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Narcolepsy or Gelineau Syndrome

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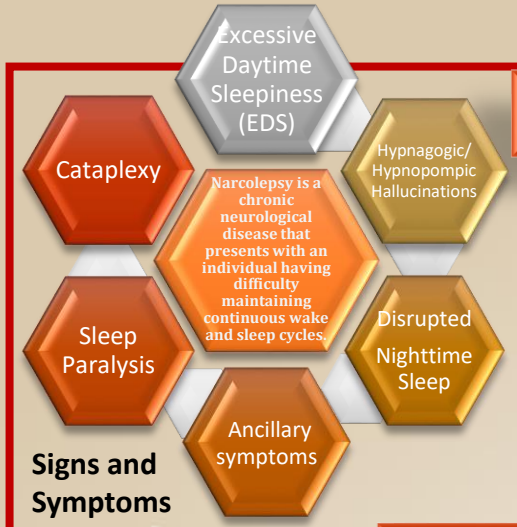


Lack of clinical awareness about different presentations in adults, children, and adolescents, often leads to misdiagnosis of narcolepsy as schizophrenia, epilepsy, and other neurological disorders resulting in the incorrect prescribing of antipsychotic medications and antiepileptic medications.

Underlying Pathophysiology

The exact cause of narcolepsy is not completely understood, however, the most current research suggests a combination of biological and environmental factors which include the following:

- Genetic predisposition
- Stochastic factors leading to the generation of potential pathogenic naïve T cells
- Inadequate central tolerance
- Cross-stimulation with various environmental mimics at the wrong developmental time
- Absence of peripheral tolerance
- Penetration of culprit T cells into the central nervous system
- Molecular mimicry
- Destruction of hypocretin neurons by CD8+ T cells or other mechanisms (Mignot, 2014, p. 331).

What has been established is narcolepsy is caused by a lack of hypocretin, also known as orexin, which is a key brain neurotransmitter produced in the hypothalamus. Hypocretin helps sustain alertness and prevent REM sleep from occurring at inappropriate times.

Airway infections caused by H1N1 influenza A and streptococcus infection are suggested triggers to the auto-immune response that takes place with narcolepsy (Lopes et al., 2015, p. 49).

Signs and Symptoms

Gelineau syndrome, or narcolepsy was named after the French neurologist Jean-Baptiste-Édouard Gélineau (1859-1906). Published by Gelineau in 1880 "the first case reports in a bookbinder and a cooper (barrel maker and seller)" (Mignot, 2014, p. 315).

The signs and symptoms of narcolepsy include excessive daytime sleepiness (EDS) in combination with rapid-eye movement (REM) sleep dissociation, and disrupted nighttime sleep. EDS is usually the first symptom, and may have been going on for some time, maybe years.

It is rare for all five symptoms to present at the same time , usually <10 percent of cases (Gupta, Sahoo, & Grover, 2017, p. 20).

Affecting males and females alike, symptoms usually begin between the ages of 10 to 20 years of age, however, onset of the disease can take place at any age. Diagnosis findings shows peaks during adolescence age 15, and a smaller peak at around 36 years of age (Gupta et al., 2017, p. 20).

Cataplexy is sudden and brief periods when the individual has a loss of muscle tone, emotionally triggered, often by laughter, fear, stress, anger or excitement. Onset of cataplexy is typically secondary to EDS, delayed by weeks, even years, and may occur multiple times per day versus once or twice in a lifetime.

