

Multiple sclerosis: Assessment and management in physical medicine and functional rehabilitation.

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Abstract:

Multiple sclerosis is a chronic inflammatory demyelinating and autoimmune disease of the central nervous system. It is the leading cause of disability in young people.

The evaluation is essential to determine the different deficiencies in order to prescribe the appropriate rehabilitation methods and technical aids.

Several methods are used and have proven their effectiveness in this pathology.

Its management is multidisciplinary involving several specialties (neurology, functional rehabilitation and its stakeholders (physical therapy, speech therapy, occupational therapy, psychiatry ...).

Key words : Multiple sclerosis, deficiencies, rehabilitation, equipment.

Plan :

Introduction

Epidemiology

Pathophysiology of multiple sclerosis

Assessment of deficiencies

Rehabilitation techniques

Technical aids

Conclusion

1. Introduction :

Multiple sclerosis is a chronic and autoimmune inflammatory demyelinating disease of the central nervous system which represents the first cause of disability in young subjects after road accidents. It affects young subjects between 20 and 40 years old with a clear female predominance (3 women for 1 man) [01].

2. Epidemiology :

Multiple sclerosis affects 2.5 million people worldwide [2]. Its prevalence is heterogeneous around the world. It is higher in Europe and North America compared with Sub-Saharan Africa and East Asia. However, the prevalence in the Maghreb countries has increased significantly in recent years [3]. In Morocco, the prevalence

rate of MS is estimated at 20 cases per 100,000 inhabitants, or 6,000 to 8,000 patients in total, according to the Maghreb health press review.

The sex ratio (woman/man) varies from one country to another but they all obey the rule of female predominance. In Morocco, studies conducted in 2014 found sex ratios of 1.7/1 and 2.1/1.

The subjects affected were young adults between 20 and 50 years old [3].

3. Pathophysiology of multiple sclerosis:

Genetic studies have shown an association of the HLA DRB1 gene and in particular the DRB1*15 haplotype, the DRB1*03 and DRB1*04 haplotypes in turn predisposing them to the disease. Whereas the DRB1*07 and DRB1*11 haplotypes protected against MS [4].

Environmental factors are also implicated in the incidence of MS, in particular vitamin D deficiency, Epstein-Barr virus infection, obesity and smoking.

Vitamin D deficiency was associated with increased disease activity. On the other hand, a high level of 25-OH vitamin D3 protected against the rapid progression of multiple sclerosis [3].

Epstein-Barr virus infection would increase the risk by 15 times in patients infected during childhood and 30 times in patients infected during adolescence and later in life [5].

Obesity and tobacco are associated with severe forms of the disease and a reduced response to treatment [3].

4. Assessment of deficiencies :

Search for disorders [6, 7]:

- NEURO MOTORS:

- *Motor deficit:* numbness or incomplete or complete loss of motor skills
 - Monoparesis, paraparesis, tetraparesis
 - Paraplegia, quadriplegia
- *Spasticity:* it is assessed by the Ashworth scale
- *Coordination disorders:* dysmetry, dyschronometry, adiadochokinesia, asynergy.
- *Balance disorders:* Cerebellar, vestibular or proprioceptive ataxias
- *Swallowing disorders:*
- *Abnormal movements:* Tremor witnessing cerebellar damage

- NEURO SENSORY:

- *Visuals:*
 - Oculomotor disorders: diplopia, nystagmus.
 - Decreased visual acuity
 - Visual field amputation (scotoma)
- *Chocleo-vestibular*
 - Nystagmus.

