

Editorial Commentary on Pediatric Sleep Disorders

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Detection of Apneas in Infants During Sleep: A Study Comparing Thoracic Impedance and Inductive Plethysmography

In this issue of *Sleep and Hypnosis*, Erler et al., compare the reliability of thoracic impedance and inductive plethysmography to assess respiratory movements. Respiratory efforts and chest wall/abdominal expansions are usually recorded as changes in pneumatic bellows, strain gauges or respiratory inductive plethysmographic (RIP) waveforms. RIP is a noninvasive method, directly related to tidal volume. Brouillette et al. showed that polysomnography using RIP with automatic calibration was highly accurate in detecting both central and obstructive apnea in infants and children (1). Transthoracic impedance (TI) is the usual method of recording respiratory efforts using home and hospital infant apnea monitors. Because transthoracic impedance is not capable of distinguishing obstructed from unobstructed breaths (1), it is not recommended for sleep laboratory use. Such studies as pneumograms and event recordings that are based on transthoracic impedance should not be used to evaluate obstructive sleep apnea. Infants frequently experience apnea, which may result in bradycardia or even in life-threatening events. Therefore it is very important to correctly assess and evaluate infants' respiratory movements and choose the best method in order to have the best signal reliability. Event recording, by dif-

ferentiating between true and false events, has advanced the diagnosis and management of infants on home cardiorespiratory monitors; however, the pathogenesis of many events remains obscure. The article reviewed polysomnographic studies of 52 infants (34 healthy infants recruited as part of campaign to prevent SIDS, 9 infants suffering from bronchopulmonary dysplasia and 9 infants with clinical suspicion of apnea syndrome) with simultaneous recording of RIP and TI. Authors demonstrate that RIP has a higher sensitivity for sleep apnea detection (99.5%) than TI (98.2%), but a lower specificity. They show that each method has pros and cons. Main problems of TI are misinterpretation of cardiac artifacts as apparent breathing activity, impaired detection of obstructive events and differentiation of paradoxical breathing. IP has advantages in recognizing true apneas but give a high rate of false positive.

A recent computerised audiovisual event recording system by elucidating infant behaviours, provides information complementary to that given by cardiorespiratory event recording. Infant monitors of the future should incorporate both audiovisual and cardiorespiratory data to elucidate optimally apparent life-threatening events, apnoeas and bradycardias (2).

Since no other standardized methods are actually available we should follow the suggestions given by the Authors on this article that the simultaneous use of both methods permit to achieve the best detection of apneas (near 100%). However, the final decision on which is the best method depends on indication: for impatient treatment TI provides precise detection of apneas; further TI is easier to set and costs

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are considerably lower than in IP. In the sleep laboratory the best method is IP.

Night Terrors in Children: Prevalence and Influencing Factors

The study of Schredl give lights on two debated issues on night terrors: the prevalence rate and the relationship with distressing factors. Night terrors are typical NREM parasomnias linked to a partial arousal from slow wave sleep occurring in the first part of the night. As most of the parasomnias, studies on exact prevalence rates are very scarce; prevalence rates (occurrence at least once a year) ranged from 3.5% to 6.2% and up to 40% of children have experienced at least one night terror attack during childhood.

The second debated issue is the association between stressors and occurrence of different kind of parasomnias. Parents indicated that exciting day-time experiences (over-exertion, school problems, TV consumption) may contribute to the occurrence of a night terror attack, but also the vulnerability to stress and inadequate coping strategies, on the other hand, may be the common factor in predisposition to parasomnias.

Confirming literature data this study reports a 4.0% prevalence rate of frequent night terrors and a strong association with other parasomnias such as nightmares and sleepwalking. Another interesting concern is the association with frequent nocturnal awakenings confirming data that alteration of sleep continuity could predispose to arousal parasomnias.

Confirming literature data, Authors report that the frequency of night terrors was not related to any personality dimensions but to stressful events. Occurrence of night terrors in children is strongly related to parental divorce, hospitalizations, school problems and the amount of TV consumption.

Another important issue is the observation that pediatric consultation is requested more often in case of night terrors than for other parasomnias.

Finally the Authors suggest that the etiology of night terrors is a combination of

predisposition and stress factors and that stress reduction using relaxation techniques may be a promising treatment for this kind of parasomnia, giving further support to the non-pharmacological treatment of sleep terror through training in relaxation and mental imagery (self-hypnosis).

Cognitive Effects of Sleep Apnea and Narcolepsy in School Age Children

The attempt to evaluate cognitive functions in sleep apnea and narcoleptic children and to assess differences is a fascinating issue. The paper analyses the potential cognitive dysfunctions in these two potentially lifelong disorders that lead to excessive somnolence and behavioral disorders.

Although there is ample evidence of significant diurnal difficulties associated with apnea and narcolepsy among adults, the nature and extent to which these symptoms affect pediatric populations remains unclear. Sleep apnea children experience academic difficulties, poor attention spans, morning headaches, and hyperactivity and also have markedly lower scores on measures of general memory, verbal memory, visual memory, learning abilities, and vocabulary compared to a non-apneic, clinic-referred control group. As with apnea research, the majority of published information regarding associated symptoms of pediatric narcolepsy is descriptive in nature; in adults, overall performance levels do not appear significantly different from normals, but narcoleptics have intermittent lapses in their abilities related to microsleeps.

The study of Hansen and Vandenberg is one of the first report evaluating cognitive deficits before and after treatment in 7 apneic and 7 narcoleptic children. As expected, sleep-disordered patients performed lower than standardized norms on measures of attention and memory prior to treatment as well as children with narcolepsy scored significantly below normative values on auditory attention and visual attention but not on general memory. After treatment, general memory performance significantly improved in apneic children and visual attention measure

approached statistical significance in narcoleptics and apneics while measure of verbal attention failed to show noticeable improvement.

Despite the limitations due to the difficulties of clinical research with pediatric populations, this study is the first attempt to clarify the diurnal effects of sleep apnea and narcolepsy in children.

Regarding sleep apnea syndrome, literature reports in adults showed that, after treatment, patients normalized most of their cognitive executive and learning disabilities, but all the short-term memory tests remained unchanged despite CPAP treatment for 4-6 months (3). The early

treatment in pediatric patients could lead to a long lasting improvement without residual deficits. Data on narcoleptic children agreed with the literature report of a more difficulty in maintaining attention than control subjects, as evidenced by significantly more perseveration errors (4). The evidence of partially similar cognitive deficits and complaints in apneic and narcoleptic children suggests that the similar cognitive dysfunction could be related to the presence of sleep disturbances and daytime sleepiness (5). Additional studies in this field is needed to clarify the role of sleep fragmentation the cognitive deficits of both conditions.

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