022	8.5	4	51	25	6	15	25	40
24/10/2022	8.0	4	56	24	5	17	33	50

as the American Physical Therapy Association's Neurology Section, the American Occupational Therapy Association, and the American Speech-Language-Hearing Associations in USA and the Italian Society of Physical Medicine and Rehabilitation SIMFER, in Italy, may help enhance and expand MS-specific rehabilitation research currently being performed by rehabilitation scientists and exercise physiologists. Standardized protocols and validated endpoints are needed for all larger studies, especially ones involving multiple centers. It is essential to formulate well-designed trials of rehabilitation therapies and techniques, and to overcome the major challenges of having a placebo group and blinding participants in rehabilitation studies. The need for well-designed research trials of rehabilitation in MS remains ongoing and imperative (22). The last cited reviews pushed us to use, in our study, the most used questionnaires and physiatrist tests. These tools have allowed us, even if in a small sample of inpatients, to detect positive results both on a cognitive that chronic fatigue impairments.(10) The case of MM72 patient is so important because by fluid Dynamic MAM treatment he had the reverse of his disability and the restore of many functions and show us that this intensive protocol is efficacious and can be done in ambulatory. The first hypothesis on its clinical effect may be that the lymph nodes drainage is efficacy on brain detoxication and on the presence of a probable normal tens Hydrocephalus. Another one possible interpretation of this results may be that the drainage of the lower limbs by MAM treatment could reduce the edema of nervous fibers and to allow them to restart.

Conclusion

In our study, after 6 weeks of ambulatory intensive fluid dynamic MAM treatments, the score from questionnaires MSIS-29, FIM, Barthel, EDSS, ESS and FSS showed improvements in all indexes. MM72 showed a significant improvement of his disability and the restore of many functions. After MAM treatments, MM72's cognitive sphere improved of 370%. Furthermore, after 5 years of paraplegy, he regained his lower limbs and feet fingers movements with an increase of 230%.

Positive results in MM72's life quality promote us to continue the study on a larger sample to more explain, understand and validate these very positive results obtained in this first SP-MS patient by our non-pharmacological, non-invasive, and ambulatory intensive MAM treatments.

Disclosure

Financial relationships do not exist.

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