- NEURO-SENSITIVE

- *Deep sensitivity: vibratory, arthrokinetic*
- *Superficial sensitivity: tactile and thermo-algic*
- *Facial neuralgia*
- *Hypoesthesia to total anesthesia*
- *Neurogenic pain*

- ORTHOPEDICS:

- *Musculotendinous retractions*
- *Limitations of articular amplitudes*

- *Vicious attitude*
- *Bedsore*

-PAIN ASSESSMENT

- *Neuropathic*
 - *Dysesthesia*
 - *Trigeminal neuralgia, NORB retrobulbar optic neuritis*
 - *Lhermitte's sign and headaches*
- *Neuro-orthopedic complications*
 - *low back pain, tendinopathies...*
 - *Spasticity and eschar.*

-NEURO-VEGETATIVES

- *Swallowing disorders*
- *Dysarthria or aphasia*
- *Bladder-sphincter disorders*
 - *Overactive bladder syndrome (pollakiuria, urgency, leaks, etc.)*
 - *Syndrome of bladder hypoactivity (Dysuria, Post-micturition residue)*
- *Anorectals*
 - *Constipation*
 - *Anorectal dyschesias*
 - *Anal incontinence*
- *Genito-sexual*
 - *Erectile dysfunction*
 - *Decreased libido, dyspareunia*

- COGNITIVE FUNCTIONS

- *Memory impairment: MMSE scale (mini mental state examination).*
- *Executive Functions Disorder*
- *Anosognosia*
- *Attention Disorder*
- *Depressive disorder*

- OTHER SIGNS:

- *Fatigue*

-EDSS scale:

Is the most commonly used scale to assess disability in multiple sclerosis [8].

- 0.0 Normal neurological examination.*
- 1.0 Absence of functional impairment*
- 2.0 Minimal Handicap*

- 3.0 Moderate Handicap
- 4.0 Relatively severe disability
- 5.0 Disability severe enough to interfere with normal daytime activity
- 6.0 Assistance Needed for Walking and Working
- 7.0 Inability to walk: patient essentially confined to wheelchair
- 8.0 Patient is confined to bed or wheelchair
- 9.0 Patient is bedridden and unable to eat or swallow or communicate.
- 10.0 Death

5. Rehabilitation techniques :

Goals :

- Improvement/maintenance of the patient's motor and functional abilities
- Maintenance of the articular amplitudes in order to fight against the effects of spasticity
- Work on static and kinetic balance
- Work transfers
- Fight against neurological pain
- Retraining for effort and fighting against fatigue

Principles :

- Stay in infra painful
- Take into account neuropathic pain in the cervico-scapular region
- Monitor signs of fatigue and educate the patient to recognize them
- Prioritize functional exercises
- Listening to the patient [9].

Means :

- Massage.
 - Cryotherapy.
 - Electrostimulation.
 - Joint maintenance.
 - Muscular stretching.
 - Work on balance, walking and transfers.
 - Exercise training.
 - Perineal rehabilitation
 - Occupational therapy.
 - Speech therapy.
 - Psychologist and psychological support.
 - Therapeutic education.
- Relaxing massages:

Massages of the cervico-dorsal region: deep kneading, superficial and deep sliding pressure on painful points [10].

- Cryotherapy :

Several modes of application are used:

Balneotherapy with cold water of 18 to 5°, cold baths, local application of ice pack or refrigerated sleeves on troublesome spastic muscles. The maximum duration is 2 hours. Hot baths should be strictly avoided in heat-sensitive patients. Its effectiveness has been demonstrated especially in the lower limbs [10].

- Laryngeal and oropharyngeal electrostimulation:

It is an innovative non-invasive technique with few contraindications. The objective is to improve swallowing by laryngeal electrostimulation associated with facial stimulation.

A study was conducted by Courmont and Testard including 9 patients with CNS damage (stroke, locked in syndrome and MS) after performing 5 to 10 electrostimulation sessions. They noticed that the number of false routes to decrease with a decrease in time of the reports of 30 to 50%. They concluded a marked improvement in motor skills and laryngopharyngeal and orofacial sensitivity leading to an improvement in swallowing disorders.

The duration of the electrostimulation is 60 minutes, the electrodes are placed on the skin, the placement of which depends on the objective of the stimulation, allowing muscle strengthening and rehabilitation of the suprahyoid and infrahyoid muscles.

Contraindications are a history of cardiac arrhythmia or present cardiac stimulation [12].

