Benefits of a cognitive rehabilitation program in relapsing-remitting multiple sclerosis patients

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Poster Session 1

Diagnosis and differential diagnosis

P261

There is less MRI brain lesions and no characteristic MRI brain findings in IIDDs patients with positive AQP4 serology among Malaysians

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Background and objective: The recently introduced International Consensus diagnostic criteria for diagnosis of neuromyelitis spectrum disorder include patients who are seronegative for AQP4 antibody. The criteria is dependent on typical MRI changes in the spinal cord, optic nerve and brain. This study aims to determine whether there are significant differences in the MRI brain images between AQP4 positive and negative patients with IIDDs
Method: MRI brain of patients with a diagnosis of IIDDs presented to the Hospital from 2010 to 2015 was analysed. The MRI was assessed by 2 radiologists blinded to the AQP4 status, on features said to be typical of NMOSD and MS.
Results: Thirty nine patients fulfilled the criteria and was included in the study. They consisted of 19 AQP4 seropositive and 20 AQP4 seronegative patients. The mean age was older (37.0 vs 28.8 years) among the AQP4 positive group. The majority of the patients were ethnic Chinese (72%), followed by the Malays and Indians. Those with AQP4 seropositive status generally has less brain lesions, with significantly less fulfilling the McDonald DIS criteria as compared with those with AQP4 seronegative status (15.8% vs 60.0%, p=0.004).

None of the seven cerebral MRI features highlighted in NMOSD 2015 diagnostic criteria, said to be characteristic of NMOSD was more common among the AQP4 positive patients. These features were in fact seen less frequently among the AQP4 seropositive patients. An example was the extensive hemispheric lesion seen in 10.5% of AQP4 seropositive patients vs 45% of those AQP4 seronegative group.
Conclusion: There was no characteristic MRI brain features in the Malaysian AQP4 seropositive IIDM patients versus those who are seronegative. This could be a reflection of ethnic difference.

Disclosure

This article is original and it has not been published. On behalf of all the authors, I declare that the enclosed manuscript in its present form has not been published elsewhere, in whole or in part.
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P262

Relevance of serum anti-MOG antibodies for diagnosis and characterization of CNS demyelinating disorders

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Background: Considerable efforts have been devoted to the search of diagnostic serological and cerebrospinal fluid (CSF) markers of inflammatory demyelinating CNS disorders. Recently, the presence of circulating anti-myelin oligodendrocyte glycoprotein antibodies (MOG-abs) has been described in patients with multiple sclerosis (MS), acute disseminated encephalomyelitis, acute myelitis (AM), optic neuritis (ON), and neuromyelitis optica spectrum disorders (NMOSD), particularly in anti-aquaporin 4 antibody (AQP4-ab) seronegative cases. To date, several areas of uncertainty still remain regarding the actual significance of MOG-abs detection, including the appropriate clinical setting in which the test is indicated, in addition to its diagnostic and predictive value.
Goals:

- To assess serum MOG-abs status of AQP4-ab negative patients with an initial suspect of NMOSD
- To analyze the association between the presence of MOG-abs and clinical, MRI, and laboratory findings
- To determine a MOG-abs positive clinically significant titre cut-off
- To clarify if MOG-abs positivity is associated with a distinct demyelinating condition

Methods: We identified stored serum samples of patients with suspected NMOSD sent to Verona Neuropathology laboratory between 03/2014 and 03/2016 for AQP4-abs assay resulting to be negative. Live-cells (HEK293A) staining immunofluorescence assay was used for the detection of MOG-abs. We retrospectively collected and analyzed clinical, MRI and CSF data of tested patients and divided them in five groups based on the final diagnosis:

1) NMOSD;
2) isolated ON and/or AM (ION/AM);
3) MS or clinically isolated syndrome (CIS) suggestive of MS;
4) other inflammatory CNS disorders;
5) non-inflammatory conditions.

