Atypical Sexual Behavior During Sleep

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Objective: This article reports a case series of atypical sexual behavior during sleep, which is often harmful to patients or bed partners. **Methods:** Eleven subjects underwent clinical evaluation of complaints of sleep-related atypical sexual behavior. Complaints included violent masturbation, sexual assaults, and continuous (and loud) sexual vocalizations during sleep. One case was a medical-legal case. Sleep logs, clinical evaluations, sleep questionnaires, structured psychiatric interviews, polysomnography, actigraphy, home electroencephalographic monitoring during sleep, and clinical electroencephalographic monitoring while awake and asleep were used to determine clinical diagnoses. **Results:** Atypical sexual behaviors during sleep were associated with feelings of guilt, shame, and depression. Because of these feelings, patients and bed partners often tolerated the abnormal behavior for long periods of time without seeking medical attention. The following pathologic sleep disorders were demonstrated on polysomnography: partial complex seizures, sleep-disordered breathing, stage 3 to 4 non–rapid eye movement (REM) sleep parasomnias, and REM sleep behavior disorder. These findings were concurrent with morning amnesia. **Conclusions:** The atypical behaviors were related to different syndromes despite the similarity of complaints from bed partners. In most cases the disturbing and often harmful symptoms were controlled when counseling was instituted and sleep disorders were treated. In some cases treatment of seizures or psychiatric disorders was also needed. Clonazepam with simultaneous psychotherapy was the most common successful treatment combination. The addition of antidepressant or antiepileptic medications was required in specific cases.
Key words: sexual behavior during sleep, violence, non–rapid eye movement sleep parasomnia, rapid eye movement behavior disorders, seizure disorder, sleep-disordered breathing.

ECG = electrocardiogram; EEG = electroencephalogram; EMG = electromyogram; EOG = electrooculogram; NREM = non–rapid eye movement (sleep); PLM = periodic limb movement; PSG = polysomnography; REM = rapid eye movement (sleep); SWS = slow-wave sleep.

INTRODUCTION

Violence, during sleep or out of sleep, related to abnormal alertness has received more attention during the past 10 years. The absence of full alertness or impairment of brain function due to associated sleep disorders has been considered a legal defense in crimes and homicides (1, 2). Sleep medicine experts have been requested to testify in medical-legal cases. Educational efforts have been made to attract the attention of physicians about the problem, its medical-legal implications, and the need for appropriate documentation of the medical problems associated with the reported violence.

A general population survey has indicated that sleep-related violence is much more common than known by physicians. Two percent of the general population report the occurrence of sleep-related violence (3). However, reports and surveys have provided little information on "atypical sexual behavior" during or out of sleep, which may present as an annoying but tolerable problem to the bed partner. It may be an aggressive, harmful behavior during sleep, and it is often called "rape" or "rapelike" behavior by the bed partner. This behavior, also called "sleep sex" by some bed partners, is therefore poorly documented. In our experience, such behavior is not often mentioned to physicians because of feelings of shame of patients and bed partners. This report describes a case series of patients who exhibited different behaviors that we labeled "atypical sexual behavior during sleep." Two of these cases led to police intervention; in one case charges of "rape" against a teenager were made, and the case was seen as a medical-legal case. The 11 cases are briefly described to outline the range of problems. The workup performed, objective findings, treatment approaches, and follow-up outcomes are also presented. The goals of the report are to outline some of the medical implications that may hide behind "atypical sexual behavior" from clinical information collected during sleep structured interviews and to suggest tests and investigations that may be done to find the underlying sleep abnormalities leading to the behavior.