- Join maintenance:

It is important in patients with limited motor skills or poor motor skills. They are done by:

Passive mobilization of large and small joints in all amplitudes

Active mobilization stimulates motor control [11].

- Muscle stretchings :

Prevent musculotendinous retractions and initiate the muscles antagonistic to spasticity to mobilize. It is indicated in all types of spasticity in all the limbs [11].

- Muscle building:

It is important, focusing especially on the lower limb allowing the optimization and securing of transfers, and work on walking.

Reinforcement must be done both concentrically and eccentrically while favoring the eccentric to avoid strengthening spastic muscles. The muscles that require this type of rehabilitation are the flexors of the lower limbs and the extensors of the upper limbs where hypertonia predominates, that said, the hamstrings, the trunk and the triceps. The resistance must be manual and is the only one allowed, as for the resistance of a weight, it is prohibited, because the latter does not allow an adaptation of the subject and does not pay attention to his exercise limit and can lead muscle fatigue [11].

- Work on proprioception and walking:

The work of proprioception is done in charge (standing) and in discharge (sitting or lying down) on unstable planes (for example the Klein balloon...). It can be helped by visual biofeedback (balance) allowing the patient to correct their posture during the exercise.

The work of walking will be trained using parallel bars with the help of one hand [11].

- Work on balance :

Postural balance is worked on by asking the patient to maintain their upright position with the help of an armrest in order to optimize their balance reactions. It is also essential to work on endurance and muscular strength to ensure the transfers. Extrinsic imbalances are also helped by sternal, dorsal and lateral thrusts on the patient's trunk, eyes open then closed in order to stimulate the two vestibular and proprioceptive systems. For intrinsic imbalances: the patient aims to come and grab objects and then place them behind him to work on the rotation of the trunk.

- Re-training and physical exercise :

The exercises recommended in multiple sclerosis are diverse:

Exercises in an aerobic environment by cycle ergometer or treadmill, gradually increasing speeds. These are most often endurance exercises either alone or associated with muscle strengthening. These exercises can interest both the upper limbs and the lower limbs.

It is advisable to detect the alarm signs during the exercises, namely paresthesias, steppage, recurvatum of the lower limb, to record the exercise time before the onset of exhaustion and systematically interrupt the exercise before this time. It is appropriate to note the patient's recovery technique (standing or sitting, leaning or not on a support). These data must be applied to daily life and to rehabilitation sessions (taking frequent breaks during the day and alternating passive and active work) [13].

On the other hand, and taking into account the phenomenon of Uhthoff reflecting an aggravation of symptoms in the face of a rise in ambient or body temperature, cooling techniques - showers or cold baths, cooling jackets, cryotherapy... are used to fight against this phenomenon. , but few studies have been published [14].

- Perineal rehabilitation :

Combines muscle strengthening techniques of the perineum (Kegel exercises) and electrostimulation if urinary incontinence or even use of self-catheterization in the event of excessive urinary retention [15].

Examples of Kegel exercises:

Exercise 1: lying on your back with your knees bent, exhaling, contract the muscles of the pelvic floor as much as possible as if to retain urine or gas. Hold the contraction for 5 seconds while breathing normally, then release with a 10 second rest between each contraction.

Do 3 sets of 10 contractions with 60 seconds rest.

Exercise 2: on exhalation: quickly contract the muscles of the pelvic floor as much as possible as if to retain urine or gas and release. Do 3 sets of 10 contractions with a 60 second rest between sets.

Exercise 3: Before coughing or sneezing, tighten the pelvic floor muscles to prevent urinary leakage and reduce pressure on the pelvic floor muscles.

NB: avoid bladder irritants such as tea, coffee, herbal tea, drinks at the end of the day [13].

- Ergotherapy :

It aims to assess the need of patients for technical aids for maximum autonomy and minimum energy expenditure and to adapt the environment to their deficiencies.

She also uses desensitization techniques to reduce the annoying sensations of paresthesia and all types of pain, for example: effleurage or tingling massages or application of dried beans, dried lentils, ultrasound, tanning, over the entire area concerned.

