Sleep Related Violence

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Conflict of interest

- Nothing to declare.
“In all of us, even in good men, there is a lawless, wild-beast nature which peers out in sleep.”

- Plato- The Republic
The Kenneth Parks Case

- 1987 high profile murder case in suburban Toronto.

- While sleepwalking, he drove 20 km from Pickering to the home of his in-laws in Scarborough, entered their house with a key they had given him and using a tire-iron bludgeoned his mother in law to death and attempted to choke his father in law.
The Kenneth Parks Case

- He left the home, got back in his car, and despite being covered with blood, drove to a nearby police station and turned himself in stating “I think I have killed some people”.
- Was found not guilty given that in this case sleep walking was legally considered a non-insane automatism, and left the courtroom a free man.
- His sleepwalking has remained settled with medication and he recently (2006) ran for a school board trustee position in Durham.
IT IS SAD, ISN'T IT? AT A TIME WHEN THEY SHOULD BE DOING SOME CROWING ABOUT LAST YEAR, THEY'VE SPENT TWO WEEKS DEFENDING THE YEAR BEFORE!

I'VE GOT IT. HE WAS SLEEPWALKING!

IN HIS CAR?

HE HAD A SLEEP DISORDER.

BETTER.
Parasomnias: Definition

- Undesirable physical or experiential phenomena that occur exclusively during the sleep period or are exacerbated by sleep.

– Mahowald
Parasomnias: Classification

- ICSD-1 Classification
  1. Disorders of Arousal (arising from NREM sleep-specifically SWS).
  2. Sleep-Wake Transition Disorders.
  3. Parasomnias usually associated with REM sleep.
  4. Other.
Parasomnias: Practical Classification/Differential Diagnosis

- **Primary:**
  - NREM (Disorders of arousal): Sleepwalking, sleep terrors, confusional arousals, sleep related eating, sleep related sexual behaviors
  - REM: REM behavior disorder

- **Secondary:**
  - Neurological: Seizures (partial complex, frontal)
  - Medical: GERD, cardiac arrhythmia, etc.
  - Psychogenic: dissociation, malingering
Parasomnias: Prevalence

- Prevalence of disorders of arousal in **adults**: 3-4% (occur weekly in 0.4%).
  - Hublin et al, 1997 (n=11,000)
  - Ohayon et al, 2000 (n=13,000)

- Prevalence of disorders of arousal in **children**: > 15%.

- **Genetic loading** for disorders of arousal:
  - 10X greater incidence in first degree relatives
  - Monozygotic twin concordance 6X > than dizygotic
Parasomnias: Three States of Being
Parasomnias: Background

- REM, NREM and Wake are not mutually exclusive states. The declaration of state is not necessarily “all or none”. The various components of sleep and wakefulness may dissociate or oscillate rapidly.

- Simultaneous admixtures of the clinical and neurophysiological elements of the three states of being (REM, NREM, Wake) exist.
Probable factors promoting state dissociation

• State generation is complex involving various neurotransmitters, neuromodulators, neurohormones, and an array of “sleep factors” acting on multiple neural networks.

• Some identical neuronal groups are extremely active in more than one state.
Evidence for state dissociation

• Hypothalamic, thalamic, and brainstem stimulation induces state dissociation.

• Manipulation of the cholinergic/glutaminergic transmitter systems results in a variety of state dissociations.
Evidence for state dissociation

- Evidence of naturally occurring state dissociations in animals i.e. clinically wakeful behavior during physiological sleep:
  - Concurrence of swimming or flight during sleep in birds.
  - Unihemispheric sleep in some aquatic mammals
Violent sleep related behaviors: Prevalence

- Not well studied:
  - 2% (Ohayon et al, 1997) n=5000
    - Most were assumed to be disorders of arousal; a minority were REM behavior disorder.
Documented incidents of sleep related violence

1. Sleep terrors/sleep walking with either self injury or assault.
2. Sleep related sexual assault.
3. Homicide and attempted homicide while sleepwalking.
4. Homicide and other crimes with sleep inertia.
5. Suicide (pseudosuicide) and fear of committing suicide.
Parasomnias associated with sleep related violence