METHODS

Patient Population

Eleven cases are reported (see Table 1). The patients were seen during a 4-year period at the Sleep Disorders Clinic, and they represented about 4% of the total patient population seen for "parasom-

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TABLE 1. Patients Characteristics

Case	Age (y)	Gender	Time of Night	Presence of Injury or Violence	History of Parasomnia	Abnormal Behavior During Sleep
1	27	F	First half of night	−	None	Moaning
2	28	F	Throughout night	−	None	Moaning
3	26	F	Throughout night	−	Sleepwalking, sleep talking	Violent masturbation, loud vocalizations
4	31	M	Throughout night	+	Sleepwalking	Violent masturbation, genital bruising
5	23	M	First third of night	+	Sleepwalking	Sexual assault
6	38	M	3–5 AM	+	None	Sexual assault
7	27	M	2–6 AM	+	None	Sexual assault
8	29	M	3–6 AM	+	Sleepwalking, sleep terror	Sexual assault
9	26	F	2–5 AM	−	Sleepwalking	Sexual assault
10	33	M	First third of night	+	Sleepwalking	Sexual assault
11[a]	18	M	6 AM	−	Sleepwalking, sleep terror, enuresis	Sexual assault

[a] Medical-legal case.

nia" during the surveyed period. The subjects came to the clinic specifically because of the "atypical sexual behavior" that occurred during sleep (ie, patients with parasomnia and bed partners were not probed to detect the possible existence of the problem). Two cases involved police intervention, which led to consultation at a time near the initial incident of atypical sexual behavior. The abnormal behavior had been present for a mean of 7.5 years (range, 2–15 years) in the nine other cases, as observed by bed partners. None of these nine subjects received medical attention for their symptoms during that time. One reason was the reported amnesia of the event by the index case, but another reason was the difficulty of the bed partner in reporting what happened in the bedroom, including, as mentioned by all of them, fear of facing incredulity.

Description of Atypical Behaviors

The atypical behaviors were subdivided into three groups: 1) annoying to bed partner but not harmful, 2) annoying to bed partner and at times harmful to index case, and 3) harmful to bed partner.

Annoying to bed partner but not harmful. This type of behavior (two cases) consisted of sexual moaning and sexually related sounds that occurred nightly and were sufficiently loud to be heard outside the bedroom.

Annoying to bed partner and at times harmful to index case. The two subjects with this type of behavior had recurrent episodes of masturbation during sleep that were associated with variable amounts of vocalization. The degree of importance of movements during masturbation was variable. Masturbation was reported to be much more violent in the man than in the woman. There was regular bruising of the penis and soreness of the groin in the man; the woman experienced only intermittent discomfort in the morning. As reported by the subjects or partners, masturbation led to occasional vaginal discharge in the woman, but there was no evidence of ejaculation in the man. Subjects had complete amnesia of the events, and in one case there remained doubts about the veracity of the report.

Harmful to bed partner or others. Seven cases were placed in this group, including the two cases involving police intervention (one of them a medical-legal case). Bed partners or the attacked bystander felt "raped" by the index case (five cases) or felt that inappropriate sexual behavior was forcefully imposed on them (two cases). In two cases there was a history of bruises and ecchymoses on the body of the bed partner resulting from forceful attempts at intercourse, forced immobilization, and forced sexual penetration. The forcefulness and brutality of the behavior were emphasized in four of the seven cases. The only woman in this subgroup of four tore up her clothes and projected herself onto her bed partner but never displayed the same degree of violent behavior reported for the three men. The violence and brutality of the action were a predominant part of the reports made by the three bed partners of these men. Despite the descriptions of violence, the abnormal sexual behavior had occurred for 5, 6, and 12 years before clinical consultation in these three cases. The only two cases seen at the first observation of abnormal sexual behavior during sleep were those involving police intervention.

Clinical Assessment

All subjects, regardless of the complaint, underwent similar evaluations. These evaluations included the following: 1) *general medical evaluation* with associated review of charts and test results obtained by private physicians during past years, including medication, drug, and alcohol intake; 2) *sleep disorders evaluation* performed by a sleep specialist (this evaluation included questionnaires [Sleep Disorders Questionnaire, the Epworth Sleepiness Scale, and the Fatigue Scale; Refs. 4–6]; clinical interviews of subjects, bed partners, and if possible other family members; and a clinical evaluation searching for physical signs seen with specific sleep disorders); 3) *clinical neurological evaluation*; and 4) *clinical psychiatric evaluation.* The last two evaluations were performed by board-certified specialists who had additional training in sleep disorders medicine.

