

# Polysomnographic Assessment of Nocturnal Enuresis in Adults: A Case Study of Parasomnia Overlap Syndrome With Obstructive Sleep Apnea

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## ABSTRACT

Enuresis nocturia is more prevalent in children than in adults. Using polysomnography (PSG), we investigated the causes of adult enuresis nocturia in a 20-year-old female patient with nighttime bedwetting. In spite of normal urological examinations, her detailed medical history disclosed frequent sleep paralysis and urination during dreams. During PSG, two electromyograms were attached to her anus to assess the tone of her bladder's sphincter while she slept. During REM sleep, the EMG tone of the mandible decreased, but the anal and bladder sphincter tones did not. The polysomnogram revealed moderate obstructive sleep apnea. Consequently, she was diagnosed with adult parasomnia (nocturnal enuresis) overlap syndrome with OSA. This study demonstrates the value of PSG with simultaneous anal tone EMG for diagnosing NREM parasomnia and nocturnal enuresis.

**KEYWORDS** : Enuresis nocturia; Polysomnography (PSG); Adult parasomnia.

## INTRODUCTION

Enuresis nocturia, characterized by nighttime bedwetting, is predominantly reported in children, yet adult prevalence is also significant but less common. A cohort study of 13,081 adults aged 18 to 64 reported 15% of men and 19% of women experiencing primary enuresis nocturia.<sup>1)</sup> As adult enuresis nocturia may be attributed to a myriad of factors, a comprehensive approach encompassing various possibilities is required for diagnosis.<sup>2)</sup>

The diagnosis of enuresis nocturia was mostly based on history taking and physical examination. Imaging studies and urodynamic studies can be done to exclude neurological or urological abnormalities. The complication of the possible causes made it difficult to differentiate between the primary and the secondary enuresis nocturia.<sup>3)</sup>

Polysomnography (PSG), a comprehensive recording during

sleep, could be undergone to differentiate between rapid eye movement (REM) and non-REM parasomnias. When doing PSG, electromyogram (EMG) are commonly attached to the chin and bilateral tibialis anterior muscles of the patient. EMG activity is generally a good indicator of the stages of REM and NREM sleep. For this patient, PSG was expanded to include simultaneous anal tone EMG to assess the sphincter tone of the bladder during sleep, a novel method not traditionally part of the standard polysomnography process. The findings from the PSG and the subsequent diagnosis provide new insights into diagnosing adult enuresis nocturia and highlight the potential of innovative uses of polysomnography.

## CASE REPORT

A 20-year-old female patient, who was healthy without a specific medical or surgical history, visited the hospital with bed wetting during night sleep. Bedwetting symptoms were about 1

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year, and symptoms were observed once every 2–3 months, and the event was repeated twice in the past month, and she visited the urology outpatient clinic. The urology examination showed no abnormalities. Since each of her urination was related with the dream of her urinating, she was referred to a sleep

clinic to be evaluated for abnormal sleep behavior. In detailed history taking, she complained of frequent sleep paralysis two to three times per week. She actually had urinated when she dreamed of urinating. A PSG was performed to differentiate REM or Non-REM parasomnia. In order to evaluate the sphinc-