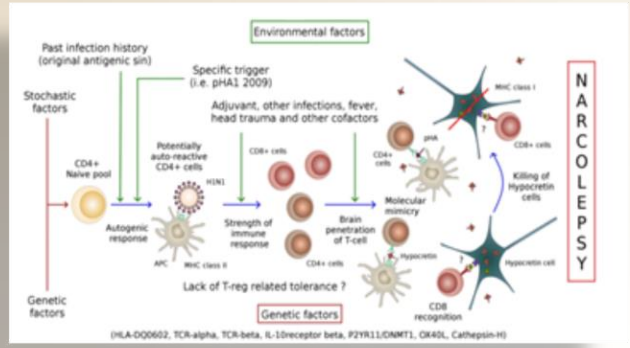
Sleep paralysis is the temporary inability to move or speak while falling asleep or waking up usually lasts only a few seconds or minutes and is similar to REM-induced inhibitions of voluntary muscle activity. Sleep paralysis resembles cataplexy except it occurs at the edges of sleep" (The National Institute of Neurological Disorders and Stroke, 2018).

Just as with sleep paralysis, hallucinations, usually visual, may be experienced when people are falling asleep or waking up, defined as hypnagogic or hypnopompic respectively, occurring in 83% of cases (Gupta et al., 2017, p.22).

While individuals may present with EDS, they typically will experience fragmented sleep, meaning they may have difficulty staying asleep at night, or sleep for short periods. "Sleep may be disrupted by vivid dreaming, sleep apnea, acting out while dreaming, and periodic leg movements" (The National Institute of Neurological Disorders and Stroke, 2018).

Ancillary symptoms may be experienced by individuals with narcolepsy but are not considered part of the diagnostic criteria. These include automatic behaviors such as when the person falls asleep during a habitual activity like eating and automatically continues the activity without awareness. When the person awakens they do not recall their actions. Recent studies show a co-occurrence of sleep and headache disorders (Mitsikostas, Viskos, & Papadopoulos, 2010).

Pathological Processes



Pathophysiological model for narcolepsy (Mignot, E.J.M, 2014, p. 331). Image retrieved from https://link.springer.com/search?query=history+of+narcolepsy

Significance of Pathophysiology

There are two major classifications of narcolepsy. Type 1 (previously known as narcolepsy with cataplexy), in which the patient will have either low levels of hypocretin or report cataplexy along with the cardinal symptom of EDS.

Type 2 narcolepsy (previously known as narcolepsy without cataplexy), in which the patient will typically have less severe symptoms, not demonstrate cataplexy, and may have normal hypocretin levels. There is a condition known as secondary narcolepsy that results from injury to the hypothalamus (The National Institute of Neurological Disorders and Stroke, 2018).

Streptococcus pyogenes and H1N1 virus may play a role in the development of auto-immunity for the hypocretin-producing cells by stimulation of T or B cells through a imitation or mimicking of molecular characteristics. Beginning with streptococci super-antigens, along with the production of auto-antibodies, general immune activation and migration of lymphocytes to the central nervous system. Perhaps these pathogens have a tropism for the hypocretin-secreting neurons, allowing activation of the microglia, and increasing the signals through the molecules of the main histocompatibility complex (MHC) class II, inducing the neurotoxicity through the release of quinolinic acid or glutaminase (Lopes et al., 2015, p.51).

The HLA-DQB1 gene provides instruction for making an important protein for the immune system, and a version of this gene called HLA-DQB10602 increases the risk of developing narcolepsy (The National Institute of Health, 2018).

Quick Facts

- 1 in 2000 individuals in the U.S. and Western Europe are affected by Narcolepsy (National Library of Medicine, 2018).
- Genetic studies have established nearly all patients (98%) with deficient hypocretin levels are positive for human leukocyte antigen (HLA) DQB1*0602 allele (Gupta et al., 2017, p.22).
- Onset of symptoms typically begin during adolescence, peak age 15 years. The birth month of March is also linked to a higher risk of narcolepsy (Watson et al., 2012).
- Onset of symptoms to diagnosis takes about 10 to 15 years (Harvard Medical School Division of Sleep, 2018).
- With both cataplexy and sleep paralysis, individuals remain fully conscious.