During the psychiatric interview, the Structured Clinical Interview for DSM-III–Revised (7) was systematically administered to patients. Patients also completed the Beck Depression Inventory.

Tests

Patients had two urine drug tests, one at the time of the clinical interview and one at the time of nocturnal sleep testing. Clinical EEGs were also performed by the Clinical Neurophysiology Laboratory with patients in regular and sleep-deprived conditions.

Sleep tests included nocturnal polysomnography (PSG) and a daytime sleep latency test.

Nocturnal PSG. This test was performed in the sleep laboratory after discontinuation of any sleep-related medication for 4 weeks. The following variables were monitored: EEG (C3-A2, C4-A1, O1-A2, Fpz-A1, Fpz-A2), chin and leg EMG, EOG, ECG (modified V_2 lead), body position, air flow, thoracic and abdominal bands, esophageal pressure, pulse oximetry, and neck microphone. Behavior was monitored by use of an infrared video camera. The test lasted a minimum of 7.5 nocturnal hours.

Daytime test. The Multiple Sleep Latency Test, with monitoring of behavior by infrared camera, was also performed during each nap.

Follow-Up Tests

All obtained information was analyzed by a sleep specialist, psychiatrist, and neurologist.

After this review, additional tests were conducted. Sleep logs were completed by bed partners or close family members for 15 days; reports of all abnormal sleep behaviors, not just sexual behavior, were requested. The onset, duration, and type of reported behaviors were tabulated. During this time, the patients' behavior was monitored as follows: 1) actigraphy (Minimitter, Sunriver, OR) for 7 days (9 of 11 subjects); 2) nine-channel recordings (EEG, seven channels; EMG, one channel; EOG, one channel) on a Oxford Medilog recorder for 7 to 10 consecutive days (3 of 11 subjects); and 3) audio tapes recorded during sleep.

The selection of each of these tests was based on the need to confirm, in the home environment, the presence and frequency of important movement activity and out-of-bed events, moaning (coherent or not), speech with movements, and out-of-bed activity (audio recordings).

The nine-channel recorder provided information on EEG abnormalities (sharp transients, spike waves, and presence of seizure), time of onset of important movement activity, relation to non–rapid eye movement (NREM) or REM sleep, and features supporting abnormal REM sleep. The results of these tests were compared with the reports made by bed partners, which confirmed and enlightened sleep laboratory findings. Once these test results were analyzed, a general review was performed by the different specialists involved, a diagnosis was established, and a treatment approach was chosen.

Analysis of Clinical Evaluations and Tests

Clinical psychiatric evaluation, PSG, sleep evaluation, and clinical EEG were all performed without knowledge of the results of other tests. Once these evaluations and tests had been performed, all gathered information was reviewed and a "preliminary diagnostic conclusion" was made by consensus. If necessary, further evidence of the suspected diagnosis was obtained (by actigraphy, audio recordings, and/or home Medilog recordings). PSG events such as sleep/wakefulness (8) and respiratory (9), cardiac, and periodic muscles events (4) were scored according to published international criteria. In the sleep laboratory, the simultaneous polygraphic, video, and sound recordings were synchronized using the internal clocks of the monitoring equipment. Actigraphy recordings were analyzed for activity and nonactivity using commercially available computer software (Minimitter). Medilog recordings were read using a commercially available, dedicated reader. These sleep recordings were analyzed for sleep states and stages, presence of abnormal activity (indicated by movement artifacts just preceding sleep stages or states), duration of activity, and determination of the state of alertness at the end of activity. The recordings were also analyzed for the presence of abnormal EEG elements, such as sharp transients, before the onset of the activity; if present, the topographic location was determined if possible. Finally, we assessed the synchronicity between the test findings and timing based on computer clocks as well as sleep log reports obtained from bed partners during the home tests.