Results: We analyzed the samples of 157 eligible patients with the following final diagnosis: 4 NMOSD, 75 ION/AM, 58 CIS/MS, 13 other inflammatory disorders, and 7 non-inflammatory conditions. Of these, 29 were MOG-abs positive with 1:20 titre in

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Background: In addition to clinical variables of Multiple Sclerosis (MS), there are social determinants such as employment and socioeconomic status that relate to the disease and the presence of cognitive impairment (CI) and impact on the quality of life of patients.
Objective: To analyze the association between employment and socioeconomic status and the three contrasted groups (MS patients with CI, MS patients without CI and control group (CG)).
Methods: 160 participants were studied: 33 MS patients with CI, 49 MS patients without CI and 78 participants from the CG.
MS patients with CI: mean age: 45.39 ± 11.28 years; education: 12.73 ± 2.89 years and 69.7% females. Disease evolution: 14.32 ± 10.42 years; Expanded Disability Status Scale (EDSS): 4.33 ± 2.09.
MS patients without CI: mean age: 38.12 ± 10.23 years; education: 15.37 ± 2.53 years and 67.3% females. Disease evolution: 8.98 ± 7.12; EDSS: 2.08 ± 1.88.
CG: mean age: 41.50 ± 10.53 years; education: 14.77 ± 2.70 years and 73.1% females.
Outcomes measures: EDSS, Brief Repeteable Neuropsychological Battery for MS, Ad hoc questionnaire to assess employment status and Socioeconomic status Index questionnaire.
Results: Association between employment status (student / housewife, employed and unemployed / retired) and group membership in the three groups ($p = .000$ $\chi 2 = 48.93$) was found. MS patients with CI have 51.5% unemployment, MS patients without CI 20.4% and 3.8% GC. Total unemployed MS patients are 71.9%.
Regarding the socioeconomic level, associations between socioeconomic groups, classified in lower class and upper middle class ($P = .005$ $\chi 2 = 10.72$) were found. 57.6% of MS patients with CI belong to the lower class, while MS patients without CI 36.7% and 25% in the control group.
Conclusion: Higher unemployment rate is observed when compared with recently reported data from Slovakia (56.5%), Japan (59%), USA (47%) and Canada (44.7%). Considering Argentina's socioeconomic difficulties, it is difficult to compare its socioeconomic level with that of other countries.

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P578

fMRI correlates of cognitive impairment and cognitive reserve in multiple sclerosis

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Cognitive reserve, defined as the lifetime cultural enrichment due to education and leisure activities, is known to mitigate cognitive decline of MS patients, supposedly by reducing the impact of brain pathology. The functional MR correlates of cognitive reserve in MS are not completely investigated.

Cognitive reserve of a sample of 20 MS patients and 13 age and education matched individuals was measured by means of the Cognitive Reserve Index and related to their cognitive impairment, measured with the BRB (Rao et al., 1991). An event related fMRI was performed in order to detect activations in brain areas during a n-back task and regression analyses were conducted on regions of interest.

A positive correlation between cognitive impairment index and brain activation (i.e. the lower the cognitive impairment index, indicative of greater cognitive impairment, the smaller the brain activation) was found in the left (r=.84) and right (r=.89) inferior frontal gyrus, left (r=.89) and right (r=.78) medial orbital gyrus, right inferior parietal lobule (r=.93). On the contrary, a negative correlation (i.e. the greater the CR the lower the brain activation) was found between cognitive reserve and brain activation in the middle cingulum (r=.87), right (r=.85) and left (r=.83) inferior frontal gyrus, left (r=.89) medial orbital gyrus and right inferior parietal lobule (r=.93).

These results might be explained by the greater brain functional efficiency in patients with higher cognitive reserve, as well as by a failure in compensatory hyper activation due to increased disease related cognitive impairment of MS. The clinical significance of brain activations might be differently interpreted in studies on MS and cognition.