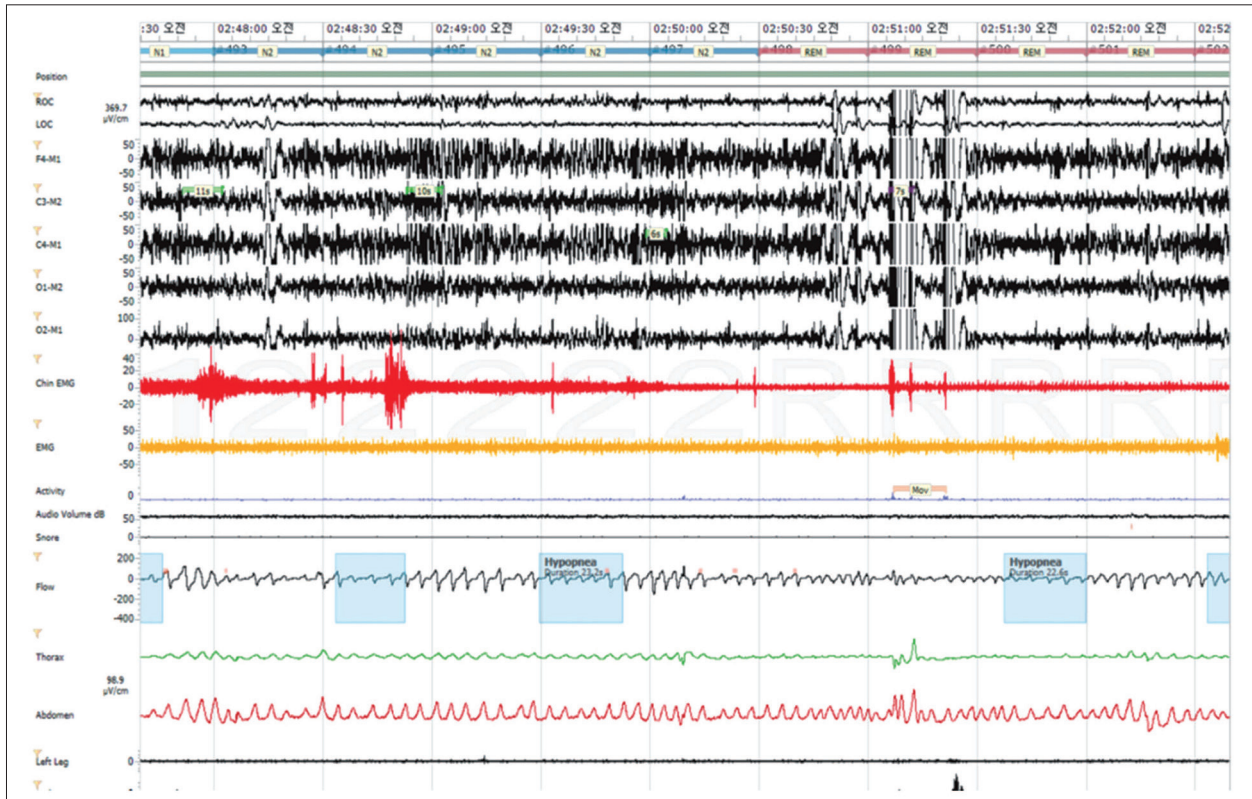


Fig. 1. No change of the sphincter tone EMG (yellow) during REM sleep.