1. **Disorders of arousal**
2. REM behavior disorder
3. Nocturnal Seizures
4. Psychogenic dissociation
5. Malingering
Disorders of Arousal: Common Clinical features

- Partial arousal from SWS (sometimes Stage N2) therefore:
  - Usually in first one-third of night (but not always).
  - Frequency decreases with increase in age.
- Often positive FHx of the same or another disorder of arousal.
- Duration usually < 15 minutes.
- Inconsolability (attempts to console or awaken may prolong event).
- Completely or partially amnestic for episode.
- Vivid dream like mentation may be present.
- Onset in adulthood not necessarily indicative of psychopathology.
Disorders of Arousal: Precipitants

- Stressors
- Sleep deprivation
- Alcohol
- Substances or medications (Zolpidem, Zopiclone, and many other psychotropics, especially combinations)
- Febrile illness
- Essentially anything that fragments (SWS or Stage N2) sleep e.g. other sleep disorders
Disorders of Arousal: Types

- Confusional arousals
- Sleep Walking
- Sleep Terrors
- Sleep related eating
- Sleep related sexual behavior
Disorders of Arousal: Confusional Arousals

- Usually brief mild form of disorder of arousal- most frequent.

- Abrupt onset with confusion and disorientation, often with complex and inappropriate motor and verbal behaviors.

- E.g. Sitting up in bed, gesturing and speaking, then lying back down with no recall of this behavior.

- “Normal” examples:
  - answering phone in sleep, conversing, and not recalling.
  - Arousing to alarm clock, turning it off, resuming the sleeping position, and on fully awakening later being frustrated alarm didn’t ring.
Disorders of Arousal: Sleep Walking

- Initiated by patient sitting up in bed and progressing to leaving the bed and walking about.

- Usually returns to bed at end of episode and resumes sleeping position.

- Motor behavior may be complex i.e. urinating on a plant, walking out of the house, driving a car.
Types of behavior in sleep-walkers who have injured themselves

- 54% Repeatedly fallen out of bed/run into walls/furniture
- 19% Jumped out of windows
- 19% Left home and driven automobile
- 7% Wielded weapons
  - n=54 Schenck et al, 1989
Disorders of Arousal: Sleep Terrors

- Initiated by patient sitting up abruptly, loud scream, associated with panic and very prominent autonomic/motor/verbal activity.
- Usually resumes sleeping position at completion of episode.
- Occasionally continues into prolonged semi-purposeful or apparently purposeful verbal and motor behaviors (eg. running around bedroom, leaving the house screaming).
Disorders of Arousal: Sleep related eating

- Specific variant of complex sleep walking.
- Specific goal directed behavior of walking to kitchen and eating (occasionally unusual combinations of foods).
- May note evidence next morning.
- May eat in a driven compulsive fashion with diminished sense of control.
- Not usually associated with waking eating disorders.
- Unexpected weight gain.
Disorders of Arousal: Sleep related sexual behavior ("Sexomnia")

- Specific variant of complex parasomnia.
- Specific goal directed behavior of initiating sexual activity.
- Sexual arousal with autonomic activation usually present (i.e. erection, ejaculation, cardiorespiratory response).
- Dream-like mentation often present.
- Predominantly adult males.
- Must be differentiated from normal sexual phenomena in sleep e.g. erections, nocturnal emission/lubrication.
Highly complex emotional and motor behaviors can originate from the brainstem and other ‘primitive’ neural structures without involvement of higher structures such as the cortex.

