

## Podcast of the Journal of Clinical Sleep Medicine

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Welcome to the regular Podcast of the Journal of Clinical Sleep Medicine. I am Dr. Stuart Quan, Editor of the *Journal*. This Podcast is a regular feature of each issue of the *Journal* and can be downloaded at the Journal's website. Each Podcast features summaries of important articles published in the current issue of the *Journal*, as well as occasional interviews with authors of these papers.

The June 15 issue of the *Journal* features three articles related to sleep problems after traumatic head injury. The first paper is entitled, "Prevalence and Consequences of Sleep Disorders in Traumatic Brain Injury" by Richard J. Castriota, Mark C. Wilde, Jenny M. Lai, Strahill Atanasof, Brent E. Masel and Samuel T. Kuna from the University of Texas Health Science Center at Houston, Memorial Herman Hospital Sleep Disorders Center in Houston, The University of Texas Medical Branch at Galveston, the Transitional Learning Center at Galveston, The University of Pennsylvania School of Medicine and the Philadelphia Veterans Affairs Medical Center. In their introduction, the authors review evidence that cognitive dysfunction is a well known problem after traumatic brain injury and is a major factor preventing return to independent living, social readaptation and vocational pursuits. At the same time, sleep disorders and narcolepsy are associated with some degree of cognitive dysfunction. The authors further indicate that there is relatively little literature linking cognitive dysfunction to hypersomnolence in traumatic brain injury. Thus, the purpose of their study was to examine the prevalence of sleep disorders in a prospectively sampled group of patients with traumatic brain injury, to explore the relationship between the presence of sleep disorders, injury characteristics and variables related to their subject population, and finally to evaluate the impact of sleep disorders on cognitive dysfunction, mood state and quality of life after traumatic brain injury.

To accomplish this task, the authors recruited 87 subjects who were at least three months post-traumatic brain injury from three academic medical centers. These subjects then underwent a standard nocturnal polysomnogram, a multiple-sleep latency test on the subsequent day and a brief neuropsychological evaluation. The authors found that 54% of their population had a normal polysomnogram and multiple-sleep latency test. However, 23% were diagnosed with obstructive sleep apnea, 10% with post-traumatic hypersomnia, 5% with periodic limb movements in sleep and 5% with narcolepsy. One of the subjects had both obstructive sleep apnea and periodic limb movements. In those diagnosed with sleep apnea, the mean apnea-hypopnea index was 26.1 events/hr of total sleep time. 26% of the sample had excessive daytime sleepiness, as documented by a multiple-sleep latency test score of

less than 10. There was no correlation between injury severity, the presence of CT scan findings at the time of injury and the Glasgow coma scores at the time of injury and daytime sleepiness. Not surprisingly, obstructive sleep apnea was more common in those who were obese, and sleepy subjects demonstrated worse performance on the psychomotor vigilance test. They also had better self-reported quality of life but no difference in a test of mood states. The authors concluded that there was a high prevalence of sleep-disorders and excessive daytime sleepiness in individuals who had traumatic brain injury and that consideration should be given to having these individuals undergo a comprehensive sleep evaluation.

The second paper in this issue of the *Journal* on the subject of traumatic brain injury is entitled, "Sleep Disorders In Chronic Traumatic Brain Injury" by Arunima Verma, Vivk Anand and Narayan P. Verma from the B.G. Tri-County Neurology and Sleep Clinic in Warren, MI. This study was a retrospective analysis of 60 adult patients who presented with sleep-related complaints three months to two years following traumatic brain injury. None of these patients had had a known history of sleep-related complaints prior to their brain injury. 54 of these individuals had undergone polysomnography and 28 had also undergone multiple-sleep latency testing. Severity of brain injury was assessed by a global assessment of functioning scale and patients were administered the Epworth Sleepiness Scale, Beck's Depression Inventory and the Hamilton Anxiety Index. The authors found that the Epworth Sleepiness Scale was elevated to a score of >11 in 52% of their subjects. 50% of the subjects had a presenting complaint of hypersomnia, which was explained primarily by the presence of obstructive sleep apnea, narcolepsy and periodic limb movement disorder. However, insomnia was a presenting complaint in 25% of the subjects. Parasomnias, with REM sleep behavior disorder being the most common, was present in the other 25% of the subjects. Although a retrospective study, this paper nevertheless demonstrates that sleep disorders are common in individuals who have had traumatic brain injury. The spectrum of sleep disorders in this population is wide ranging including not only obstructive sleep apnea but insomnia and parasomnias as well.