Implications for Nursing Care

As was profoundly stated in the article by Mitsikostas et al., "Sleep is a mirror of patients' internal life." Narcolepsy presents the same complexity as sleep disorders, and co-occurrence of other disorders such as mood disorders and headache disorders is not uncommon (Mitsikostas et al., 2010, p. 1240). Key points to appropriate narcolepsy diagnosis will be:

- A detailed medical history
- Symptom recognition
- Testing such as Nocturnal Polysomnography (PSG) followed by Multiple Sleep Latency testing (MSLT)
- Biomarker testing

There are two sets of diagnostic criteria used for diagnosis of narcolepsy: the International Classification of Sleep Disorders, third edition (ICSD-3) developed by the American Academy of Sleep Medicine, and the Diagnostic and Statistical Manual of Mental Disorders, fifth edition (DSM-5) developed by the American Psychiatric Association (designed for the general practitioner who is not an expert in sleep medicine). Both ICSD-3 and DSM-5 suggest use of hypocretin deficiency as a diagnostic criterion, but must be carefully considered since it requires a lumbar puncture, and lacks an assay that is commercially available for widespread use in clinical practice (Ruoff & Rye, 2016, p. 7).

Although there is no cure for narcolepsy, symptoms can typically be treated with medication and lifestyle changes that include taking short naps, avoiding caffeine or alcohol before bed, and no heavy meals before bedtime.

Patients with severe symptoms will need to follow state laws regulating individuals with epilepsy, particularly with driving and operating heavy machinery.

Reasonable accommodations must be made by employers as part of The Americans with Disabilities Act when it comes to modifying work schedules and workload. Accommodations would apply to children and adolescents with special needs in the school setting by modifying class schedules for administering medications, taking naps, etc. (The National Institute of Neurological Disorders and Stroke, 2018)

MEDICATIONS FOR TREATING DAYTIME SLEEPINESS IN NARCOLEPSY

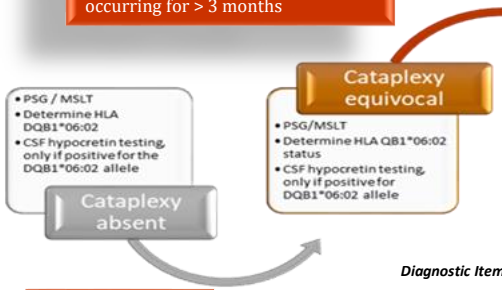
Methylphenidate (brand name: Ritalin, Concerta, Metadate, Methylin)
dextroamphetamine (Dexedrine)
mixed amphetamine salts (Adderall)
modafinil (Provigil)
armodafinil (Nuvigil)
sodium oxybate (Xyrem)

MEDICATIONS FOR TREATING CATAPLEXY IN NARCOLEPSY

venlafaxine (Effexor)
fluoxetine (Prozac)
clomipramine (Anafranil)
protriptyline (Vivactil)
sodium oxybate (Xyrem)

A detailed medication list with dose recommendations can be retrieved from https://healthysleep.med.harvard.edu/narcolepsy

Daily periods of irrepressible need to sleep or daytime lapses into sleep occurring for > 3 months



Algorithm for diagnostic Workup

Bolded criteria required to satisfy narcolepsy diagnosis. Diagnostic Items in subsequent boxes recommended but considered optional (Ruoff & Rye, 2016, p. 9).

Conclusion

Although considered rare, the neurological disorder narcolepsy presents itself in the family of the author of this academic poster. My paternal grandmother was diagnosed with narcolepsy as an adult, and although I did not know her personally, I learned from other family members the disease was quite debilitating for her. My eldest daughter was diagnosed with narcolepsy as a teen.

Research of the disease lead me to discover that misdiagnosis is a common theme with narcolepsy. As stated previously, more often than not individuals are diagnosed with emotional or psychiatric disorders and prescribed inappropriate medications, so it is my hope and purpose the poster presentation will not only aid in a better understanding of narcolepsy, but help guide clinicians to appropriate and timely medical diagnosis of narcolepsy.

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