Pathological Laughter as a Manifestation of Left Frontal and Right Pons Stroke

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Abstract

Background: Pathological laughter is a disorder of emotional expression characterized by bouts of uncontrollable laughter with no motivating factor. It is seen in various neurological disorders such as Post Traumatic Brain injury, Post stroke, Multiple sclerosis, Amyotrophic lateral sclerosis, etc.

Case Summary: Here, we present a case of a 46 year old male who presented with pathological laughter to the psychiatry outpatient department following acute infarct in the left frontal and right pons area of the brain.

Discussion: Our patient had developed pathological laughter subsequently after right pons and left frontal infarct as pseudobulbar affect. Our case report is unique as both the voluntary and involuntary pathways mediating laughter are involved.

Conclusion: Hence, our case may be indicative of possible role of combination of antipsychotics and antidepressants, which warrants further research.

Keywords: Pathological laughter, Brain Infarct, Pseudobulbar affect.

INTRODUCTION

Pathological laughter is defined as episodes of uncontrollable laughter with no motivating stimulus or inappropriate stimulus under normal conditions.[1] It is a disorder of expression of emotion. Pathological laughter when associated with pathological crying is also known as pseudobulbar affect, emotional incontinence, and emotional lability. Pathological laughter has been described in various neurological disorders such as Alzheimer's disease, Multiple sclerosis, Traumatic Brain injury, Tumors of the Cerebello-pontine region, and Stroke.[2-4] The prevalence following stroke is reported to be about 10 to 20%.[5] Here we present a case of pathological laughter following a stroke in the left frontal and right pons.

CASE SUMMARY

A 46-year-old male presented to the emergency department with complaints of giddiness and episodes of uncontrollable laughter since 4 days. These episodes of laughter arose immediately following a non specific stimulus and were irrespective of the situation. These episodes are

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uncontrollable, lasted for a few minutes,and persisted throughout the day. The patient's social and personal behaviour was found to be appropriate except for the bouts of inappropriate laughter. Patient was a known case of hypertension. The patient had no past or family history of any psychiatric illness.

On neurological examination,the patient was found to have dysarthria, bradykinesia, reduced arm swing, and brisk deep tendon reflexes. The patient had difficulty in initiation of walking and short steps. Mini mental status examination score of 22/30 was obtained. Cardiovascular, Respiratory, and per Abdominal examinations were within normal limits.

MRI brain showed acute infarct in the left frontal and right pons with chronic lacunar infarct left cerebellar region. (*See fig. 1*)

The patient was treated with Tablet (Tab) Aspirin 150mg/once a day, Tab Atorvastatin 20mg/once a day, Tab Clopidogrel 75mg/once a day, Tab Cilnidipine 5mg/once a day, and Tab Risperidone was given upto 5mg/once a day. However the patient while on Risperidone developed developed tremors and masked like facies. Hence Risperidone was tapered and stopped in view of risk of worsening of extrapyramidal symptoms. Patient was started on Escitalopram which has been titrated to 15mg with 80% improvement of symptoms during follow up.