This technique is based on the habituation of the subject to stimuli making him indifferent to phobic stimuli [15].

- Speech therapy :

It supports cognitive disorders, speech and swallowing disorders [16].

- Psychologist :

The pathology of multiple sclerosis, and like any chronic pathology, is not devoid of psychic disorders (mood disorders, anxiety, depression, bipolar affective disorders.) which also have an impact on its quality of life from patient than those around him. The psychologist has the important role of helping patients to accept their disease and to live with it. It can intervene at any stage or stages of the disease: during changes in the patient's life, or aggravation of his pathology. To do this, physicians should not fail to send patients being followed for multiple sclerosis for consultation with psychologists familiar with the pathology [17].

- Therapeutic education:

Fatigue is the most frequent and dreaded sign by patients, for this we recommend time management by the patient. Thus, he will be able to divide his activities during the day and will have to privilege his rest time as much as possible [18].

6. Technical aids :

- Goals :

- Fight against activity limitation
- Make up for the deficit
- Improve autonomy
- Improve the quality of life

- Types of technical aids:

- Simple cane, English cane, tripod, walker, 4-wheel rollator.
- Malleoloc peroneal orthoses
- Plantar elevator orthoses, orthopedic shoes

- Lifting orthoses:

+ Orthosis with elastic return: preferred if normal plantar flexor tone because plantar flexion remains active.

+ Polypropylene overfoot orthosis: Forefoot support and limits plantar flexion, if moderate hypertonia of the plantar flexors.

+ Articulated dynamic overfoot orthosis: Chignon orthosis: Respect for multi-axial movements. It is an evolutionary orthosis: Resistance adapted to the evolutionary functional possibilities of the patient (by mechanical adjustment)

- Active correction of inversion: Plantar flexion Supination Adduction. Rolling foot, cruro-pedal orthosis, knee orthosis

- Wheel chairs

- Indications :

- Appearance of a deficit,
- Tiredness when walking
- Reduced walk perimeter

Depending on the problem:

If balance disorder: simple cane, English, tripod, walker, 4-wheel rollator.

If fibular deficit: malleolus fibular orthosis,

If the plantar flexors are deficient: plantar levator orthoses or orthopedic shoes.

If dorsal flexion and plantar flexion deficit possible: orthosis with elastic return

If dorsal flexion deficit with plantar flexor hypertonia: polypropylene overfoot orthosis.

If recurvatum: knee brace, bun brace, cross-pedestal brace, rolling foot.

If excessive deficit or significant spasticity: wheelchair [19].

7. Conclusion :

The management of multiple sclerosis is multidisciplinary involving several specialties (neurology, functional rehabilitation and its stakeholders (physiotherapy, speech therapy, occupational therapy, psychiatry, etc.). Indeed, rehabilitation in multiple sclerosis has shown a significant improvement in the different aspects of the patient's quality of life. A program with well-established objectives must be followed with maintenance sessions to prolong the gain and the effect of rehabilitation on the individual.

References :