Disclosure

Nothing to disclose

P579

Benefits of a cognitive rehabilitation program in relapsing-remitting multiple sclerosis patients

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Aim: Assessment of the benefits from a Cognitive Rehabilitation Program in Relapsing-Remitting Multiple Sclerosis (RRMS) patients.
Equipment and methodology: The study was composed by three groups: 1.- Twenty-one RRMS patients who received the Rehabilitation Program; 2.- Nineteen RRMS patients who did not participate in any Rehabilitation Program; 3.- Twenty-six subjects free from the disease.
The assessment of the possible benefits on patients from Group 1 was carried out by means of neuropsychological (BRB-N) and psychophysiological (a series of attentional and mnemonic tasks) evaluation in three different time points:

A) Before applying the program;
B) after the program;
C) four months after the program ended.

Groups 2 and 3 only undertook evaluations A and B.
Results: Group 1 showed a wide range of improvements in several cognitive tasks: reaction time (RT) on Selective Attention

tasks (r=0.01) and Working Memory Task (r=0.0008), and also in the percentage of correct answers in a Divided Attention task (r=0.02). There were not significant differences in the groups that did not receive rehabilitation, although some deterioration due to the progress of the disease was appreciated. The healthy control group did not show significant differences between measures, showing that these tasks are reliable and are suitable for longitudinal studies.
Conclusions: The Cognitive Rehabilitation Program applied improved the cognitive impairment of RRMS patients, in comparison to the pathological group without treatment that showed a decline in their cognitive abilities. These improvements and no effects in other cognitive tasks show the difficulties in generalizing the benefits after cognitive rehabilitation in patients with RRMS, suggesting a complex process in the brain related with the cognitive rehabilitation program.

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P580
Cognitive assessment with BICAMS battery during and after MS relapse
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Background: Cognitive impairment (CI) can present in multiple sclerosis (MS) patients at any time, regardless of the disease severity and activity. It seems that cognitive decline during MS relapses also can occur. The Brief International Cognitive Assessment for Multiple Sclerosis (BICAMS) was recommended as brief, simple, and specific instrument for the evaluation of cognition in MS patients. However, it is unknown whether it is possible to detect the cognitive changes during MS relapse with BICAMS.
Objectives: The purpose of the study was to assess the cognitive status with the Lithuanian version of BICAMS during MS relapse and 3-month follow-up period.
Material and methods: 90 MS patients and 30 cognitively normal control subjects, matched on age, gender and level of education were enrolled. 60 MS patients were assessed during MS relapse, 1st and 3rd mth after relapse and 30 MS patients - during remission. Cognitive functions were assessed with the BICAMS tests.
Results: MS patients performed significantly worse than controls on the three neuropsychological tests of BICAMS ($p< 0.001$). Relapsing MS patients performed SDMT test worse than remitting MS patients ($p< 0.001$). Significant increment of SDMT, BVMT-R and CVLT-II test scores was observed during the 1st mth after relapse in relapsing patients ($p< 0.001$) and of CVLT-II test - during the 3rd mth. The improvement of SDMT score after relapse was influenced by the EDSS score changes, age and education, the improvement of BVMT-R score - by the IFN-beta biological activity and duration of immunomodulatory therapy and the improvement of CVLT-II - by the duration of relapse ($p< 0.001$). Comparison of men's and women's memory changes after relapse revealed visual memory improvement in men and verbal learning in women ($p< 0.05$).
Conclusions: Clinically meaningful impairment in cognitive status changes was observed in relapsing MS patients. The increment of SDMT, BVMT-R and CVLT-II scores after MS relapse was influenced by different factors.