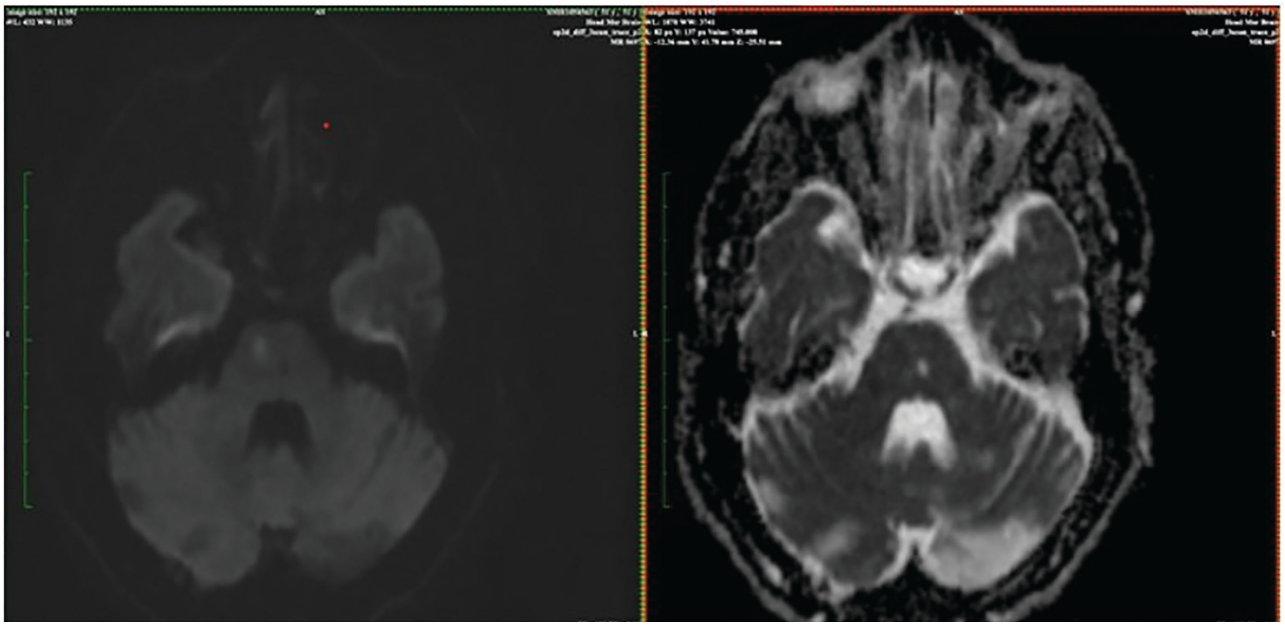


Fig. 1: Right pontine lacunar focus of diffusion restriction with low ADC

DISCUSSION

Pathological laughter is a disorder of emotional expression characterized by episodes of uncontrollable laughter. These bouts may be provoked by stimuli that are congruent to emotion but the response is increased in intensity. Or stimulus may have an emotional valence contrary to the expression.[6] Normally laughter is produced in the presence of stimuli that trigger happiness. The ability to understand that a particular stimulus should be perceived as happiness depends on it being perceived or recollected in a particular social or cognitive context.[7] This function is mediated by the emotion induction sites namely ventromedial prefrontal cortex, anterior cingulate cortex, amygdala, and ventral striatum.[8] The emotion effector sites control facial and respiratory muscles and include motor cortices, hypothalamus, periaqueductal grey matter, cranial nerve nuclei, and premotor cortex.[8] The pathways for emotion induction and effector pass through the cerebellum. Cerebellum plays a modulatory role in controlling the intensity, duration, and whether an emotion should be expressed in a given social context. Pathological laughter is hence produced by the dysfunction of any of these pathways.[1] In our case, the patient had an acute infarct affecting frontal and pontine areas and a chronic cerebellar infact and hence these pathways involvement might be a underlying cause for the pathological laughter.

Serotonergic dysfunction has been implicated in pathological laughter and crying. Serotonin receptors are widespread in the brain and are present on descending pathways to cerebellum. These pathways control emotions.[9] Selective serotonin reuptake inhibitors (SSRI) have been used in the treatment of pathological laughter and crying. For pathological laughter post stroke Citalopram,[10] Sertraline,[11] Fluoxetine,[12] and Amitriptyline[13] have been tried. For patients not responding to SSRIs Venlafaxine[14] and Mirtazapine[15] have been tried. In patients with multiple sclerosis and amyotrophic lateral sclerosis combination therapy of Dextromethorphan/Quinidine has been used.[16] Topiramate an antiepileptic agent has also been used in a case with PLC following cerebral lupus.[17] Recent studies have implicated other neurotransmitters such as dopamine, norepinephrine, and glutamate in the pathogenesis of PLC.[18] A case report of pathological laughter following pontine haemorrhage was treated with Dextromethorphan and no improvement was seen. The patient was treated with a low dose of Quetiapine and a drastic improvement was noted.[19] Our patient was treated with atypical antipsychotic Risperidone and improvement was noted. However, the patient developed extrapyramidal side effects and hence a trial of Escitalopram (SSRI) is being tried. Hence further studies using atypical antipsychotics and SSRI as treatment options are needed.

CONCLUSION

Pathological laughter is not a unusual manifestation of the brain infarct. Our case presented with pathological laughter as a consequence of left frontal and right pons infarct which responded well with SSRI.

