



Lung involvement correlates with disability in MS patients with COVID-19 pneumonia

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Abstract

Introduction The visual-well aerated lung (V-WAL) is a score for the visual quantification of the well aerated lung on CT scan in COVID-19 patients and its value at admission seems to predict future COVID-19 severity. The aim of the present study was to analyze the association between V-WAL and risk factors for severe COVID-19 evolution in people with multiple sclerosis.

Materials and methods This is an observational retrospective study, including people with multiple sclerosis and concomitant COVID-19, who were investigated with a lung CT scan at Hospital admission. The association of V-WAL with age, sex, EDSS, comorbidities, recent steroid use, and treatment (anti-CD20 vs other) was assessed by a multivariate linear regression model.

Results In this observational retrospective study, the only factor that was significantly associated to a lower V-WAL at multivariable analysis was an increasing level of the EDSS ($R^2=0.41$, $p=0.001$), with an average decrease of 8% of V-WAL for each additional EDSS point.

Discussion and conclusion This analysis shows that a high EDSS level is the main factor associated to the severity of lung involvement in a group of people with multiple sclerosis who were hospitalized for Covid-19.

Keywords Multiple sclerosis · DMTs · Disease modifying treatment · COVID-19 · Visual well aerated lung · V-WAL

Introduction

Several risk factors additional to those of the general population (age, sex, comorbidities) expose people with multiple sclerosis (pwMS) to the risk of severe COVID-19 evolution, i.e., progressive disease, significant disability, and anti-CD20 therapies [1, 2]

The visual well aerated lung score (V-WAL) depicts the degree of lung involvement in COVID-19 pneumonia (a greater V-WAL indicate a smaller lung involvement) and V-WAL at admission seems to predict COVID-19 severity [3].

V-WAL has been associated with stroke severity in patients with concomitant stroke and COVID-19 [4]. V-WAL at admission has never been described in patients with MS and the aim of the present study was to analyze the association of the V-WAL to MS characteristics in a group of pwMS with COVID-19.

Materials and methods

This is an observational retrospective study, including a subgroup of pwMS with COVID-19 from the MUSC-19 study [1], who were investigated with a lung CT scan at hospital admission, in two Italian MS centers (Piacenza and Montichiari).

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The same radiologist reviewed lung CT scans and estimated V-WAL, according to the methods described by Colombi et al. [3]

Demographics, MS disease course, EDSS, MS treatment and COVID-19 severity were collected.

The association of V-WAL with age, sex, EDSS, comorbidities, recent steroid use, and treatment (anti-CD20 vs other) was assessed by a multivariate linear regression model.

The study was approved by the regional ethics committee of Liguria (University of Genoa; n 130/2020–DB

id 10,433) and at a national level by the Italian Medicines Agency.

Results

Twenty-four pwMS with COVID-19 were included, mean age was 47.7 years (Standard Deviation (SD) = 15.69), 62.5% were female, 70.8% had relapsing–remitting MS, 20.8% secondary progressive MS and 8.3% primary progressive MS. Median EDSS was 3.5 (range 1.5–6.3), mean MS duration was 12 (SD = 8.95) years and 29.2% had at least one comorbidity. Anti-CD20 was the current therapy in 45.8%, injectables in 25% and orals in 29.2%.

Nineteen pwMS had mild/moderate COVID-19 requiring hospitalization, seven were admitted to Intensive Care Unit and 2 of them died. Mean V-WAL in the entire cohort was 0.6 (standard error (SE) = 0.28). The only factor that was significantly associated to a lower V-WAL at multivariable analysis (Table 1) was an increasing level of the EDSS ($R^2 = 0.41$, $p = 0.001$) (Fig. 1), with an average decrease of 8% of V-WAL for each additional EDSS point (Table 1).

Table 1 Multivariable analysis assessing factors associated to high values of V-WAL score

Parameter	Beta coefficients (SE)	<i>p</i>
Age	0.002 (0.004)	0.57
Sex (males vs female)	−0.049 (0.097)	0.61
Comorbidities (yes vs no)	−0.090 (0.118)	0.45
Therapy (anti-CD20 vs others)	−0.094 (0.090)	0.29
Recent use of methylprednisolone (yes vs no)	−0.224 (0.236)	0.34
EDSS (1 point)	−0.076 (0.022)	0.001

Dependent Variable: Well-aerated lung score

Model: (Intercept), Age, Sex, Comorbidity, Therapy, Recent use of methylprednisolone, EDSS