- [1] : Nadime Hoballah. La sclérose en plaques : histoire, physiopathologie et thérapeutiques actuelles. Sciences pharmaceutiques. 2018. ffdumas-01863495
- [2] : Mamadou, Z., Toudou Daouda, M., Assadeck, H., & Heinzlef, O. (2019). *Épidémiologie de la sclérose en plaques en Afrique Subsaharienne : revue systématique. Revue Neurologique*, 175, S85. doi:10.1016/j.neurol.2019.01.237 10.1016/j.neurol.2019.01.237
- [3] : Gouider, R., Mrabet, S., Sidhom, Y., Kacem, I., Lubetzki, C., & Papeix, C. (2020). *Spécificités de la Sclérose en plaques chez les maghrébins: Rôle des facteurs environnementaux et génétiques**. *Bulletin de l'Académie Nationale de Médecine*. doi:10.1016/j.banm.2019.09.003
- [4] : Mohajer B, Abbasi N, Pishgar F, Abdolalizadeh A, Ebrahimi H, Razaviyoun T, et al. HLA-DRB1 polymorphism and susceptibility to multiple sclerosis in the Middle East North Africa region: a systematic review and meta-analysis. *J Neuroimmunol* 2018;321:117—24.
- [5] : DeMorand. Le patient atteint de sclérose en plaques. Elsevier Masson, 2014, 978-2-294-74402-0. Lien URL : http://secure-ecsd.elsevier.com/fr/Ban_Produits/Morand/Morand.pdf
- [6] : Kwiatkowski A. Fatigue et sclérose en plaques. Fondation ARSEP, 2017. Lien URL : https://www.arsep.org/library/media/other/docs_patients/Fatigue-et-SEP-web-oct-2017.pdf
- [7] : Leray E, Moreau T, Fromont A, Edan G – Epidemiology of multiple sclerosis. *Rev Neurol*, 2016;172(1):3-13
- [8] : « EDMUS :: Échelle EDSS ». https://www.edmus.org/fr/proj/ms_edss.html
- [9] : G, Samuel. Prise en charge d'un patient atteint d'une sclérose en plaques avec score EDSS 7.5, 2015-2016.
- [10] : S. Gaigeard, « Prise en charge d'un patient atteint d'une Sclérose En Plaques avec un score EDSS 7,5. », p. 44.

- [11] : Courmont, M., & Testard, M. M. (2013). *Rééducation des troubles de la déglutition par électrostimulation. Journal de Réadaptation Médicale : Pratique et Formation En Médecine Physique et de Réadaptation*, 33(2), 46–50. doi:10.1016/j.jrm.2013.03.001
- [12] :L. Mailhan, A. Fontaine, C. Terbèche, I. Monteil.Quoi de neuf en rééducation dans la sclérose en plaques ? What is new in rehabilitation for multiple sclerosis patients? *La Lettre du Neurologue* - vol. X - n° 4 - avril 2006.
- [13] : Brochet, B., Lebrun-Fréney, C., de Sèze, J., Zéphir, H., Allart, E., Audoin, B., ... Vukusic, S. (2017). *Thérapeutiques et prise en charge de la sclérose en plaques. La Sclérose En Plaques - Clinique et Thérapeutique*, 145–216. doi:10.1016/b978-2-294-75020-5.00016-8
- [14] : « Exercices de Kegel: CISSS de Laval ». <https://www.lavalensante.com/soins-et-services/>
- [15]: Betts CD, Mellow D, Fowler CJ. Urinary symptoms and the neurological features of bladder dysfunction in multiple sclerosis. *J Neural Neurosurg Psycho* 1993 ; 5 : 245-50 Gallien P, Robineau S, Nicolas B, L-e Bot MP, Brissot R, Verin M. Vesico urethral dysfunction and urodynamic findings in multiple sclerosis. A study of 149 cases. *Arch Med Phys Rehabil* 1998 ; 79 : 255-7
- [16] : Florence Higue-van Steebrughe. *Prise en charge globale e la sclérose en plaques. Sciences pharmaceutiques*. 2016 dumas-01421655.
- [17] : Donzé, C (2007).Rééducation fonctionnelle et sclérose en plaques : une vue d'ensemble.*Revue Neurologique*, 163(6-7),711-719.
- [18] : Dlephine,Lamotte, « Troubles-de-la-marche-dans-la-SEP.pdf ». <http://www.rhone-alpes-sep.org/wp-content/uploads/2013/04/Troubles-de-la-marche-dans-la-SEP.pdf>
- [19] : Betts CD, Mellow D, Fowler CJ. Urinary symptoms and the neurological features of bladder dysfunction in multiple sclerosis. *J Neural Neurosurg Psycho* 1993 ; 5 : 245-50 Gallien P, Robineau S, Nicolas B, L-e Bot MP, Brissot R, Verin M. Vesico urethral dysfunction and urodynamic findings in multiple sclerosis. A study of 149 cases. *Arch Med Phys Rehabil* 1998 ; 79 : 255-7

