Pathological Laughing and Crying Is Associated with Posterior Fossa Lesions in Multiple Sclerosis

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Background

- Pathological laughing and crying (PLC) is defined as episodes of involuntary laughing, crying, or both, that are contextually inappropriate or incongruous with the individual's subjective mood state.
- PLC is known to occur in persons with MS (PwMS) with a prevalence approximately **10%**
- PLC patients report lower overall quality of life, relationship quality, & higher work impairment
- Localization of neuroanatomical lesions associated with PLC remains poorly delineated.

Objective

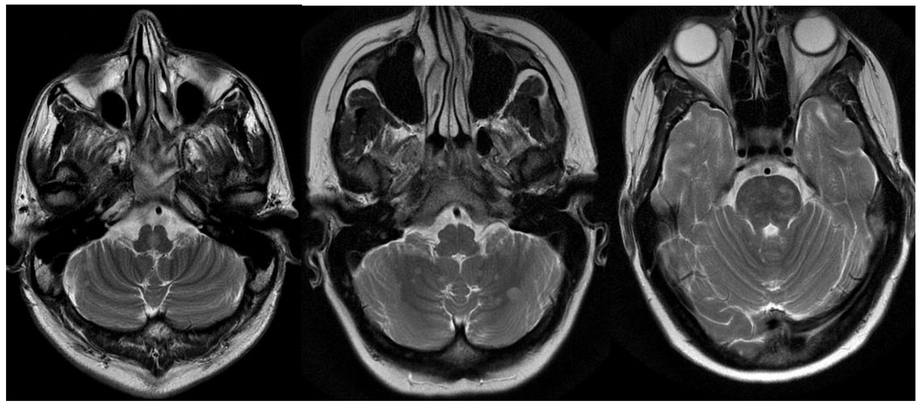
- To examine the relationship between lesions in the posterior fossa and PLC in PwMS

Methods

•Retrospective chart review from the London (ON) MS Clinic. PwMS who had completed the Center for Neurologic Study Liability Scale (CNS-LS) and had a clinical 1.5T MRI at this center (1.5T) within 6 months of each other

Assessment questions
1. There are times when I feel fine 1 minute, and then I'll become tearful the next over something small or for no reason at all.
2. Others have told me that I seem to become amused very easily or that I seem to become amused about things that really aren't funny.
3. I find myself crying very easily.
4. I find that even when I try to control my laughter, I am often unable to do so.
5. There are times when I won't be thinking of anything happy or funny at all, but then I'll suddenly be overcome by funny or happy thoughts.
6. I find that even when I try to control my crying, I am often unable to do so.
7. I find that I am easily overcome by laughter.

•Total number of brainstem and cerebellar lesions were counted and measured on T2 Flair MRI transverse sections



•**STEP 1**: Chi-square analysis compared the number of posterior fossa lesions (brainstem and cerebellum) in PwMS with PLC (CNS-LS of ≥ 17) with those without PLC (CNS-LS 0-16).

•**STEP 2**: Same analysis performed restricting the analysis to PwMS without depressive symptoms (Hospital Anxiety and Depression Scale, Depressive subscore (HADS-D) ≤ 8) due to the confounding effect of depression on CNS-LS scores.

Results

- From 2012-2016, 80 cases identified
- 3 excluded: CIS diagnosis (n=2); No HADS-D score (n=1)

Age in years	
Mean ± SD	39.3 ± 11.0
Education in years	
Mean ± SD	14.1 ± 2.3
Years Since Diagnosis	
Mean ± SD	5.3 ± 7.3
Gender # (%) Female	51 (66.2)
MS Type # (%)	
Relapsing Remitting	66 (85.7)
Primary Progressive	4 (5.2)
Secondary Progressive	7 (9.1)
EDSS Median (Range)	2.0 (0-6.5)
Mild (0.0) # (%)	58 (75.3)
Moderate (3.5-5.5) # (%)	11 (14.3)
Severe (≥ 6.0) # (%)	7 (9.1)
Taking DMT? Yes (%)	40 (51.1)
First line injectable	22 (55.0)
First line oral	15 (37.5)
Second line DMT	3(7.5)

Overall Lesions Present	
# (%) Yes	42 (54.4)
Brainstem Lesions Present	
# (%) Yes	42 (54.4)
Range	0 – 16
Mean ± SD	1.61 ± 3.031
Cerebellum Lesions Present	
# (%) Yes	42 (54.5)
Range	0 – 12
Mean ± SD	0.83 ± 1.773

CNS-LS	
# (%) Positive (≥17)	22 (28.6)
# (%) 0 -16	55 (71.4)
Median (Range)	13.00 (7 – 29)
HADS-D	
# (%) Impaired	19 (24.7)
Median (Range)	4.00 (0 – 17)

• All initial analyses were negative. No significant relations between posterior fossa lesions & CNS-LS scores **[X^2 (df 11, N = 77) = 12.903; p = 0.300**]

Analysis restricted to HADS-D ≤ 8 (n=57)

		Significant PLC Score		Total
		0 – 16	17 & Above	
Brainstem + Cerebellar Lesions Total	**0**	21	4	25
	1	7	1	8
	2	0	4	4
	3	3	0	3
	4	4	1	5
	5	4	1	5
	6	2	0	2
	7	2	1	3
	8	1	0	1
	13	1	0	11
TOTAL		45	12	57

Significant difference was found between total number of posterior fossa lesions in those with positive CNS-LS scores such that PwMS with *LESS* lesions were more likely to have PLC **[X^2 (df 9, N = 57) = 17.882, p = 0.037]**

Conclusions

•An association exists between the number of posterior fossa lesions on MRI and the presence of pathological laughing and crying in PwMS

•Further work necessary to elucidate nature of relationship

Acknowledgements

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References: Feinstein et al. 1997, 2004, Ghaffar et al. 2008, Hanna et al. 2016, Parvizi et al. 2001, 2007, 2009