




Case Report

Early Successful Eye Movement Desensitization and Reprocessing (EMDR) Therapy for Verbal Memory Impairment in an Adjustment Disorder: A Case Report in a Newly-Diagnosed Multiple Sclerosis Patient

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Abstract: Multiple sclerosis (MS) is a chronic inflammatory disease of the immune system affecting the central nervous system. Several phenotypes are possible, and cases usually present with a relapsing-remitting (RR) course with disease onset at a young age. MS diagnosis can represent a traumatic event for the patient, possibly evolving into adjustment disorder (AD). AD is defined by the presence of emotional or behavioral symptoms in response to identifiable stress occurring within the prior three months and similarly to post-traumatic stress disorder (PTSD) can significantly affect quality of life. Usually, neuropsychological disorders are not associated with AD. Several treatments are available for AD, and among them, eye movement desensitization and reprocessing (EMDR) is one of the most effective in relieving depression and anxiety. However, little is known about AD and PTSD in the MS population and no data are available on the effectiveness of EMDR for cognitive impairment associated with AD. We describe a 25-year-old patient with RR MS developing an AD with a verbal memory deficit after being diagnosed. Both the psychological and cognitive deficits were diagnosed using an extensive neuropsychological battery. Considering the high impact of the verbal memory deficit, on the patient's quality of life, an EMDR intervention was planned. After a six-month EMDR intervention performed by two trained neuropsychologists, the patient was retested. There was an improvement in verbal memory tests and depression anxiety scales and the Dissociative Experiences Scale. It is recognized that emotional changes and psychiatric disorders, frequently affect MS patients at diagnosis. It is imperative to recognize this and promptly set a neuropsychological treatment. Moreover, we suggest checking cognition along with depression and anxiety. Finally, to our knowledge, this is the first report of AD with an isolated neuropsychological deficit (verbal memory) developed after the MS diagnosis and treated beneficially with e EMDR. More studies are needed to confirm the efficacy of EMDR in treating cognitive impairment associated with AD in MS patients.

Keywords: multiple sclerosis; EMDR; cognitive impairment; adjustment disorder; PTSD; neuropsychology

1. Introduction

Multiple sclerosis (MS) is a chronic autoimmune inflammatory disease of the central nervous system (CNS), mainly presenting with a relapsing-remitting (RR) course in

young adults. Clinically, MS will present with focal neurological symptoms such as motor, balance, visual, sphincteric, or sensory deficits that could bring disability over time. Several disease-modifying treatments (DMTs) are now available for RRMS; however, MS still represents one of the most frequent causes of disability among the young population. Cognitive impairment may also present as one of the symptoms of the disease from the early disease stages and more frequently in the progressive disease stages [1–3]. RRMS is characterized by relapses corresponding to new or worsening focal symptoms that will partially or completely recover (remissions). In contrast, progressive disease courses (primary and secondary progressive MS) are characterized by a slow, gradual accrual of disability (mainly motor, sphincteric and cognitive) independent from relapses over time and expression of less inflammation and more evident axonal damage and neurodegeneration [4]. The emotional burden is frequently related to MS, possibly interfering with daily activities and quality of life (QoL) [5]. Moreover, MS can be associated with several psychological and psychiatric disorders, such as depression and anxiety, but also post-traumatic stress disorder (PTSD) and adjustment disorder (AD) [6–9]. The DSM-V defines PTSD as a psychiatric disorder involving extreme distress and disruption of daily living related to exposure to a traumatic event. AD is characterized by the presence of emotional or behavioral symptoms in response to identifiable stress occurring within the prior three months. Communication about a chronic disease diagnosis or presence of disabling symptoms is a potentially traumatic event. Of note, MS diagnosis itself can be thus considered a trauma [6]. The emotional distress is disproportionate to the event severity, with social or working functioning impairment. Few studies have been published about PTSD and AD in the MS population [5,6,10–12], showing that PTSD prevalence in the MS population was reported to be similar to the general population [6,7] or similar to the prevalence in potentially life-threatening diseases such as cancer [6]. To note, published studies evaluated heterogeneous populations in terms of sample size [6], DMTs, and disease course, enrolling patients with both RR and progressive disease courses [6,10,11]. One study observed among veterans that MS patients with PTSD prior to MS diagnosis present a more aggressive disease course [13]. More recently, several studies evaluated the psychological impact of COVID-19 in people with MS [14].

