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Uncontrollable Urge to Specific Life-style Activities in Parkinson's Disease-An Addiction or A Part of Impulse Control Disorder?

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Abstract: Parkinson's disease is one of the emerging, incurable neurological disease affecting people sporadically with a very least genetic predisposition. PD is mostly characterised by motor, cognitive as well as psychiatric symptoms; though many treatment options are available to manage the symptoms. PD predominantly affects motor systems but psychiatric manifestations follow the course of the disease at different point of time. Life threatening features as delusion, hallucination has been reported as inevitable features in few cases not all. However, psychotic features also may occur as an adverse effect of dopamine agonist used in PD. Constellation of addictive syndromes such as pathological gambling, hypersexuality, compulsive shopping has been reported earlier in certain patients. In this case report, we reflect on a PD patient developing an unusual addiction to a particular daily activity which is using computer for alarmingly excessive amount of time. We also discuss patients supporting symptoms to define the diagnosis and his evolving treatment protocol to manage those. Atypical addictive symptoms are not usual but can be seen in clinical practice. We present a 67 years old man with parkinsonism beginning with tremor whose first symptom was mild pain in right forearm pain eventually developed abnormal urge to electronic gadget referring to addiction or impulse control disorder (ICD) which has contributed to his age related insomnia as well.

Keywords: Parkinsonism, Tremor, Addiction, Delusion, Impulse control disorder

1.Introduction: Parkinson's disease (PD) is a progressive neurodegenerative disorder affecting predominantly dopaminergic neurons showing underactivity in a specific area of the brain called substantia nigra; associated with overactivity of cholinergic neuron [1]. Brain dopamine also plays a central role in the behavioral reward system of both humans and animals, reinforcing a myriad of both productive and counterproductive behaviors [2]. It's caused by the loss of cells deep within the brain that produce a neurotransmitter called dopamine. Degeneration of these neurons impairs the transmission of signals within the brain, affecting a person's ability to control their muscles resulting in common initial signs including tremor, stiffness, rigidity, bradykinesia and shuffling gait. Parkinson's tremor normally exhibits frequency of 5-7 Hz [1-2]. Few patient reported symptoms are small handwriting, trouble

sleeping,soft or low voice, stopping or hunching over,dizziness or fainting,loss of smell[3].But many people with Parkinson's disease also report troubling non-motor symptoms. These may include depression, anxiety, psychosis, cognitive impairment.Though not too often but addictive symptoms have also been outlined in several cases[4].Commonly encountered behavioral addictions in PD are related to gambling,sexual behavior,compulsive shopping.We are presenting a case with the history of developing an unusual addictive manifestation of using gadget(computer in this case).For instance,this patient also developed delusion at a specific time-point which was differentiated as early exhibition of a particular symptoms rather than a side effect of the dopaminergic drug.Moreover,the delusion developed is related to his personal computer and he was delusional about someone who is stealing his personal data,pictures from his device.Heretofore,it is believed that his addiction to computer use is either a result of his prolonged inability to move that made him to stay involved in a specific daily activities demanding least movement or an interplay of neurotransmitters that need further scientific evaluation.Any addictive features can impair a patient's daily life in fact can contribute to the unpropitious situation which is why these should be diagnosed and managed promptly to ensure patient comfort[5][6].

2.Description: A 66-year-old man presented back in 2008 with moderate pain in right forearm.Initially,he was treated with NSAID but pain never subsided for long.After few months he started having pain in right lower limb too associated with numbness.He was evaluated many times by primary care doctor and referred to neurologist resulting in the diagnosis of myalgia. Later he started having tremors in both right upper and lower limbs further complicated with rigidity in the same location.Carbidopa-Levodopa was prescribed by his neurology consultant showing gradual improvement with less symptomatic period in a day.Tremor and rigidity was never resolved forever in point of fact doses were increased in strength and frequency gradually.

