

Muscle paralysis in a child caused by sudden unexpected intense sound

Yadav J S^{1,*}, Jain S², Kaur S³, Arun K⁴, Srivastava A S⁵

Dept. of psychiatry, Institute of Medical Sciences, BHU, Varanasi

***Corresponding Author:**

Yadav J S

Dept. of Psychiatry, Institute of Medical Sciences, BHU, Varanasi

Email: jspsy@ipsf.in

Abstract

Motor muscle paralysis is caused by damage of nervous system and severity may range from mild to complete loss of muscle power, causes of this abnormality mostly exist in brain or nerves. There are other variations of motor paralysis are periodic limb paralysis, sleep paralysis, and dissociative motor paralysis. The sudden motor paralysis is mostly caused by generalized seizure activity in brain that can be induced by many reasons like light, sound, exercise, changes in body metabolism etc. In this case we have reported atypical presentations of unexpected intense sound induced motor paralysis and in which there were diagnostic and management problems.

Key words: Motor muscle paralysis, Unexpected intense sound.

Introduction

Muscle Paralysis is defined as loss of muscle power for one or more muscles, which can be temporary or permanent. The causes of paralysis can be multiple but most common causes are interruption of nerve pathway between brain and muscle. The other causes of muscle paralysis are functional weakness, partial epilepsy, cataplexy, muscular drop attacks etc. the functional weakness may be diagnosed as psychogenic or 'non-organic' paralysis⁽¹⁾ and muscular drop attacks can occur in partial seizures. Focal atonic seizures result from relatively circumscribed seizure activity in one or more cortical areas that contribute to the elaboration and execution of motor functions⁽²⁾. Cataplexy is another condition in which sudden loss of muscle tone occurs when the person awakes, in this condition person feel weakness and a loss of voluntary muscle control. This attack can occur at any time during the waking period and more often triggered by sudden, strong emotions such as fear, anger, stress, excitement, or humor⁽³⁾. The interesting issue in our case is atypical presentations of symptom that can not be fully explained by above mentioned causative factors of muscle paralysis and the triggering factors not directly affect the motor cortical area for seizure or emotional area for fear response.

Case

A four year-old child was brought in child guidance OPD with complaint of sudden fall on ground with hearing of intense sound. The episode was abrupt with progressive frequency, since two years. The symptoms usually occurred whenever he heard intense sound without warning. Mother of child first noticed this problem when child was playing with peer group, another child of peer group suddenly sneezed behind this child and he felt on ground, at that time due to sudden fall on ground he had small swelling on his

forehead. When mother reached to child he was crying, conscious and after few second sat on ground, he was oriented to person and recognized his mother. When mother consoled him he stopped crying and expressed his pain to mother. Initially his family members not bothered much about this incidence; therefore they consulted a local doctor who prescribed some medicines. The second episode happened at home, when his elder brother cried loudly beside child and he again felt down, family members noticed that in this episode pattern was also similar as before, but this time no injury happened and child again sat after few second and was oriented.

Since the time mother of child noticed that child often used to fall on the ground whenever he heard intense sound produced near to him without warning, and each episode was not associated with loss of consciousness, tonic clonic movement, or post ictal confusion, child used to sit or stand after few second of episode, but due to frequent falls child had many injuries on his head and body. The direction of sound did not affect the pattern of episode, but in contrary if child was made aware prior to production of sound, there was no effect of sound noticed. The birth history of child suggested difficult hospital delivery and has history of aspiration of amniotic fluid, therefore he did not cry after birth; hence other life supports were given to him. The history of initial development was obtained and it was noted that mile stones (social and motor development) were delayed, he was able to stand with support at one and half year of age, he needed support of attendant for his routine activities, speech was not fully developed and social interactions were found poor at the time of examination. His family history has negative for psychiatric or neurodevelopmental disorders. Biochemical investigations, ENT, EEG, CT scan, brain, liver function test, and other systemic examinations findings were within normal range. We

have applied combined approaches of exposure modification and pharmacological therapies. He received twice a week exposure modification sessions, in which child was exposed to similar sound repeatedly in a graded manner of making him aware of sound. Simultaneously Syrup Oxcarbazepine 150 mg/day was given in two divided doses. The response was assessed after two week of therapies and it was found that child was symptom free even when similar sounds were applied at many occasions.

Discussion

There are many causes of temporary muscles paralysis but in this case muscle paralysis occurred, in response to sudden intense auditory sounds when child was unaware of it. This could occur when cortical area is stimulated for seizure activity in response to sound and involves both sides of motor area. In a previous study, patients with partial seizure those were not sensitive to sound shows wide spread effect on neuronal activity in temporal lobe rather auditory area⁽⁴⁾.

The different components of musical sound have different effect, and these components of sound processed by cortical subsystem rather non-specific auditory area of the brain⁽⁵⁾. A more complex musical processing activates cortical and subcortical territory bilaterally although with right predominance of excitability cortical area could be stimulated by different degree with extent by different cortical stimuli in-patient sensitive to different stimuli⁽⁶⁾. In our case stimulated sound was of specific frequency and was not mixed with different components that could precipitate the seizure. Therefore in contrast to above three studies we have seen that muscular paralysis due to atonic or focal partial seizure triggered by intense sound is not likely to occur because sound of specific frequency is poor stimulus of cortical area in comparison to mixed component of sound.

Though in our case frequency of sound do not varies much therefore probability in stimulation of cortical and associated areas are minimal, hence the probability of temporarily paralysis muscles during intense sound was also less.

In this case paralysis did not occur when sound was produced with prior awareness to child. Therefore causes of dissociative motor paralysis are of lesser possibility because a change of emotional component involvement was less. We could keep other possibilities of reflex paralysis due to fear response, but again there are no direct reflex between auditory system and cortical area. The other possibility we could think is that cortical limbic fiber primarily stimulated by auditory system that took important role in paralysis of muscle. Though the response with oxcarbazepine was desirable therefore we could keep possibility of neuronal stimulus trigger by intense sound.

Summary

Certain kind of auditory stimulus can cause neuronal stimulus which lead to skeletal muscle paralysis.

References

1. Stone J, Warlow C, Sharpe M. The symptom of functional weakness: a controlled study of 107 patients. *Brain*. 2010;133(5):1537-51.
2. So NK. Atonic phenomena and partial seizures. A reappraisal. *Adv Neurol*. 1995;67:29-39.
3. Siegel, Jerome. "Narcolepsy". *Scientific American* 2001;77.
4. Liegeois-Chauvel C, Musolino A, Chauvel P. Localization of the primary auditory area in man. *Brain* 1991;114:139-151.
5. Peretz I, kolinsky R, Tramo R. Functional dissociation following bilateral lesions of auditory cortex. *brain* 1994;117:1283-1301.
6. Zifkin BG, Zatorre R. Musicogenic epilepsy. In: Zifkin BG, Andermann F, Beaumanoir A. Reflex epilepsies and Reflex seizure. *Advances in Neurology*. Philadelphia: Lippincott-Raven press; 1998:75:273-281.