Follow-Up

Once the diagnosis and a proposed treatment plan had been established, subjects were followed by the most appropriate specialist. If the specialist thought a test was needed to improve treatment, this test was performed during follow-up and not considered here. There was always follow-up by the Sleep Disorders Center to assess the sleep-related behavior, and all information from other specialists involved in patient treatment was recorded in the sleep clinic chart. An assessment of the patient's condition, which included involvement of current bed partners if available, was done 12 months after initial treatment for all patients.

RESULTS

Brief Case Reports

Case 1. A 27-year-old woman had had vocalizations within 15 to 20 minutes of sleep onset since her teenage years. Moaning consisted of inarticulate sounds with clearly sexual undertones that occurred at least three times per week. There was no relationship with daytime activity, stress, menstrual cycle, or social alcohol intake.

Case 2. A 28-year-old woman had onset of moaning at age 12 years. At presentation, her loud moaning disturbed her spouse and children. This behavior began nightly within 20 minutes of sleep onset and was not related to daytime activity. The patient was not on medication and never used alcohol or drugs.

Case 3. A 26-year-old woman abruptly tore off her clothing and masturbated violently during the first half of the night. Masturbation was associated with soft to loud vocalization and occasional vaginal discharge. If her husband interrupted the episode of masturbation, it might recur a second or a third time during the night. Any attempt to initiate intercourse after she was awakened was rejected, and she denied the behavior. The husband considered the overall sexual behavior increasingly intolerable.

Case 4. A 31-year-old man had had abrupt and violent masturbation while asleep for at least 12 years. Episodes lasted from 3 to 15 minutes, and movements became more violent with longer episodes. Bed partners noted inarticulate moaning sounds and movements of the feet or legs. The patient seemed confused and disoriented if he awakened during an episode. Timing of these events was variable. No ejaculation was reported by the patient or the bed partner. The patient avoided any intimate relations for more than 8 years, but he was aware of persistent bruising on the penis, groin soreness, and disturbed bedding.

Case 5. A 23-year-old man attempted to remove his girlfriend's clothing and fondle her during the first third of the night. He never forced intercourse and never ejaculated. His girlfriend observed that he was difficult to awaken and, once awake, seemed confused and disoriented. He snored heavily, had respiratory pauses, drooled, and ground his teeth during sleep.

Case 6. A 38-year-old man had sexually assaulted his spouse during sleep for 12 years. Events occurred irregularly but at least once every 15 days between 3 and 5 AM, he tore off his wife's clothes, fondled her, and tried sexual intercourse. Initially the patient was described as "not present," "unresponsive," and acting violently. When intercourse took place, the patient was "awake" but had no memory of instigating the event. Alcohol did not influence the behavior. Sleep deprivation seemed to weakly correlate with an event in 24 to 48 hours. During one episode he attempted to choke his wife; this triggered marriage counseling and referral.

Case 7. A 27-year-old man had had atypical sexual behavior during sleep since age 22. The frequency of episodes varied from several successive nights to none for 2 to 4 weeks. He usually "awoke" with an ejaculation between 2 and 6 AM. To avoid the behavior, he slept in a different bed or on the floor. When he tore off the restraints he used to avoid moving in bed, he broke two fingers. His wife reported that he expressed great despair and shame at the behavior.

Case 8. A 29-year-old man had sexually assaulted his partner while asleep between 3 and 6 AM for at least 6 years. He uttered profanities and forcibly held down his partner, who sustained cuts and bruises. He also moved his arms and legs excessively in sleep when he dreamt of fighting against "intruders."