Unified Parkinson Disease Rating Scale (UPDRS), a common rating scale consisting of subscale 1 covering mentation, behavior, and mood, subscale 2 rates of activity of daily living, subscale 3 clinician rating of motor manifestation of PD, subscale 4 complication of therapy, was used during evaluation of the patient.[2]

In subscale 1 evaluation, the patient showed no intellectual impairment, vivid dreaming, sustained depression without vegetative symptoms, no loss of initiative in elective activities. In subscale 2, patient's speech was moderately affected, no salivation, no choking, moderately slow and small handwriting, slow and clumsy in food-cutting, utensil handling, slow dressing and hygiene but no help needed, slow in bed-turning and adjusting bedclothes as well, rare falling, frequently freezing when walking, mild difficulties in walking, moderate tremor in right arm, infrequent tremor in left arm, no sensory complaints. On subscale 3, patient showed resting tremor of mild amplitude,absent action tremor,mild to moderate rigidity,mild bradykinesia,monotonal speech quality,abnormal reduction of facial expression,more than one attempt to arise from a chair,slightly stooped posture,shuffling with short steps while walking,able to stop self from falling,moderate degree of slowness in movement.Subscale 4 was not evaluated as dopaminergic drugs were not started yet.MRI performed in 2010 revealed age appropriate cortical sulcal pattern,ventricles were non-dilated with patent basal cisterns.No acute hemorrhage or abnormal extra-axial collection were reported.No evidence of focal parenchymal mass or mass effect was found.An attempt of follow up MRI in 2020 was unavailing due to his unsteady movement and uninterrupted resting tremor.

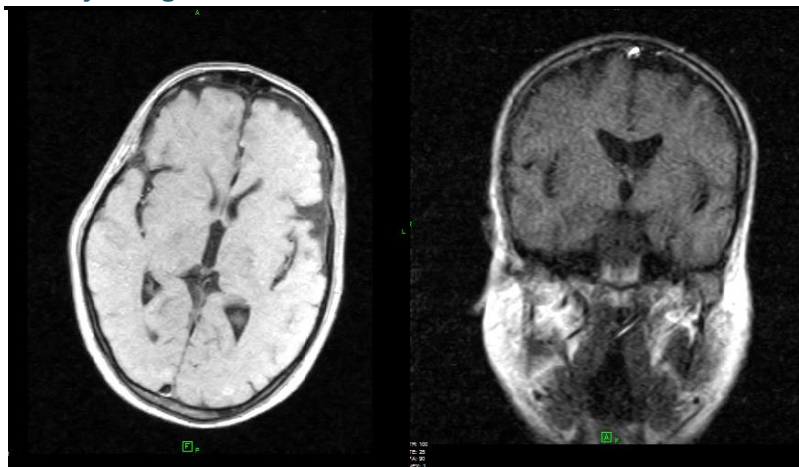


Figure 1 and 2: MRI Brain w/o enhancement showing no acute hemorrhage, patent basal cistern, no parenchymal mass effect.

During a session, pts wife reported that pt has always been telling her about someone who is stealing personal data from his computer at his absence. All the possibilities of dementia were excluded out by the physician; pointing the cause of this thinking to the delusion. Dopaminergic medication was stopped for a 3 weeks but the delusion never went to baseline establishing drug side effect unlikely. Patient developed delusion at the 5 years of diagnosis. Antipsychotic drugs has been refused by patient. Now he is on Carbidopa-Levodopa, Entecapone, Trihexyphenidil to treat his excessive salivation. Meanwhile, patient was also diagnosed with coronary artery disease (CAD) followed by percutaneous coronary intervention (PCI) two times. For the last 2 years before we reported this case, the patient also developed an addiction to using his computer with regard to his delusion about stealing his private information. Patient informed that he feels continuous unavoidable feeling of using his computer and he fails to control this impulse. Possibilities of suspected addiction and impulse control disorder were taken in account. Her average screen time is 16 hours a day which is surprisingly extravagant. Additionally, he fails to return to his sleep with a strong urge to use it. This sleep deprivation might have welcomed more symptoms like excessive daytime fatigue, deterioration of parkinsonism, irritability, anxiety, impulsive behavior. Generally a sleep deprived person end up experiencing microsleep during the day in contrast to this patient who is unwilling to leave his table probably under influence of addiction and delusion. It is worth notifying that patient had major depressive disorder and generalised anxiety disorder and still under care of psychiatrist. He is taking antidepressant (Sertraline) and Amitriptyline on a regular basis.

