Differentiating Seizures from Other Paroxysmal Nocturnal Events in Young and Older Adults

Christopher P. Derry, MB BS, MRCP, PhD

KEYWORDS

• Parasomnia • Nocturnal frontal lobe epilepsy • Sleep
• Epilepsy • EEG • Video

One of the important questions sleep clinicians and technologists ask when observing paroxysmal motor events during a polysomnogram (PSG) is whether this could be an epileptic seizure. Answering this question is often not straightforward. Clear descriptions of events are often lacking, because witness accounts are often absent or incomplete. Although nocturnal tonic-clonic seizures have characteristic features and are usually not difficult to diagnose (particularly if witnessed), partial seizures may cause more problems. Frontal lobe partial seizures during sleep are most likely to cause diagnostic confusion, especially when these occur predominantly or exclusively from sleep (so-called nocturnal frontal lobe epilepsy [NFLE]). Distinguishing them from nonepileptic parasomnias can be challenging.

An appreciation of the range of epileptic and nonepileptic sleep disorders, their clinical characteristics, and the use and limitations of investigations in this setting assists the clinician in reaching the correct diagnosis; these are reviewed in this article.

PAROXYSMAL NOCTURNAL EVENTS: THE DIFFERENTIAL DIAGNOSIS

There are several epileptic and nonepileptic conditions that should be considered in the patient with paroxysmal events in sleep.

Sleep-Related Seizures

Four main seizure types may occur predominantly or exclusively from sleep: generalized tonic-clonic, complex partial seizures of frontal lobe onset, complex partial seizures of temporal lobe onset, and tonic seizures. The characteristic features of these are discussed later.

Tonic-clonic seizures

Tonic-clonic seizures from sleep are usually easily diagnosed if collateral history is available from a bed partner or another witness. The characteristic progression of a tonic-clonic seizure is well described.[1] There may be an initial cry, followed by jaw clenching and cessation of respiration associated with tonic limb extension in which the limbs are usually extended. This tonic phase is followed by clonic jerking of the limbs, usually symmetric in nature, ending with a deep inspiration and subsequent stertorous breathing. A tonic-clonic seizure usually lasts 1.5 to 2.5 minutes. After the seizure, there is initially stupor, followed by confusion lasting minutes. Often this is followed by a return to sleep.

Even if no witness account is available, tonic-clonic seizures may be associated with tongue biting (usually on the lateral aspect) and urinary incontinence; evidence of such features on waking should raise the suspicion that a tonic-clonic

Conflicts of interest: The author has none to disclose.
Financial disclosures: The author has none to disclose.
Department of Clinical Neurosciences, Western General Hospital, Crewe Road, Edinburgh, EH4 2XU, UK
E-mail address: cderry@nhs.net

Sleep Med Clin 7 (2012) 113–123
doi:10.1016/j.jsmc.2011.12.006

seizure occurred, particularly if associated with generalized myalgias and unusual fatigue, headache, amnesia, or malaise.

Frontal lobe seizures

Complex partial seizures arising from the frontal lobes can cause diagnostic confusion, because the features range from subtle to dramatic or bizarre.[2] Most individuals with frontal lobe epilepsy (FLE) have a significant proportion or all of their events during sleep. NFLE is the diagnosis if 90% or more of the seizures arise from sleep. Frontal lobe complex partial seizures are usually characterized by an abrupt, often explosive-onset, awakening of the patient from non–rapid eye movement (NREM) 2 sleep accompanied by sustained asymmetric dystonic, tonic posturing, violent hypermotor behaviors, thrashing, pedaling, and/or kicking of the lower extremities. Patients are often aware during the seizure, but say they cannot control their movements or vocalizations.

Other motor automatic movements (automatisms) that may be seen include prominent bimanual and bipedal movements, such as bicycling or kicking movements of the legs, hand clapping, and/or leg slapping. Some stand, walk, or run during the seizure, although they rarely wander far. Axial body movements, such as rocking, thrashing, running (often in an apparently agitated or distressed manner), sitting up, and head nodding are also common. Automatisms in some patients have a semipurposeful quality.[3] Sexual automatisms, such as pelvic thrusting and genital manipulation, are sometimes observed.[4]

Vocalization is common, and often consists of unintelligible screaming or moaning. Some individuals exhibit palilalia (repeating their own words) or scream obscenities; others breathe strangely but without vocalization.[3] The seizure often wakes the patient from sleep, and consciousness may be preserved during it. Some report that a brief aura wakes them, often nonspecific or sometimes an unpleasant choking sensation.[5] Although some complex partial frontal lobe seizures may include tonic postures or clonic movements, reflecting involvement of the supplementary motor area or primary motor cortex respectively, many do not and are characterized by automatisms only.

The seizures of NFLE are often characterized by paroxysmal attacks of increasing complexity and duration. Minor attacks are characterized by stereotyped limb, axial musculature, and/or head movements that typically last 2 to 4 seconds.[2] Paroxysmal arousals consist of abrupt, stereotyped arousals from sleep accompanied by trunk and head elevation often with vocalization and frightened expression that often last only 5 to 10 seconds. Major attacks (formerly called nocturnal paroxysmal dystonia) typically last 20 to 30 seconds and are characterized by stereotyped asymmetric tonic or dystonic posturing, bizarre hyperkinetic behaviors, bipedal automatisms, axial movements of the trunk and pelvis, vocalization, and tonic or dystonic posturing. Episodic nocturnal wanderings are uncommon, characterized by agitated ambulation, screaming, and sometimes semipurposeful automatisms.[6]

Patients rarely have a single type of attack. Smaller episodes are usually considered fragments of larger seizures,[2] and all events are considered to be manifestations of the same underlying epileptic process.[7] These can be difficult to distinguish from nonepileptic arousals.[8] They may occur repetitively and frequently throughout the night, and are often underreported, with some individuals being unaware of the episodes.[2]

Temporal lobe seizures

Between 50% and 80% of patients with temporal lobe epilepsy (TLE) report that some of their seizures occur during sleep,[9] although seizures in TLE more often occur when awake. Secondarily generalised tonic clonic seizures (GTC) in TLE occur most often during sleep, with partial seizures more common in wakefulness. Exclusively nocturnal TLE is uncommon.[10] Individuals with nocturnal TLE are usually woken by a typical temporal lobe aura (autonomic, experiential, or special sensory) that progresses to a complex partial seizure characterized by expressionless staring with minor oral or limb automatisms. Although TLE should be considered in the diagnosis of paroxysmal nocturnal events, in my experience, diagnostic difficulty is less common than for FLE because they usually have seizures awake, interictal epileptiform discharges (IEDs) awake and asleep, and their seizures are accompanied by ictal electroencephalogram (EEG) patterns.

Tonic seizures

Tonic seizures occur predominantly in individuals with learning disability and symptomatic generalized epilepsy, particularly Lennox-Gastaut syndrome (LGS). LGS most often appears between ages 2 and 6 years, is characterized by frequent daily seizures of multiple types, and is usually accompanied by developmental delay and psychological and/or behavioral problems. Tonic seizures are the most frequently occurring seizure type in LGS, 90% of which occur during sleep. These seizures are typically brief, lasting only seconds, and are characterized by symmetric or asymmetric posturing of the upper limbs, often with involvement of the neck, trunk, and lower