

The Parasomnias: Epidemiology, Clinical Features, and Diagnostic Approach

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KEYWORDS

- Parasomnias • Confusional arousals • Sleepwalking
- Night terrors • Nightmares • RBD and sleep paralysis

Parasomnias are a group of disorders exclusive to sleep and wake-to-sleep transition that encompass arousals with abnormal motor, behavioral, or sensory experiences.¹⁻³ Sensory experiences often involve but are not limited to perceptions, dreamlike hallucinatory experiences, and autonomic symptoms. When accompanied with excessive motor activity and other complex motor behaviors, these parasomnias can be disruptive to the patient and bed partners. Motor behaviors may or may not be restricted to bed but can become dangerous when the subject ambulates or is agitated. In some parasomnias, it may be injury or concerns for physical injury to the patient or bed partner that brings them to the attention of physicians. The other presentations include disrupted nocturnal sleep of patients, bed partners, or family members sharing the sleeping quadrant. The behaviors are inappropriate for the time of occurrence but may seem purposeful or goal directed. In general, most parasomnias are more common in children and decrease in frequency as they get older.⁴⁻⁶ Parasomnias have been reported in approximately 4% of the adult population.⁷

These complex motor behaviors occurring during sleep may have medicolegal implications, as violence could be a prominent component as

documented in the case of Canadian Supreme Court case *Her Majesty the Queen v Kenneth Parks* and in the State Supreme Court case *State of Arizona v Scott Falater*. The incidence of violent behavior during sleep is generally presumed to be low, but recent reports indicate a prevalence of up to 2% in adults.⁸ Sexual differences have also been noted in other parasomnias such as rapid eye movement (REM) sleep behavior disorder (RBD) and sleep-related eating disorder. Complex behaviors with sexual acts have been implicated in cases of sexual assault and rape.

PATHOPHYSIOLOGY

Sleep can be broadly divided into non-REM (NREM) and REM sleep. NREM sleep is further divided into stage N1, stage N2, and stage N3 (slow wave sleep). Sleep stage shift is not a complete on-off switch phenomenon, but involves reorganization and transition of various neuronal centers for an equivocal stage to declare itself.^{1,2} During this period of reorganization (a unique state of sleep dissociation) an admixture of 2 or 3 different states of being is observed. **Fig. 1** depicts the conceptualization of the overlapping states of being leading to parasomnias.⁹ It is usually an arousal during these periods of

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Nocturnal Spells: overlapping states

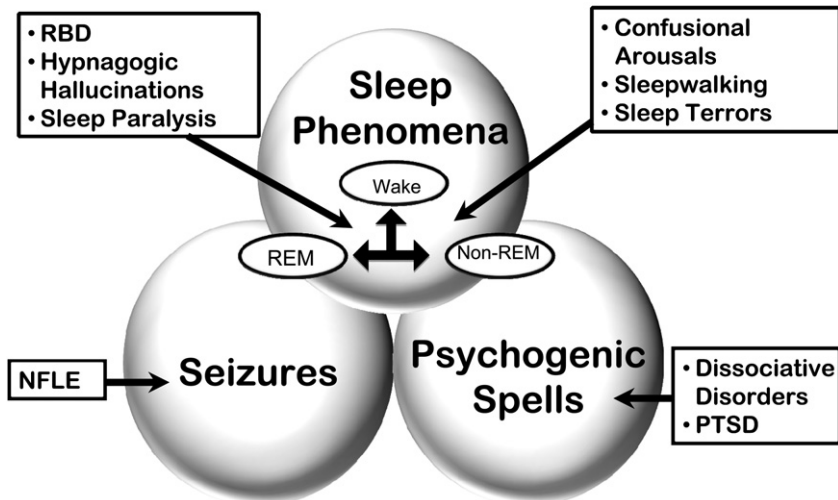


Fig. 1. Overlapping states of being. Parasomnias are explainable on the basic notion that sleep and wakefulness are not mutually exclusive states but may dissociate and oscillate rapidly. The abnormal admixture of the 3 states of being (NREM sleep, REM sleep, and wakefulness) may overlap, giving rise to parasomnias. REM parasomnias occur because of the abnormal intrusion of wakefulness into REM sleep and likewise NREM parasomnias such as sleepwalking occur because of abnormal intrusions of wakefulness into NREM sleep. Other nocturnal spells that may be confused with parasomnias include NFLE and psychogenic spells such as posttraumatic stress disorder (PTSD), dissociated disorders. (Modified from Mahowald MW, Schenck CH. Non-rapid eye movement sleep parasomnias. *Neurol Clin* 2005;23(4):1078, vii; with permission.)

reorganization that leads to complex motor behavior during sleep.^{2,10}

Another hypothesis is the deafferentation of the locomotor centers from the generators of the different sleep states. Locomotor centers are present at spinal and supraspinal levels and this dissociation can explain motor activity or ambulation, especially in patients with disorders of arousals.¹¹

Central pattern generators, which are located in the brain stem and spinal cord, are believed to be responsible for involuntary motor behaviors classified into:

- Oroalimentary automatisms, bruxism and biting;
- Ambulatory behaviors, ranging from the classic bimanual-bipedal activity of somnambulism to periodic leg movements; and
- Various sleep-related events associated with fear, such as sleep terrors, nightmares, and violent behaviors.¹¹

CLASSIFICATION OF PARASOMNIAS

NREM Parasomnias

The International Classification of Sleep Disorders 2nd Edition (ICSD-II) categorizes NREM parasomnias (disorders of arousals) into 3 broad categories

(**Fig. 2**)¹²: confusional arousals, sleepwalking, and night terrors. These share several common features (such as having increased predilection in children, decreasing with age, and occurring in the first half of the night, typically within the first 2 hours of sleep) but have certain unique features: inconsolable crying and autonomic hyperactivity in night terrors and ambulation in sleep terrors, which helps differentiate them.

Confusional Arousals

Case history: A 56-year-old man with history of traumatic brain injury and noncompliance with positive airway pressure therapy for his sleep-disordered breathing, began experiencing nocturnal spells as frequently as multiple times per night, primarily during the first half of the night. These spells were characterized by sudden arousals associated with confusion and singing behavior.

During the diagnostic nocturnal polysomnogram (PSG) video recording (**Fig. 3**), multiple similar spells of arousals with confusion, along with side-to-side head movements, arm flapping, and talking occurred exclusively from NREM sleep, and in 1 event he was reported by the sleep technicians to be “quacking like a duck.”

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