Pathological Laughter, Multiple Sclerosis, Behavioural Abnormality

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MJAFI 2006; 62 : 383-384

Key Words : Pathological laughter, Relapsing remitting multiple sclerosis

Introduction

Pathological laughter (Fou rire prodromique) is an uncommon clinical manifestation of lesion involving cerebro-brainstem-cerebellar pathways which control the laughter [1]. Existence of laughing centre has been hypothesized in the basal pons. Pre motor cortex, and anterior cingulate gyrus initiates motor component of the laughter and basal temporal and limbic system along with inhibitory impulse from cerebellum influences the emotional content of the laughter via an integrator in the hypothalamus [2-4]. Various aetiologies in the region of prefrontal, temporal cortex, internal capsule, hypothalamus, thalamus, lesions in and around brainstem and the cerebellar pathways have been known to be associated with pathological laughter [2,3,5,6]. Gelastic seizures seen in hypothalamic hamartomas sometimes mimics pathological laughter [7].

The prevalence of pathological laughter in Multiple Sclerosis (MS) is about 10%. It is found in a chronic progressive phase of the disease and associated with mild cognitive impairment, which carries a bad prognosis [8,9]. Pathological laughter as a presenting symptom in the relapsing phase of MS due to pontine lesion is rare and on literature search, only one such case could be found [10].

Case Report

A right handed 38 year old male, a known case of MS was brought by relatives in Mar 2005, with behavioural problems, in the form of inappropriate laughter and inability to control the laughter. The laughter would last for 5-10 minutes for trivial matters and sometimes spontaneously during normal conversation. He also had delusion of infidelity suspecting the moral character of his wife.

The patient was symptomatic from Oct 2002 with right sided hemiparesis, which recovered over four to five weeks. In Nov 2003 patient had recurrence of symptom with weakness of right side, nasal intonation and swallowing difficulty. Clinically he had right 7th and bilateral 9th and 10th cranial nerve paresis with bilateral upper motor neuron signs without any sensory or behavioural abnormality. Investigations revealed normal cerebro spinal fluid, increased P 100 latency in visual evoked potential studies with normal brain stem auditory evoked potentials. Magnetic resonance imaging (MRI) showed features consistent with MS. He was diagnosed as relapsing remitting multiple sclerosis (RRMS) and treated with pulsed doses of methyl prednisolone and mycofenalate. Patient improved significantly but continued to have stiffness and hoarseness of voice.

In Dec 2004, he had relapse with increased weakness, difficulty in feeding and forgetfulness. His mini mental status examination (MMSE) score was 24/30. Jaw jerk was brisk and he had bilateral 9th and 10th cranial nerve palsy with spastic quadriparesis. Repeat MRI showed no fresh lesion. He was treated with nasogastric feedings, methyl prednisolone and

Fig. 1 : MS plaque in the pons

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Interferon γ -1a, 44 μ g, subcutaneously, thrice a week. Patient showed improvement in his speech and swallowing. He was discharged on interferon and mycophenolate.

During present admission there was no significant change in the neurological disabilities and MMSE score, other than development of pathological laughter. Repeat MRI showed an additional plaque in region of pons.

The behavioural abnormality was suspected to be due to interferon which was stopped for two weeks but his neurological deficits increased, so he was restarted on interferon along with steroids. It was inferred that pathological laughter and behavioural abnormality were due to appearance of fresh lesion in pons and not a side effect of interferon. After treatment, pathological laughter and delusions disappeared and other neurological deficits improved considerably. At present, the patient has been discharged from hospital and is on mycophenolate and interferon with nasogastric feeds.

Discussion

Normal laughter is a coordinated motor function triggered by a specific stimulus and is accompanied by mood elevation. Pathological laughter is defined as 'sudden involuntary displays of laughing that are disproportionately motivated by a trivial stimulus without accompanying mood elevation' [4]. Arroyo et al [2], have demonstrated by stereo electro-encephalographic recordings that anterior cingulate region and pre cingulated motor cortex are involved in triggering the motor components of the laughter, where as basal temporal cortex is involved in modifying laughter's emotional content. Pathological laughter is infrequently seen in intra or extra axial brainstem tumours, and in lesions involving prefrontal and basitemporal cortex, internal capsule, thalamus hypothalamus [4,6]. Controlled laughter is produced by the 'laughing centre' situated in the ventral basal pons which is subject to tonic inhibitory impulses from cortex and limbic system and cerebellum via an 'integrator' located in the hypothalamus [4,5]. Lesions interfering with this pathway eliminates the supra nuclear control and produces pathological laughter [3-5].

Feinstein et al [8,9], have reported the incidence of pathological laughter of 10%, which is often seen in chronic phase. In a study of 152 patients of MS with pathological laughter, they found that the patients had mild cognitive impairment when subjected to Wisconsin card sort test.

Takado et al [10], have reported a patient of multiple sclerosis who had pathological laughter and hemiparesis whose MRI showed a lesion in the right pontine base. He improved with pulsed dose of steroids. Patient had

relapse of pathological laughter with hemiparesis after six years with repeat MRI showing a fresh plaque in the left pontine base. They opined that the pontine base lesion was responsible for the pathological laughter.

In our case, the only manifestation of relapse was pathological laughter and abnormal behaviour. Our patient had no improvement in the behaviour on stoppage of interferon. Pathological laughter coincided with demonstration of fresh lesion in the pontine base suggesting their causal relationship

In conclusion pathological laughter is known to occur in advanced stage of multiple sclerosis, but its occurrence as a presentation of relapse in multiple sclerosis is rare and can be often over looked as behavioural abnormality. In a setting of multiple sclerosis it carries a bad prognosis.

Conflicts of Interest

None identified

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