Along with the DSM-V definition, a medical disease per se can no longer be considered as a stressor event for PTSD diagnosis, and patients without all diagnostic criteria for PTSD should be diagnosed as AD. Usually, neuropsychological disorders are not associated with PTSD and, more importantly, AD [15]. AD and PTSD are generally treated with psychological intervention.

Different therapeutic approaches are possible for PTSD and AD, and among them, eye movement desensitization and reprocessing (EMDR) is widely used [16]. Other includes cognitive-behavioral therapy, psychodynamic psychotherapy, exposure therapy, mindfulness and relaxation training, and antidepressants [17]. However, EMDR and cognitive-behavioral therapy are the two principal recommended treatments by several guidelines like the British Association for Psychopharmacology Guideline [18], the Australian Guidelines for the Prevention and Treatment of Acute Stress Disorder, Posttraumatic Stress Disorder, and Complex Posttraumatic Stress Disorder, and the International Society for Traumatic Stress Studies [19]. EMDR is an evidence-based psychotherapy treatment originally designed in the 1980s to alleviate the distress associated with traumatic memories [16,20]. EMDR is guided by the Adaptive Information Processing model, which posits that EMDR therapy facilitates the accessing and processing of traumatic memories and other adverse life experiences to bring these to an adaptive resolution. The AIP hypothesizes that at the foundation of PTSD and AD are unprocessed memories originating from the high level of arousal engaged by traumatic events. Patients with PTSD and AD often experience flashbacks, nightmares, intrusive thoughts, and somatic responses. These symptoms might represent a signal of dysfunctionally stored memories. In re-processing the traumatic experiences, the EMDR therapy obtains an adaptive resolution and functioning [16]. The patient is exposed to two elements simultaneously: he focuses on the

most emotionally loaded images with associated physical sensations, and at the same time, bilateral stimulation is offered. Bilateral stimulation (e.g., taps, tones, or eye movements) are used in this treatment to stimulate the cerebral information processing system. Several randomized controlled clinical trials and meta-analyses have demonstrated the effectiveness of EMDR in PTSD and AD alone or compared to other treatments [16,17,21,22]. EMDR therapy focuses on three time periods: past, present, and future, particularly on past disturbing memories and related events. An eight-phase treatment approach is used to (1) process past traumatic events, forging new associative links with adaptive information; (2) target present circumstances that elicit distress and desensitize internal and external triggers; (3) incorporate imaginal templates of future events, to assist the client in acquiring the skills needed for adaptive functioning [16]. After the treatment affective distress is relieved, negative beliefs are reformulated, and physiological arousal is reduced.

Only two studies specifically evaluated the efficacy of EMDR intervention in MS patients: one including eight MS patients [23] and the second comparing EMDR and relaxation therapy [5]. Both studies did not evaluate cognition in the selected population.

Here, we describe an RR-MS patient developing AD and verbal memory deficit after the MS diagnosis communication. In the hypothesis that this cognitive impairment was caused by AD, the patient was treated with EMDR, with excellent results for both neuropsychological and AD symptoms.