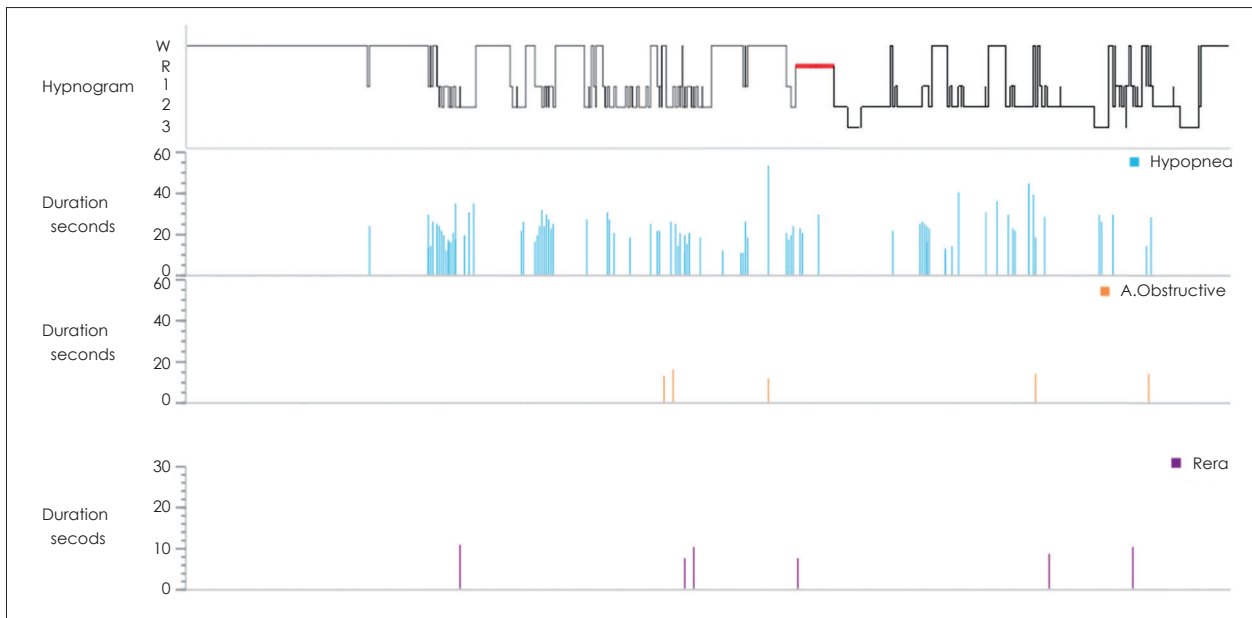


Fig. 2. Hypnogram the hypnogram showed obstructive sleep apnea.

ter tone of bladder during sleep, 2 electromyograms were attached to the patient's anus at 3 o'clock and 6 o'clock directions, and PSG was performed. It was confirmed that the tone of chin EMG fell down during REM sleep, but the anus and bladder sphincter tone did not fall. The PSG result showed moderate obstructive sleep apnea; 92% lowest oxygen saturation, apnea hypopnea index 21.3. This patient was diagnosed with adult parasomnia (enuresis nocturia) overlap syndrome with OSA. Enuresis symptom has resolved after treating OSA with continuous positive airway pressure (CPAP) treatment, without other urologic management.

## DISCUSSION

The exacerbation of enuresis symptoms is a well-known consequence of sleep disorders, including OSA.<sup>4)</sup> It is plausible that the moderate OSA diagnosis of our patient may have played a role in the manifestation of her enuresis nocturia. The patient's recurring experiences of sleep paralysis indicate that enuresis nocturia could have been a manifestation of parasomnia. This case study of a 20-year-old female highlights the possible co-occurrence of parasomnias, obstructive sleep apnea (OSA), and enuresis nocturia. OSA is commonly accompanied by a variety of other symptoms and conditions including parasomnia and insomnia.

The innovative use of polysomnography in this case, with simultaneous anal tone EMG, provided a deeper understanding of the patient's sleep physiology and the link between sleep stages and bladder control. It is important to note that REM sleep is associated with a loss of skeletal muscle tone, including the external urethral sphincter, which can contribute to enuresis nocturia.<sup>5)</sup> In this case, the consistent sphincter tone during REM sleep suggests that her bed-wetting could have resulted from a central process related to dreaming and not a decrease in sphincter tone.

With this result, we could conclude the diagnosis as adult parasomnia (enuresis nocturia) overlap syndrome with OSA. This conclusion is cannot be made with previous evaluations.

Previous diagnosis were primarily made based on history taking, and differential diagnosis was based on imaging or urodynamic studies. By monitoring anal sphincter tone, which reflects urethral sphincter tone of bladder, concurrently with PMG monitors including EMG, we could understand the association between sleeping and enuresis nocturia intuitively. This innovative approach would assist identifying the cause of the enuresis nocturia and further understanding of the diagnosis and the sleep itself. This case accentuate proper diagnosis in treating enuresis nocturia. We hope this evaluation method would help future patients with enuresis nocturia.

In conclusion, this report highlights the importance of implementing a comprehensive and innovative diagnostic strategy in the management of adult enuresis nocturia. PSG, including simultaneous anal tone EMG, was helpful for diagnosis in patients with NREM parasomnia; enuresis nocturia, so it is reported with the results.

### Acknowledgments

None

### Conflicts of Interest

The authors have no financial conflicts of interest.

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