- Decorticate experimental and barnyard animals are capable of performing very complex, integrated motor acts).
- Generators of many components of REM and NREM sleep reside in brainstem near the locomotor centres.
Disorders of Arousal: Neurobiology

• Sleep related violence in a disorder of arousal may be similar to “sham rage” in animals with hypothalamic lesions. (Some have suggested that these animals are behaviorally awake yet partially physiologically asleep.)
Sleep Inertia (Sleep Drunkenness)

- Normal phenomenon.
- Period of impaired performance and reduced vigilance as one transitions from sleep to wake in the morning or after a nap.
- Averages ~ 1 hr. in normal non-sleep deprived individuals. Worse with sleep deprivation.
Sleep Inertia (Sleep Drunkenness)

- May be accompanied by microsleep episodes on PSG. Other neurophysiological evidence supports delay in fully defined wakefulness, despite apparent full clinical wakefulness.
- Considerable inter-individual variation in duration/extent.
Sleep Inertia (Sleep Drunkenness)

- May have workplace/forensic implications (e.g. erroneous decision during a middle of the night phone call, error after awakening from a scheduled nap in workplace, shoplifting after a nap).
- May represent the “confusional arousal” potential in all of us.
Parasomnias associated with sleep related violence

1. Disorders of arousal
2. REM behavior disorder
3. Nocturnal Seizures
4. Psychogenic dissociation
5. Malingering
REM Behavior Disorder

- Almost exclusively in elderly males.
- Vivid, action-packed, violent dreams.
- Dramatic, potentially violent dream enacting motor and verbal behavior occurring during sleep—usually 2nd ½ of night.
- Patient awakens fully after (usually very brief) episode and recalls dream mentation which clearly correlates with observed motor and verbal behavior.
REM Behavior Disorder

- Can result in sleep related injury to patient or bedpartner.
- Readily diagnosable (on PSG) and treatable.
- Only recently described (1982).
- Prodrome (years): ↑ sleep related motor (limb twitching, kicking) and verbal (swearing and yelling in sleep) behavior.
REM Behavior Disorder: Neurobiology

- Failure of the normal atonia that occurs in REM sleep thus to some extent, patients are able to act out their dreams.

- Probably due to neuronal loss at peri-locus coeruleus α; evidence for this is that RBD occurs with increased frequency in Parkinsonism (~80% of RBD cases progress to Parkinsons), other neurodegenerative disorders, and CVA.
Clinical and Lab Evaluation of Sleep Related Violence

• Comprehensive sleep history including interview of bed partner and victim if available.
• Thorough general physical, neurological, and psychiatric examination.
• Extensive polysomnographic study including:
  – Expanded EEG montage at paper speed of 15 mm/sec.
  – EMG monitoring of all four extremities.
  – Continuous audiovisual recording.
  – May require more than one night to “capture” behavior.
The lack of utility of polysomnography in forensic cases involving Disorders of Arousal

• Primary reason for polysomnography (PSG) in such cases is to rule out:
  – Causes other than disorders of arousal eg. nocturnal seizures, RBD, dissociative states.
  – Other sleep disorders which may precipitate disorders of arousal such as OSA.
• Short of capturing an event on a sleep study there are no PSG findings which conclusively indicate that a given individual is prone to a disorder of arousal.
The lack of utility of polysomnography in forensic cases involving Disorders of Arousal

- Even if an event is captured, given the high prevalence of disorders of arousal in the general population, that observation is of no value in “proving” a previous forensic event was a disorder of arousal.
Two key questions in forensic cases involving NREM parasomnias (disorders of arousal)

1. Is it conceivable that such a complex, protracted, violent or illegal behavior could have occurred during a period of sleepwalking and therefore be without conscious awareness or responsibility?
   - *Often answer is “yes”*

2. Is that what occurred at the time of the illegal or violent act?
   - *Can never be definitively known*
Forensic sleep medicine experts as impartial friends of the court (amicus curae)

• “expert witnesses” retained by defense or prosecution may pervert scientific evidence to bolster “their side” resulting in “junk science” and “junk verdicts”.

• AASM and AAN have established guidelines for expert witness qualifications and testimony.

• suggested that sleep medicine specialists serve as court appointed impartial experts to scientifically educate the court, rather than act as hired guns.
Further questions regarding Sleep Related Violence

- How can these disorders be most accurately diagnosed?
- Is there a prodrome for sleep related violence?
- Why the male predominance?
- How can these disorders be best treated or prevented?
- What to do with the offender?
- How to protect a potential victim?
- What is the likelihood of recurrence?