2. Case Report

2.1. Demographic Details, Medical History and Initial Presentation

We describe a case of a right-handed Caucasian woman with a family history of MS (first-degree cousin with RR-MS). She first experienced, at 17 years old, a transient episode lasting two months of “tingling” sensations in her right limbs. At the time, she did not undergo any investigation. At 22 years old, she suffered from right-hand motor impairment and recovered spontaneously in six months. Again, at 25 years old, she presented with severe left motor deficits, loss of all sensation in left limbs, urinary and sphincteric dysfunctions, and finally underwent a neurological workup. Her brain magnetic resonance imaging (MRI) showed multiple periventricular and infratentorial lesions involving the corpus callosum and the brainstem with no gadolinium (gd+) enhancement. A spinal MRI confirmed several inflammatory disseminated lesions in the cervical and dorsal spinal cord, two with gd+. The patient was treated with steroids with partial improvement. Suspecting an inflammatory demyelinating disease of the CNS, autoimmune and infectious serology was ruled out, and the cerebrospinal fluid (CSF) analysis confirmed the presence of intrathecal synthesis. Based on personal and family history, radiological, and CSF findings, a diagnosis of RR-MS was made according to McDonald’s criteria [24]. Her Expanded Disability Status Scale (EDSS) was 2,5 (P2 S1 T0 C0 Sf2 V0 M0), and a disease-modifying treatment (DMT) was proposed at the moment of diagnosis communication. A few days later, the patient discussed again with the neurologist DMTs options. She was then started on Fingolimod two months after, with no side-effects. The patient lived with her caregivers at the time of diagnosis. After MS diagnosis communication, the patient started complaining and reporting to her caregivers and neurologists about memory impairment affecting her QoL, particularly her academic career.

2.2. Neuropsychological Examination

An extensive neuropsychological and psychological evaluation was then performed after two months from MS diagnosis (T0) with a comprehensive battery that screened language, memory, attention, praxical abilities, executive functions, information processing speed, and logic (Table 1) by two trained and experienced neuropsychologists (V.S. and M.F.S.). According to the Italian published normative data, raw scores (RS) were corrected for age, and educational levels obtaining adjusted scores (AS) and converted into equivalent scores (ES) [25–30]. ES is a regression-based standardization technique based on a five-point scale. The patient was fully oriented. Results showed normal cognitive functioning

except for an isolated verbal and working memory deficit (ES of 0 at the Short Story and Rey-Auditory Verbal Learning Test (RALVT)). The patient was aware of her cognitive deficit and referred that this condition negatively influenced her QoL. The patient was also tested with the Beck Depression Inventory (BDI-II) and the Beck Anxiety Inventory (BAI) (Table 2) [31,32], which showed at T0 a mild level of depression with loss of interest, irritability, mental fatigue, and difficulties in concentrating.

Table 1. Neuropsychological examinations: baseline (T0) and follow-up (T1).

Test	RS (T0)	AS (T0)	ES (T0)	RS (T1)	AS (T1)	ES (T1)	Cut-Off NV
Short story	11.5	7	0	29	24.5	4	≥7.5
Corsi Span	7	6.25	4	7	6.25	4	≥3.5
RAVLT immediate delayed	24	12.4	0	59	47.4	4	≥28.53
	7	3.4	0	15	11.4	4	≥4.69
ROCF immediate delayed	36	36	4	36	36	4	≥28.88
	20	13.75	3	22	15.75	4	≥9.47
Digit span forward	6	5	3	6	5	3	≥3.75
Digit span backward	3	-	-	4	-	-	≤2
phonemic fluency	38	27.3	3	40	29.3	3	≥17.35
Semantic fluency	47	39	4	46	38	3	≥25
TMTa	23	42	4	25	44	4	≤93
TMTb	46	116	3	52	122	3	≤282
TMT b-a	23	73	3	27	77	3	≤186
cognitive estimate	12	12.8	-	11	11.8	-	≤19
SDMT	52	35.5	4	51	34.5	4	≥34.2
Weigl test	15	15	4	15	15	4	≥4.50
Raven’s Matrices	35	31	4	36	36	4	≥18

T0: corresponding to first neuropsychological evaluation after MS diagnosis; T1: corresponding to neuropsychological follow-up after EMDR treatment. Abbreviations: AS: Adjusted Scores; ES: equivalent scores; NV: normal values; RAVLT: Rey-Auditory Verbal Learning Test; ROCF: Rey-osterrieth complex figure; RS: raw scores; SDMT: symbol digit modalities test; TMT: trail making test.