Disclosure

Nothing to disclose

P581
An examination of cognitive fatigue and the interrelatedness of disease severity, fatigue, depression, and sleep quality
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Background: Cognitive fatigue (CF) can be defined as decreased performance with sustained cognitive effort. While the study of CF is becoming more predominant, no research to date has yet examined the interrelatedness of CF and other associated characteristics of MS and their possible role in predicting CF. The current goal was to examine the interrelatedness of disease severity, fatigue, depression, sleep quality, and CF in multiple sclerosis (MS). Four theoretical models explaining the predictive roles of these variables were evaluated.
Methods: Fifty-eight (58) individuals with a confirmed diagnosis of clinically definite MS were recruited through the MS Clinic at the Ottawa Hospital. CF was measured by examining last third versus first third performance on the Paced Auditory Serial Addition Test (PASAT). The PASAT and self-report measures of fatigue, depression, and sleep quality were administered as part of a larger neuropsychological battery. Path analysis was used to evaluate each of the proposed models.
Results: CF was correlated only with depression ($r = .362$, $p = .006$) and sleep quality ($r = .433$, $p = .001$). Sleep quality was the greatest significant independent predictor of CF ($\beta = .433$, $t_{(1,55)} = 3.53$, $p < .001$), accounting for 17.3 % of the total variance. The best fitting model showed sleep quality as the largest contributor to CF; however depression also played a smaller predictive role. Furthermore, depression emerged as the strongest predictor of sleep quality as well as fatigue. Disease severity only predicted depression in our sample.
Conclusions: Findings indicate that sleep quality is the most significant predictor of CF (as measured by performance breakdown) in MS. Sleep quality itself, however, accounted for only 17.3% of the variance in CF suggesting that other variables which were not formally assessed in this sample (ex. anxiety, etc.) may also play a predictive role.

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variability. However, the ratio of the music tempo expressed in BPM over the gait cadence improved similarly in all groups. Walking speed, walking distance, fatigue and QoL results were comparable to our previous study. Participants reported that they appreciated the support and well accepted the interventions. All participants completed the study.
Conclusions: Findings from this pilot study showed that people with mild to moderate MS were able to motor image. Cueing might influence the synchronisation between cues and imagined steps, which could be transferred to actual walking. A larger study seems feasible, requiring a sample size of 20 per group, based on group differences in walking distance.

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P798

Objective physical activity measurement in people with multiple sclerosis: a review of the literature

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Background: Current descriptive epidemiology rates of physical activity (PA) levels in people with Multiple Sclerosis (MS) rely heavily on recall-based measurements of PA. Healthy population literature suggests these may lack resolution and places a strong emphasis on the use of objective PA measures in large scale cohort and intervention studies. At present, there is no gold standard objective PA measurement tool for use in MS literature. It is also unclear which aspect of PA MS researchers should be reporting.

Objective:

1) To identify the objective PA measurement tools and outputs that are most commonly used within Multiple Sclerosis literature and
2) To determine which PA measurement tools and outputs should be used in future MS and PA research.

Methods: A systematic search strategy was conducted on 8 databases (2000-2016) using keywords associated with MS and PA. This review forms part of a more detailed systematic review and meta-analysis that aims to establish current physical activity levels in pwMS. Once the search was complete, information on objective PA devices used and PA outputs reported were extracted and narratively described.
Results: This review includes 32 papers of which there are 3 intervention studies, 3 reliability/validity studies and 26 cohort/case control studies. Uni-axial accelerometers were the most popular objective PA measurement tool in this review (68%). Pedometers (14%) and multi-sensor systems (3%) were the second and third most common devices used. PA outputs included activity counts per day, steps per day, energy expenditure (kilocalories) per day, minutes of moderate-vigorous PA (MVPA), minutes of light PA, minutes of sedentary behaviour and daily dynamic activity. Both activity counts per day (n=21 studies) and steps per day (n=11 studies) were most commonly used representing 78% of the PA output in current literature.
Conclusion: Uni-axial accelerometers and pedometers are the most popular PA measurement tools used in MS literature. However, these tools may not be the most accurate measure of PA and other options including multi-sensor systems should be investigated. Additionally, PA is widely being expressed as activity counts and step counts per day. Single metric description of PA may not be accurate. Attention to capturing the duration, frequency, intensity and energy expended during daily PA is warranted.

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