The third paper on traumatic brain injury in this issue of the *Journal* is entitled, "Hypersomnia Following Traumatic Brain Injury." The authors were Nathaniel F. Watson, Sureyya Dikmen, Joan Machmer, Michael Doherty and Nancy Temkin from the University of Washington in Seattle. Their study was a prospective cohort study in 514 consecutive patients with traumatic brain injury, 132 non-cranial traumatic controls and 102 trauma-free controls to determine the prevalence and natural history of sleepi-

ness following traumatic brain injury. Sleepiness was ascertained by extracting four items from the Sleep and Rest Scale of the Sickness Impact Profile, which is a health-related quality of life instrument. The participants were drawn from 3 longitudinal investigations of outcome following traumatic brain injury. These were the behavioral outcome of head injury, patient characteristics and head injury outcome and the phenytoin prophylaxis of post-traumatic seizures studies. The authors found that one month after traumatic brain injury, 55% of brain injured subjects endorsed at least one sleepiness item, in comparison to 41% of traumatic controls and 3% of trauma-free controls. However, one year after traumatic brain injury, 27% of traumatic brain injury subjects endorsed at least one sleepiness item in comparison to 23% of traumatic controls and 1% of trauma-free controls. Sleepiness was more severe in those traumatic brain injury patients who had greater injury severity, as based on the time to follow commands one month post injury. One year later, sleepiness had decreased in most subjects with the traumatic brain injury cohort demonstrating the greatest improvement over the course of a year following brain injury. Nevertheless, a significant number of brain-injured patients, as well as traumatic-control patients, were sleepy one year after their injury. The authors conclude that sleepiness is common following traumatic brain injury. In addition, those with more severe injury have greater degrees of sleepiness. Nevertheless, most individuals will improve over the course of a year although significant sleepiness is persistent in some subjects.

Also in this issue of the *Journal* is a paper entitled, "The Treatment of Parasomnias With Hypnosis: A Five-Year Follow Up Study" by Peter J. Hauri, Michael H. Silber and Bradley F. Boeve from the Mayo Clinic Sleep Disorders Center in Rochester, MN. In this study, 36 patients who had hypnotherapy for parasomnias between 1994 and 2000 were followed by questionnaires for up to five years. Specifically excluded were those individuals with a high likelihood that the parasomnia was related to another disease entity or sleep disorder, such as REM sleep behavior disorder, nocturnal epilepsy or obstructive apnea. These patients underwent hypnosis during one session for approximately 50 minutes, with nine patients also having a second session. A follow-up 30 minute session was scheduled two weeks after they hypnotherapy, but 21 of the patients canceled their follow up appointments. A one-page questionnaire was sent one month, 18 months and five years after their hypnosis therapy to determine whether the patients responded to therapy.

The authors found that the questionnaire response rate was 75% for the one-month follow up, 72.7% for the follow up at 18 months and 62.2% at the five-year follow up. At the one-month follow up, 45.4% of patients were at least "much improved" and this response rate was relatively unchanged over the ensuing five years. However, because of the attrition rate in follow up over the five years, a further analysis was done with the 18 patients who completed all three follow-up questionnaires. There were nine patients who initially responded successfully to hypnosis and five of these continued this response for the next five years. The other four patients had a relapse. Of the nine patients who did not respond to the hypnosis after one month, three patients spontaneously improved and six remained symptomatic without improvement. Thus, the five-year response rate was 28%. The authors suggest that, given the "brevity" of the hypnosis therapy and the success rate reported, hypnotherapy might be a treatment of choice for patients with this type of parasomnia.

Next is an interview with Dr. Andreas Theodorou who is Professor of Clinical Pediatrics and Chief, Pediatric Critical Care Medicine at the University of Arizona College of Medicine in Tucson, AZ. He also is a member of the Arizona Governor's Council on Traumatic Brain and Spinal Injury. Along with his co-author, Dr. Sidney Rice, he wrote an editorial concerning 3 articles on traumatic brain injury in this issue of the *Journal*.

**SQ:** Andy, welcome to the JCSM podcast and thank you for agreeing to be interviewed.

**AT:** Thank you, Stuart, it's a pleasure to be here.

**SQ:** How common is traumatic brain injury?

**AT:** Actually, it's quite common. The CDC shows that over 1.4 million people a year suffer from traumatic brain injury. Fortunately, the majority of those are mild or moderate head injuries but it's significant because, even mild head injury can lead to significant long-term problems.