Table 2. Psychological scales: baseline (T0) and follow-up (T1).

Test	Score		Cutt-Off
	Baseline (T0)	Follow-Up (T1)	Normal Values
BDI	15	9	≤13
BAI	20	15	≤7
DES	35.7	28	≤30

T0: corresponding to first psychological evaluation after MS diagnosis; T1: corresponding to psychological follow-up after EMDR treatment. Abbreviations: BAI: Beck Anxiety Inventory (BAI); BDI-II: Beck Depression Inventory; DES: Dissociative Experiences Scale.

Although the patient herself did not verbalize having a depressive mood with sadness, she appeared emotionally anesthetized. She verbalized only a mild level of anxiety regarding her MS. Her concern was only related to memory difficulties affecting her studies; she was previously an excellent university student about to graduate and then failed her last exams after her MS diagnosis. When describing her neurological condition, she used irony,

jokes, and nicknames to refer to MS. She also presented symptoms of dissociation as she talked about her disease without emotional involvement. The Dissociative Experiences Scale (DES) confirmed a tendency toward dissociative functioning. Her neurological evaluation was similar to the one performed after the steroids improvement, and no changes in EDSS were observed except for the cerebral functional system score, which raised from 0 to 3. Based on these results, a diagnosis of AD with verbal memory impairment occurred after the MS diagnosis was made.

2.3. Psychological Intervention

A neuropsychological treatment was proposed based on an AD diagnosis with verbal memory deficits. The same two trained neuropsychologists who previously tested the patient proposed and structured a six-month intervention. Considering the high impact on the patient's QoL of the neuropsychological disease, the quickest possible intervention was offered, and therefore, EMDR was chosen. One-hour weekly sessions using EMDR techniques were performed for six months immediately after T0. The standard eight phases protocol (history taking, preparation, assessment, desensitization, installation, body scan, closure, reassessment) was used. To maximize the effectiveness of EMDR, we used cognitive-behavioral techniques to identify cognitive distortions, the problem-solving approach, the in-vivo exposure, and emotional management strategies associated with breathing exercises. As required by the EMDR protocol in the preparation phase, a relaxation technique known as "safe place" was used. Then the principal traumatic memories related to MS diagnosis were identified. The patient was collaborative throughout all the sessions. Initially, both bilateral ocular stimuli (back-and-forth eye movements) and tapping (alternating vibrations delivered through hand-held pulses) were tried, then switched only to tapping because of better compliance by the patient. A combined session of psychoeducation with both the neurologist (D.V.) and psychologist (V.S.) was also conducted with the patient to elaborate on the misunderstandings and doubts that the patient had expressed regarding MS after the diagnostic communication.

2.4. Results and Follow-Up

After six months of psychotherapy, we repeated the neuropsychological and psychological battery (T1-Tables 1 and 2) and detected no cognitive impairment. The equivalent scores of Short Story and RAVLT improved from 0 to 4, both immediate and delayed exercise. The patient performed similarly or slightly improved in all the other cognitive tests. We also observed an improvement in BDI-II, BAI, and DES retest. The patient was able to succeed in her last exams obtaining her degree with merit. She learned to manage emotional experiences related to MS, reducing avoidance strategies and dysfunctional behavioral mechanisms.

