

Brain lesion distribution distinguishing MS from other CNS inflammatory diseases

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INTRODUCTION

Multiple Sclerosis (MS) is a demyelinating Central Nervous System (CNS) disease associated with high social-economic burden. Data regarding low prevalence countries are considered scarce and can lead to diagnosis challenge in a day-to-day basis. Brain MRI criteria, distinguishing MS from Neuromyelitis Optica Spectrum Disorder (NMOSD) and Myelin oligodendrocyte glycoprotein Antibody Disease have been validated but not with distinct epidemiologic scenarios or other CNS inflammatory diseases.

OBJECTIVES

To evaluate if the original Matthews-Jurynczyk criteria could distinguish MS from other inflammatory CNS diseases, including NMOSD, in our Brazilian Northeast sample, adding the distribution and morphology of infratentorial lesions to the analysis.

METHODS

Anonymized BMRI of 31 MS patients and 20 other CNS inflammatory conditions were assessed and scored for the distribution and morphology of inflammatory brain lesions by applying the Matthews-Jurynczyk criteria with an additional criteria of infratentorial lesion.

RESULTS

51 patients were enrolled, 31 with MS and 20 with other inflammatory CNS diseases, including 10 patients with NMOSD. Inferior periventricular temporal lobe lesion presented with the best kappa coefficient ($k=0.65-0.84$). The presence of pericallosal lesion had the greater sensibility (87.1%) and accuracy (84.3%). Finding at least one of the four extended criteria (juxtacortical, periventricular, pericallosal, infratentorial) presented with 93.5% sensibility and the better specificity (95.2%) was observed when all four were present.

CONCLUSION

Our study proposed to apply and assess BMRI criteria in MS, NMOSD and other CNS inflammatory conditions. The findings suggest that the criteria can be feasible in distinguishing such conditions in our epidemiologic scenario. Adding infratentorial lesions increased the specificity but didn't improve the overall method accuracy. Epidemiological and methodological differences should be considered, and further work is needed to support its use on a standard basis.

Table 1 – Kappa coefficient / observed-agreement rate:

	E1	E2	GS	kappa		
				GSxE1	GSxE2	E1xE2
Juxtacortical lesion						
No	21 (41.2%)	24 (47.1%)	19 (37.3%)	0,589	0,801	0,723
Yes	30 (58.8%)	27 (52.9%)	32 (62.7%)			
Temporal lobe lesion						
No	23 (45.1%)	26 (51.0%)	21 (41.2%)	0,840	0,726	0,648
Yes	28 (54.9%)	25 (49.0%)	30 (58.8%)			
Pericallosal lesion						
No	11 (21.6%)	16 (31.4%)	20 (39.2%)	0,598	0,829	0,751
Yes	40 (78.4%)	35 (68.6%)	31 (60.8%)			
Infratentorial lesion						
No	16 (31.4%)	25 (49.0%)	23 (45.1%)	0,634	0,843	0,644
Yes	35 (68.6%)	26 (51.0%)	28 (54.9%)			

E1 (Evaluator 1); E2 (Evaluator 2); GS (Gold-standard).

Table 02 – Statistical data for gold standard:

	MS		Sensitivity	Specificity	PPV	PVN	Accuracy
	Yes	No					
Juxtacortical lesion							
Yes	24	9	77,4%	55,0%	72,7%	61,1%	68,6%
No	7	11					
Temporal lobe lesion							
Yes	26	4	83,9%	80,0%	86,7%	76,2%	82,4%
No	5	16					
Pericallosal lesion							
Yes	27	4	87,1%	80,0%	87,1%	80,0%	84,3%
No	4	16					
Infratentorial lesion							
Yes	22	5	68,7%	73,6%	81,4%	58,3%	70,6%
No	10	14					

MS = Multiple Sclerosis; PPV = positive predictive value; PVN = negative predictive value

Table 03 – Original criteria for gold standard:

	MS		Sensitivity	Specificity	PPV	PVN	Accuracy
	Yes	No					
1 of 3 original criteria							
Yes	29	10	93,5%	50,0%	74,3%	83,3%	76,4%
No	2	10					
2 of 3 original criteria							
Yes	26	5	83,8%	75,0%	83,8%	75,0%	80,3%
No	5	15					
3 of 3 original criteria							
Yes	22	2	71,7%	90,0%	91,6%	66,0%	78,0%
No	9	18					

MS = Multiple Sclerosis; PPV = positive predictive value; PVN = negative predictive value

Table 04 – Extended criteria for gold standard:

	MS		Sensitivity	Specificity	PPV	PVN	Yes
	Yes	No					
1 of 4 extended criteria							
Yes	29	13	93,5%	35,0%	69,0%	77,7%	70,5%
No	2	7					
2 of 4 extended criteria							
Yes	27	6	87,0%	70,0%	81,8%	77,7%	80,3%
No	4	14					
3 of 4 extended criteria							
Yes	25	3	80,6%	85,0%	89,2%	73,9%	82,3%
No	6	17					
4 of 4 extended criteria							
Yes	17	1	56,5%	95,2%	94,4%	59,3%	70,6%
No	13	19					

MS = Multiple Sclerosis; PPV = positive predictive value; PVN = negative predictive value

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