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REFERENCES

1. Parvizi J., Anderson S.W., Martin C.O., Damasio H., Damasio A.R. Pathological laughter and crying: a link to the cerebellum. Brain. 2001 Sep; 124 (Pt 9):1708-19. doi: 10.1093/brain/124.9.1708. PMID: 11522574
2. Starkstein S.E., Migliorelli R., Tesón A., Petracca G., Chemerinsky E., Manes F., Leiguarda R. Prevalence and clinical correlates of pathological affective display in Alzheimer's disease. J NeurolNeurosurg Psychiatry. 1995 Jul; 59(1): 55-60.doi:10.1136/jnnp.59.1.55. PMID: 7608711; PMCID: PMC1073602.
3. Minden S.L., Schiffer R.B. Affective disorders in multiple sclerosis. Review and recommendations for clinical research. Arch Neurol. 1990 Jan; 47(1):98-104.doi: 10.1001/archneur.1990.00530010124031. PMID: 2403790.
4. Arciniegas D.B., Wortzel H.S. Emotional and behavioral dyscontrol after traumatic brain injury. PsychiatrClin North Am. 2014 Mar; 37(1): 31-53.doi: 10.1016/j.psc.2013.12.001. PMID: 24529422.
5. House A., Dennis M., Molyneux A., Warlow C, Hawton K. (1989) Emotionalism after stroke. BMJ 298: 991-994.
6. Bingelien, Arina & Shapiro, Colin & Sockalingam, Sanjeev & Hawa, Raed. (2016). Pathological Laughing and Crying Post-stroke: Liaison Psychiatrist Beware Clinical Case. Journal of Neuropsychiatry. 2. 12-13. 10.4172/Neuropsychiatry. 1000112.
7. Provine, R.R. (1996). Contagious yawning and laughter: Significance for sensory feature detection, motor pattern generation, imitation, and the evolution of social behaviour. In C.M. Heyes & B.G. Galef, Jr. (Eds.), Social learning in animals: The roots of culture *(pp. 179–208).* Academic Press
8. Tsutsumi S., Yasumoto Y., Ito M. Pathological laughter caused by frontal glioblastoma: case report. Neurol Med Chir (Tokyo). 2008 Jul; 48(7):307-10. doi: 10.2176/nmc.48.307. PMID: 18654050
9. Kerr C.W., Bishop G.A. Topographical organization in the origin of serotonergic projections to the different regions of the cat cerebellar cortex. J Comp Neurol 1991; 304: 50215
10. Grethe Andersen, Karsten Vestergaard, Jens O Riis. Citalopram for post-stroke pathological crying. Lancet. 1993; 342:837-9.
11. Burns A., Russell E, Stratton-Powell H, Tyrell P.,O.' Neill P., Baldwin R. Sertraline in stroke-associated lability of mood. Int J Geriatr Psychiatry. 1999 Aug; 14(8):681-5. PMID: 10489659
12. Brown K.W., Sloan R.L, Pentland B. Fluoxetine as a treatment for posts.troke emotionalism. Acta Psych Scand. 1998; 98:455-8.
13. Schiffer R.B., Herndon R.M., Rudick R.A. Treatment of pathologic laughing and weeping with amitriptyline. N Engl J Med. 1985 Jun 6; 312(23):1480-2. doi: 10.1056/NEJM198506063122303. PMID: 3887172
14. Smith A.G., Montealegre-Orjuela M., Douglas J.E., Jenkins E.A. Venlafaxine for pathological crying after stroke. J Clin Psychiatry. 2003;64(6):731–2.

15. Kim S.W., Shin I.S., Kim J.M., Lim S.Y., Yang SJ, Yoon JS. Mirtazapine treatment for pathological laughter and crying after stroke. ClinNuropharmacol. 2005; 28(5):249-51.
16. Brooks B.R., Thisted R.A., Appel SH, Bradley WG, Olney R.K., Berg J.E., *et al*: AVP-923 ALS Study Group. Treatment of pseudobulbar affect in ALS with dextromethorphan/quinidine: a randomized trial. Neurology. 2004;63(8):1364-70
17. Pathological Laughter Associated With Cerebral Lupus: A Case Report. ASEAN Journal of Psychiatry, Vol. 18 (1), January - June 2017
18. Wortzel H.S., Oster T.J., Anderson C.A., *et al*. Pathological laughing and crying: epidemiology, pathophysiology, and treatment. CNS Drugs 2008; 22:531Y545.
19. Chen, Yu-Ren M.D.*; Huang, Ya-Ping M.D.†; Lin, Shan-Ju MD†; Kuan, Tsao-Hsiang M.D.†; Lin, Chin-Hsien M.D.‡. Effectiveness of Quetiapine for Poststroke Pathological Laughing: Case Report and Review of the Literature. Clinical Neuropharmacology 33(6):p 319-322, November 2010. | DOI: 10.1097/WNF.0b013e3181f6bfbe