We also report the patient's opinion: "Last June, I discovered the existence of multiple sclerosis. Becoming aware of the disease was like a freezing shower, a novelty that somehow changed my life. It was my last year of university, and I missed nine exams at graduation, and the shock had provoked in me a great discomfort: a loss of memory. I could not study and pay attention to what was around me. Time passed by, and I could not do any exams at the university. Thus began my therapy. It has been long and emotionally difficult work for me. Many topics were hard and full of emotions of all kinds. Being able to feel the anger, the fear, the anguish, and the sadness in certain parts of my body was initially strange and complex. I managed to recover the memory, and I could graduate on time and with merit as I wanted. Talking about multiple sclerosis is always hard for me but by calling it 'my friend' I lighten the heavy name that it actually has". Over the next four years, she did not experience a clinical relapse. Her brain and spinal MRI remained stable over time, as well as her EDSS and QoL. The patient is fully independent in her work and social life. Fingolimod is still ongoing and is well tolerated by the patient. Cognition was checked after two years with a brief three-test neuropsychological evaluation: the brief international cognitive assessment for multiple sclerosis (BICAMS) battery [33], and the mood was checked with BDI during

a periodic neurological check-up. The BICAMS battery is composed of the Symbol digit Modalities Test (SDMT) (for information processing speed), the California verbal learning test (CVLT) (for verbal memory), and the brief visuospatial memory test revised (BVMTR) (for visuospatial memory). SDMT was already used two years prior, CVLT is similar to RAVLT, and BVMTR is similar to ROCF. All normalized scores (adjusting for age, sex, and educational level) [33] were above the normality cut-off of 35.

3. Discussion

We described a case of a young woman presenting with AD and neuropsychological deficit influencing QoL after RR-MS diagnostic communication and treated with a psychotherapy technique. Cognitive dysfunction is increasingly recognized in the early phases of MS, involving memory, information processing speed, and executive dysfunction [1,34] and possibly interfering with QoL in young patients. Many factors may contribute to cognitive impairment development in MS patients. Both white matter inflammatory lesions (producing a cortical-subcortical disconnection syndrome) and grey matter lesions (involving cortical areas involved in cognitive processes such as the temporal lobe) may contribute to these symptoms [35,36]. Additionally, it is nowadays more recognized that the neurodegenerative processes are a part of the pathogenesis of MS from the early disease stages. Patients from early disease stages display superficial and deep grey matter atrophy, e.g., in the thalamus, which contributes to cognitive impairment [37]. Cerebral atrophy might also influence depression in the MS population [38]. In our case, MRI didn't show inflammatory lesions with a location that could justify a transient neuropsychological deficit, and no brain $gd+$ were present at the time of diagnosis. Moreover, MS onset probably occurred years before MS diagnosis, based on medical history and dissemination in space at MRI, but the patient experienced a transient verbal memory impairment with AD only after diagnostic communication. She was previously fully independent in her daily activity and was about to graduate. Furthermore, two years after MS diagnosis she tested normal at the BICAMS neuropsychological battery. However, we acknowledge that advanced imaging assessment for cortical and deep grey matter volume measurement is lacking in our patient, as well as double inversion recovery (DIR) sequences to exclude any focal cortical grey matter lesion. This could represent the first limitation in our case.

We assumed that in this case, the neuropsychological deficit resulted from AD, caused by the impact of the diagnosis, treated with a cognitive rehabilitation path using a psychotherapy technique and not a neuropsychological program. Psychiatric disorders, particularly depression and anxiety, are common in the MS population [9]. It is now well established that people with chronic neurological illnesses, such as MS, demonstrate poorer psychological functioning and QoL compared to the general population [11]. The possible association between PTSD and neurological or autoimmune conditions has been recently studied in different people, such as U.S. war veterans or war survivors [39–41], and an increased risk of developing neurodegenerative or autoimmune diseases has been observed in PTSD patients. The mechanism underlying this association is not yet fully understood, but some studies speculated that PTSD patients may have distinct levels of proinflammatory cytokines and immune phenotypes but if this is a pre-morbid situation that may represent a risk factor for the development of PTSD or a consequence of the stress events is yet to be determined [42,43]. Moreover, coping mechanisms and social support may intervene differently in compensating and adjusting to the new diagnosis's impact among people with the same disease.