**SQ:** What are the common sequelae of individuals who suffer from traumatic brain injury?

**AT:** The ones that have severe brain injury have the more obvious injuries, such as the difficulties in walking, talking, eating--obvious cognitive function abnormalities, being unable to talk, eat and swallow. Those are the obvious problems. The more subtle problems, and these are the problems we see in the milder head injuries, are chronic headaches in otherwise "normal" people. You have loss of memory or decreased memory, so it's not so obvious. You have some cognitive problems, like someone that was a wizard in math and now has problems. There are also personality problems. There is the individual that has perfect motor skills--no outward scars of any kind and they look great, but they're different. We have families that have come and talked to us after being in the intensive care unit. They walk in with their family member, who looks terrific and we're high-fiving, thinking what a great job we did with this brain injury and the parents will tell us, "But, you know, they're different. They're not the same child we brought in. We're happy we have him. We're excited they're alive but they're not the same." Their personality has changed. Behavior is different. Impulsivity is a big problem. Attention deficit disorders and hyperactivity are very common after traumatic brain injury and these are things that can change a life, change a lifestyle, even if you walk and talk just fine.

**SQ:** Thank you. After reading the papers in this month's journal, why do you think that more sleep evaluations are not ordered in these patients?

**AT:** It's interesting. If you think about it, I just went through some of the common things that are side effects of brain injury. These are things we talk about, and I didn't mention sleep disorders. I probably should have mentioned it to you but I think that's the problem. It isn't one of the things we bring up right away. Even experts that deal with brain injury don't evaluate it, don't consider it. In fact, one of the papers was quite interesting. It evaluated all patients with a brain injury rather than those that had a complaint of a sleep disorder. So all patients were looked at and they found substantial sleep disorders, even when there was no complaint. I guarantee you if the practitioner doesn't question specifically looking for a sleep abnormality of some kind it's not going to be brought up. I think it just hasn't been well recognized in the past. Plus, the thing to remember about brain injury and brain injury recovery is that the problem is a longitudinal problem. It's not the same month to month, or year to year even. The

patient changes and it's hard to identify and treat a problem that's continually changing. Early on in the recovery, some of the more severe brain-injury related problems catch people's attention. Maybe some of the more obvious motor problems or the more obvious cognitive problems catch people's attention and you try to deal with it. So the sleep disturbance is completely missed. Or it's so low on the totem pole of problems, it's just not evaluated. The easiest way to treat the sleep problem, quite frankly, is being medicated and not properly identified, so you hide the problem further.

**SQ:** So, do you think that more sleep evaluations are indicated in these patients?

**AT:** Absolutely. I think the importance of the articles presented, which adds to our understanding of the sleep disorders associated with traumatic brain injury, suggests that they're complicated. It's not one consistent problem. Which means there is no one consistent treatment. So a properly evaluated patient will get presumably better treatment. So I believe we should be doing formal sleep studies much more frequently than we are. And tied into that I think we should study the long-term affects of proper diagnosis and, therefore, a more focused treatment for sleep disorder.

**SQ:** So if we want to order more sleep evaluations on these patients, how soon do you think after their injury do you think this should occur?

**AT:** Everybody's a little different. The mild head injuries, the ones that have always walked and talked just fine, that are left with either cognitive problems or issues which could be primarily sleep, they should be tested relatively early. Probably by three months. The reason why I wouldn't say right away is because of the change I described earlier. The changes that go on after traumatic brain injury, at least in mild injury, could be very quick. One day is different than the next. So I think you don't want to test in that real early phase. But after three months, it's probably fair. And in a more severe injury, probably after six months it's fair. By that time, their recovery is going to be on a plateau and it would make sense to test them.

**SQ:** You think then that we probably need more research in this area, I guess?

**AT:** No question about it. It's logical that if you better diagnose a problem and aim your treatment, that your outcome will be better. But in brain injury, the outcome isn't just the sleep itself. The outcome we want to test is total recovery from the brain injury and to show that I think we need proper studies.

**SQ:** Well, thank you very much, Andy. This has been a conversation with Dr. Andreas Theodorou, who wrote an editorial in this issue of the *Journal of Clinical Sleep Medicine*, commenting on several articles published on sleep and traumatic brain injury. Thank you, Andy.

**AT:** Thank you, Stuart.