3. Discussion: While it is still controversial, PD patients develop addiction to any behavior less commonly than the general population[5]. Differences in personality trait and reward sensitivity can be linked with addiction. Potential driving force for addiction is dysfunction of dopaminergic signalling in PD but more pathways can be involved. Sometimes it is very difficult to differentiate between behavioral addiction and impulse control disorder. Impulse control disorder is considered as highly influencing feature in PD with strong association of dopamine agonist. On top of that, exact mechanism of ICD is still to be discovered but involvement of dopamine reward and inhibition system is definite[6]. Dopamine-based reward as well as reinforcement system play key roles in impulse control disorder such as gambling disorder. Mesolimbic dopamine pathway connecting ventral tegmental area (Brain stem) with nucleus accumbens of ventral striatum (Basal ganglia) is the major part of this neurobiology. Excessive uncontrollable urge to use gadget like computer is tough to be categorized as addiction or impulse control disorder especially when it is occurring under influence of delusion. Impulsive personality traits can turn into a disorder while dopamine receptor agonist like pramipexole, ropinirole involving mostly D3 receptor to which their affinity is the most. Furthermore oral dopamine agonist carries the risk of developing ICD more than transdermal patch. Levodopa, one of the most common choice as initial therapy, also associated with ICD notably when used as combination with dopamine agonist. Patient treated in levodopa has increased odds of having ICD than patient without levodopa making this very significant in this pathogenesis. Few personal

risk factor such as depression, anxiety also are accountable for ICD and addiction which is very much relatable in this patient. Genetic association is also being evaluated for last few decades. Henceforth, there are studies concluding that AA genotype of DRD3 and CC genotype of GRIN2B are can be attributed as a risk factor for ICD in PD patients. Few more studies identified other genetic variation like DRD3 p.Ser9Gly(rs6280), DRD3 p.S9G, GRIN2B(rs7301328), DRD1(rs4532 and rs4867798), DRD2/ANKK1 are also risk factor for ICD in PD [6][7]. However in our case, attributing this excessive gadget using behaviour to ICD or addiction is a subject to debate. As these clinical situations can cause detrimental consequences indeed, they should be assessed and identified at the very beginning. Most likely approaches to fight this symptoms are 1) Reducing the existing dose 2) stop the offending medication 3) replace with a different dopaminergic agent [7]. Exponential experiments are going on for last few decades to find more specific neurobiological approach to establish genetic construct, set up an treatment protocol to cure addictive behavior and ICD.

4. Conclusion: Addiction to any substance or any activities is one of the very infrequent symptoms in PD. At times, any kind of addictive symptoms associated with lifestyle activities may remain unrecognized hence untreated. Studies have concluded that its dopaminergic medications causing impulsive and addictive behaviours including gambling, preoccupation with or with pornography, compulsive shopping or binge eating. Addiction to use computer has been rarely reported yet. These inevitable addictive feature also can be an untoward feature of ICD. Therefore, It will be an excellent topic for further research and evaluation to interlink this uncommon type of addiction with PD. Additionally, the causal pathway should also be identified to know if this specific addiction is due to dopaminergic medication (increased dopamine availability) or long term history of rigidity and less symptom free period. It must be emphasized that any addictive symptoms or ICD should be identified as early as possible to improve quality of life and make the job of taking care of the old aged patient easier for family members, health care assistant, home health aid.

5. Consent : The patient agreed the doctors could use and publish his disease as an article without sharing his personal information.

6. Conflict of interest: The author declared no potential conflicts of interest with respect to the authorship and publication of this article.

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