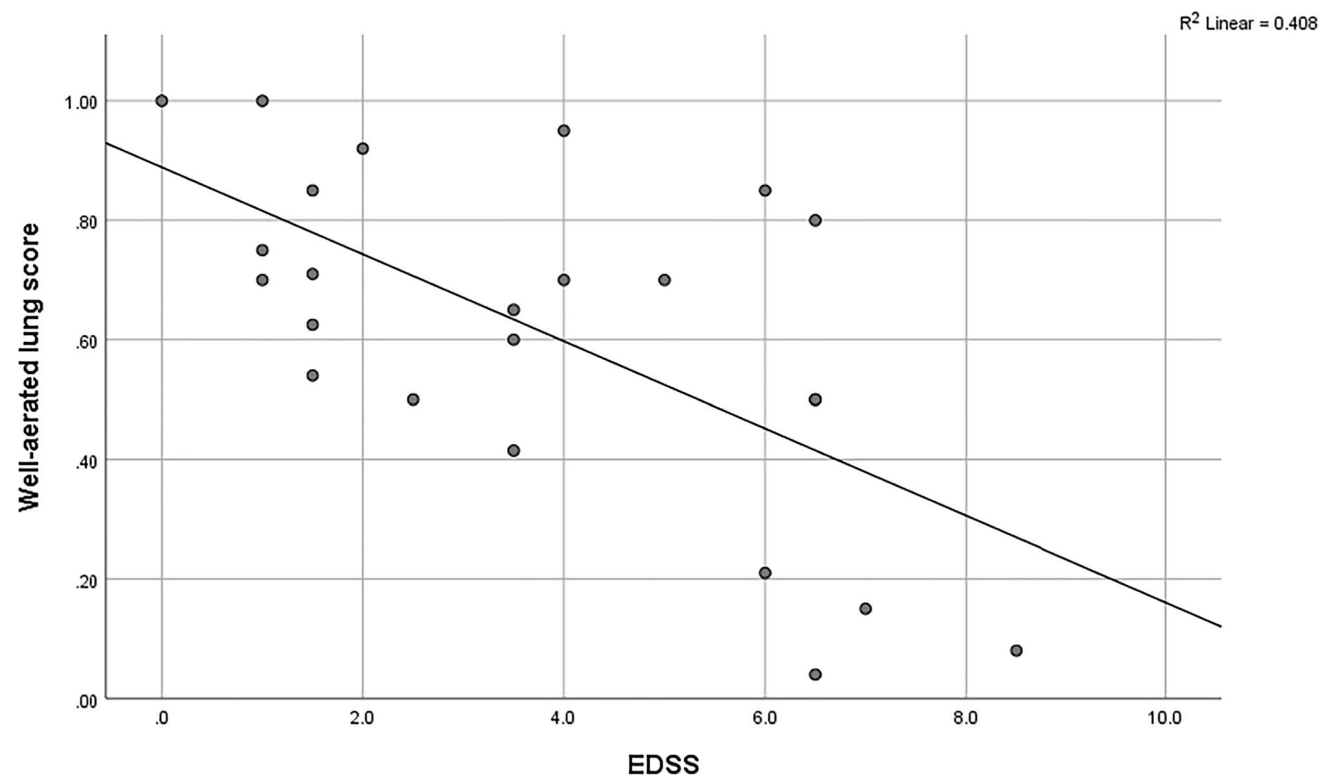


Fig. 1 V-WAL and EDSS correlation

Discussion

Previous studies have shown that in pwMS older age, male gender, higher EDSS, cardiac comorbidities, obesity, progressive MS course, administration of high doses of methylprednisolone in the month before infection and anti-CD20 therapy are risk factors for a severe COVID-19 evolution [1, 2].

Acute Respiratory Distress Syndrome is the hall-mark for severe evolution of acute respiratory failure in SARS-CoV-2 infection [5], and the extent of lung involvement at hospital admission has been associated with a severe COVID-19 evolution [3].

This analysis shows that a high EDSS level is the main factor associated to the severity of lung involvement in a group of pwMS who were hospitalized for Covid-19, after adjusting for all the other variables. For each EDSS additional point, there was an 8% decrease in well aerated lung: we suggest to consider lung CT scan in the diagnostic work-up of disabled pwMS with admitted to the emergency causality with SARS-CoV-2 infection.

Conclusion

This analysis better characterizes the “higher severity” of Covid-19 in patients with high EDSS.

Declarations

Ethical approval The study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

Informed consent Patients signed informed consent regarding publishing their data.

Research involving human participants and/or animals Not applicable.

Conflict of interest P. Immovilli has received consulting fees from Roche, Biogen, Merck, Novartis and Sanofi. M.P. Sormani has received consulting fees from Biogen, Boehringer Ingelheim, GeNeuro, GSK, Immunic, Merck, Novartis, Roche, and Sanofi. C. Cordioli has received consulting fees from Biogen, Merck Serono, Novartis, Bristol Myers Squibb, Roche, Almirall. I. Schiavetti has received consulting fees from Associazione Commissione Difesa Vista, Eye Pharma, Hippocrates Research, and D.M.G Italia outside the submitted work. P. De Mitri, S. Grazioli, D Guidetti have nothing to disclose.

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