PTSD was previously linked to possible episodic memory deficits [44]. However, we found no similar description in MS patients. Few studies are present in the literature regarding the prevalence of PTSD and AD in the MS population [5,6,10–12], suggesting that PTSD and AD might have a similar prevalence compared to the general population [10] or even higher [6]. However, comparisons are difficult due to different methodologies of the published data. Moreover, none of these studies found an association between PTSD and MS disease duration, severity, and clinical type of MS and EDSS suggesting that PTSD

might be more related to individual factors [5]. To note, only fatigue was checked in most of these studies but not cognition, therefore it is unknown if the MS population might develop more frequently an AD with cognitive impairment. Larger studies need to be conducted on the MS population from diagnosis and comparing different disease courses and the possible interference of cognitive impairment with the psychiatric comorbidities.

Several treatment options have been described for PTSD and AD treatment, such as prolonged exposure therapy, cognitive processing therapy, or EMDR when considering psychological therapies and several classes of antidepressants, antipsychotics, and anxiolytics when considering pharmacological options [20]. In particular, EMDR was initially designed to reduce the distress associated with traumatic memories like AD and PTSD and facilitate those memories' access and processing to an adaptive resolution. Affective distress could be relieved, negative beliefs reformulated, and physiological arousal reduced [16]. The processing of the traumatic experience that occurs with the EMDR allows the patient to change their perspective through desensitization and cognitive restructuring, incorporate emotions appropriate to the situation, and eliminate the reactions relevant to the physical condition. This process allows for the adoption of more adaptive behaviors. After EMDR treatment, the patient no longer presents the typical symptoms of PTSD and AD. Therefore, intrusive thoughts and memories, avoidance behaviors, and hyper-arousal are no longer found. Moreover, the patient will better discriminate between real and imaginary threats conditioned by anxiety.

EMDR is now considered one of the most effective treatments for PTSD and AD along with trauma-focused cognitive behavioral therapy [16,19,20]. When comparing the two treatments, most meta-analyses found similar efficacy between the two or a slight advantage of EMDR [45–48]. However, EMDR has been demonstrated to be more rapid in solving PTSD and AD symptoms than cognitive behavior treatment [16]. Several studies have highlighted that PTSD and AD, if not treated, are long-lasting, highly debilitating, and negatively impact QoL and social costs [5,16]. In our case study, the patient needed a quick intervention and was treated primarily with EMDR to obtain a rapid and effective response. To maximize effectiveness, we also partially associated cognitive behavioral therapy. Therefore, we cannot exclude that the excellent and persistent response, in this case, was the result of combining both treatments. This could be another limitation of our case study.

Only two studies are present in the literature regarding the effectiveness of EMDR in the MS population [5,23]. Carletto et al. comparing two groups of 20 MS patients, demonstrated the superiority of EMDR to relaxation therapy. PTSD was overcome in most patients after only ten sessions (two to three months) [5]. More recently, Wallis et al. explored the efficacy of EMDR to relieve anxiety after only one to three EMDR sessions in 18 MS patients, with significant positive results at a three-month follow-up evaluation [23]. Our patient was invited to concentrate on the most disturbing memories about the diagnostic communication and the disease course with effectiveness after six months of EMDR and no mental relapses over time.

Finally, one strength of this case study is the cooperation between different healthcare professionals, particularly neurologists, neuropsychologists, and psychotherapists. The multidisciplinary approach allowed our patient to be promptly diagnosed with both neurological and neuropsychological disease and to assure a quick recovery after treatment.

4. Conclusions

To our knowledge, there are no previously published cases of neuropsychological disorder started after a diagnostic communication of MS and treated using EMDR. Even though with several limitations, our case study highlights the possibility of cognitive impairment associated with AD in response to MS diagnostic communication. In our case, EMDR was effective at relieving emotional distress and treating neuropsychological impairment (particularly verbal memory deficits) associated with AD, but further studies are needed to both study AD with and without cognitive impairment in the MS population and

AD treatments such as EMDR. We believe that this report could enhance awareness and underline the importance of a multidisciplinary MS team that includes neurologists, neuropsychologists, and psychotherapists to structure increasingly personalized and effective interventions for MS patients.

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