Association of Lack of Dreaming and Forgetfulness: Presentation of a Case with Depression

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Abstract

Although the aim and the function of sleeping is not definitely explained, its relation with memory has been discussed for more than 200 years. We want to discuss literature on dream-memory relation in the light of a depression case who was complaining from forgetfulness. We present a depression case who presented with complaints of forgetfulness and lack of dreaming and both complaints were relieved after treatment with fluoxetine 20 mg/day. We believe that investigating dreaming in patients who have memory disturbances can shade light on dreaming-memory relationship.

Keywords: Dreaming, forgetfulness, depression

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Introduction

Why and how dreaming occurs and its function has drawn researchers attention for a long period of time [1]. Eighty percent of dreaming is known to occur during rapid eye movement (REM) sleep. Since the discovery of rapid eye movement (REM) sleep, the neural underpinnings of dreaming have become increasingly well understood, and it is now possible to complement the details of these brain mechanisms with a theory of consciousness that is derived from the study of dreaming. The theory advanced here emphasizes data that REM sleep may constitute a protoconscious state, providing a virtual reality model of the world that is of functional use to the development and maintenance of waking consciousness [2,3]. After David Hartley's claim that dreaming is effective in memory formation approximately 200 years ago, effects of sleep and dreaming in memory formation has been discussed [4].

During REM period, central nervous system is thought to be activated uniquely and information is processed. Changes during REM sleep show the relation between dreaming and information processing [3]. Psychoanalytic literature suggests that during dreams materials which are kept in subconscious as fragmented structures are fused as a result of internal and external factors [5].

Hippocampal slow activities which appear rhythmically during REM sleep draws attention to the relation of REM sleep and cognitive processes [3]. These waves which appear only during REM sleep are estimated to reflect hippocampocortical functioning, therefore cognitive activity and also they suggest that meanwhile information is processed. In addition some studies suggest that REM latency is related with high cholinergic activity which is known to be important in learning and memory. Processing of stored information in hippocampus and especially, its occurrence only during REM sleep, will lead the way in research on cognitive functions of sleep [3,6].

We will present a case of depression complaining from absence of dreaming and discuss sleep-memory relation in light of this case.

Case

BK, a 40 years old male, admitted to our clinic with complaint of forgetfulness. During interview he stated that he couldn't dream since his forgetfulness has started. He has had forgetfulness and inability to concentrate for 3-4 months and before it he experienced anhedonia and loss of interest. He denied a sleeping problem except lack of dreaming. In his mental status examination his grooming was decreased. His mood was depressed. No delusions or hallucinations were detected. Judgement and abstraction were normal. In his memory examination, both short and long term memories were impaired. Neurological examination was within normal limits. Personal history was unrevealing. He denied any substance abuse. Family history revealed depression in his sister.

Complete blood count, liver and kidney function tests, fasting glucose level, electrolytes, vitamin B12, folic acid, and thyroid function tests were within normal limits. Routine electroencephalography (EEG), and brain magnetic resonance (MR) imaging were normal. Score in Mini Mental State Examination (MMSE) was 18 mainly due to memory impairment. Clinical Global Impression (CGI) score was 4. With a diagnosis of depression, fluoxetine 20 mg/day was started and 2 months later he described 80% decline in complaint of forgetfulness. Ham-D score decreased to 7 from 22. CGI score declined to 2 from 4. He declared that he started dreaming in parallel with improvement in forgetfulness and decreasing HAM-D points. MMSE score also increased to 26 from 18.

Discussion

In recent years, research on molecular biology, genetics, neurophysiology, and cognitive neurosciences gave striking findings about the role of sleep in learning and memory reprocessing [7]. Animal and human studies demonstrated that different phases of sleep have differential effects on learning and memory [1]. Dreaming is believed to reflect activation and reunification of memories [4].

Most studies on the role of sleep in memory reprocessing and consolidation focused on REM sleep because of the relations between REM and memory. Some of these studies reported increased sleep and particularly REM duration after a learning task [8].

Another finding which researchers, who suggest that learning occurs and memory is consolidated in REM sleep, take into account is recurrence of increased neural activity during a learning task in REM sleep [8].

A group of researchers who examined the relation between learning and REM sleep compared students entering an exam and controls. They found an increase in density of REM sleep eye movements in students who were preparing for examination [9].

PET studies showed increased connections in functional connections of nervous circuits during learning. This finding suggests that REM sleep augments learning related nerve circuits [10,11].

Buzsaki suggested that information flows from cortex to hippocampus during REM sleep, teta waves augments long term potentiation which is necessary for hippocampal memory formation and this hippocampo-cortical dialogue during sleep is responsible for coding and sustaining of hippocampus originated memory fragments in the cortex [12].

Hobson and PaceSchott suggested that during REM sleep new associations are formed between memory fragments stored in cortex which is independent from hippocampocortical knowledge flow; and this hyperassocative state is a cognitive presentation of this hyperassociative state [13].

Demir et al [14] compared 25 depressive patients and 25 healthy controls in order to investigate effects of depression on cognitive functions [14]. They detected impairments in visual memory, visual tracking, focused attention and verbal fluency in depressive patients. These impairments were correlated with severity of depression. In our case pretreatment Mini Mental State Examination score was 18. This score shows impaired cognitive functions in our patient as in patients in Demir et al study.

Comorbidity of forgetfulness and lack of dreaming in our patient and their parallel improvement supports the positive effect of dreams on memory.

Although none of the 3 major neurochemical models of dreaming considers serotonin as a dream promoting neurotransmitter [15-17], clinical anecdotes [18,19], and an experimental

study [20], reported increased dreaming with SSRI's. In addition, fluoxetine was found to increase dreaming in patients with previous affective and/or anxiety disorders [18,20].

Although SSRI's suppress REM sleep during acute period, they relatively improve REM sleep in later periods [21]. Our case also stated a subjective increase in dreaming after two months of fluoxetine treatment. Particularly in depressive patients antidepressant effects on dreaming is thought to be due to interaction of several factors [22].

Case reports and research data indicate a strong effect of SSRIs on dream recall and dream content [23]. In our case increased dreaming reported by the patient may be due to improved recall of dreams which is caused by improvement of cognitive functions by SSRI treatment. To differentiate effect of increased recall from increased dreaming, polysomnography would be great but it couldn't be done due to limitations of our center.

A previous study found that dreams are affected in patients whose hippocampal regions are damaged [24]. Therefore involvement of hippocampus should be evaluated in depressive patients presenting with forgetfulness.

Habson and McCarley suggested an association between increased activation of serotonin and acetylcholine in forebrain during REM sleep. So that, during REM sleep activation in cortex and diencephalone occurs because of increased cholinergic activation [15]. In our case, while dreaming which is associated with REM sleep increased, functions associated with cholinergic system were also improved.

Despite these theories, it is not possible to explain complex neurochemistry of dreaming with simple interactions and the mechanism underlying increase in dreaming with increased serotonergic transmission in some people is still not completely understood. [22]

Nevertheless in our case an exogenous mediated increase in serotonergic transmission may be the cause of increase in dreams. In this context serotonin-acetylcholine interaction should be examined in future research to understand the relation between dreaming and forgetfulness.

The most striking finding in our depression case is the correlated impairment and improvement of dreaming and memory. But despite this correlation, improvement in memory may be due to other factors such as a direct effect of remission of depression.

Future research on sleep physiology in patients with memory disturbances may shade light on dreaming-memory relationship.

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