Relevant family history. The father had a history of unipolar depression and was hospitalized twice. A brother committed suicide. The patient tried cocaine, amphetamines, alcohol, and other drugs during his teenage years. However, he had stopped using drugs at age 22 and denied any regular alcohol intake for at least 5 years.

Case 9. A 26-year-old woman initiated foreplay with her bed partner by adjusting his clothing, fondling him, and uttering sexually provocative phrases between 2 and 5 AM. If she received a positive response, she would "awaken," appear upset, and accuse her partner of coercing her to have sex during sleep.

Case 10. A 33-year-old man with no prior history of violent behavior grabbed his wife during the first third of the night, tore off her clothes, and forced intercourse. She pleaded and defended herself but was unable to "reach" him. The wife reported that he seemed "far away" and appeared "glassy-eyed." Once sexual intercourse occurred, the husband fell asleep. Cries and noises had awakened a teenage child, who called 911, which brought the police. The husband had no memory of or explanation for the behavior. The wife went to the police station the next day, as requested by the police officer at the scene, but then refused to pursue legal proceedings. She believed that her husband had a medical problem, and the couple sought medical help.

Case 11. An 18-year-old male was accused of assaulting a female teenager sleeping in the vicinity. He had placed his finger into her vagina. The event occurred near 6 AM after sleep deprivation. The defendant had been a restless sleeper since early infancy, had sleep-onset insomnia in early childhood, and had sleep terrors until the age of 6 or 7 years. Thereafter, he developed enuresis and exhibited somnambulism on a regular basis until his teenage years. When his father revealed a 3-year history of homosexual behavior and moved out of the house, the subject again demonstrated sleep-onset insomnia, sleep talking, and occasional sleep terrors. Recently he had had an irregular sleep/wake cycle due to working in the evening at a gas station while attending school. He reported limited intake of alcohol earlier in the evening and was not intoxicated when arrested at the time of the event.

Presence of Parasomnia

The presence of an atypical behavior during sleep was demonstrated in all cases. This behavior was classified as "parasomnia." However, the type of parasomnia was different depending on the case. Table 1 presents the age and gender of each patient, the type of complaints mentioned by bed partners, and a summary of positive findings at testing.

Types of Abnormalities Found During Sleep

Behavior annoying to bed partner but not harmful. As can be seen in Table 1, the subjects in this group were two young women with sexually evocative moaning and sounds. The behavior was confirmed in the sleep laboratory and by audio recordings made at home. The sexual undertone of the moaning was clear in both cases, and the loudness was as reported by bed partners. During the PSG recordings, the moaning and vocalizations always occurred during NREM sleep. This observation matches the reports of more important noise in the beginning than at the end of night. In case 2, there were more frequent, short (3–10 seconds) sleep interruptions during NREM sleep (without PSG explanation) in the first and second sleep cycles than expected. Vocalizations and sounds occurred during

stage 2, 3, and 4 NREM sleep in case 1, and during slow-wave sleep (SWS) in case 2. The results of clinical neurological examination and clinical EEGs were within the normal range for age.

The psychiatric evaluation was negative for psychopathology in both cases. There were some low-grade feelings of guilt because the behavior occasionally disturbed the sleep of the family. There was a positive family history in case 2: the patient's mother had vocalizations during sleep intermittently throughout her adult life. The presence of the unexplained frequent EEG short arousals was similar to the patterns recently reported in two studies of NREM sleepwalking, but sleepwalking was never observed in this case. The diagnosis of NREM sleep parasomnia was the conclusion (see Table 2), and medication trials were suggested.

Behavior annoying to bed partner and at times harmful to index case. As shown in Table 1, both a man and woman had masturbatory behavior during sleep, but findings were different. The woman (case 3) had evidence of NREM sleep parasomnia with abrupt onset of moaning and attempts to remove her pajamas during the first SWS cycle. This behavior was preceded by stage 4 NREM sleep with high-amplitude slow waves similar to the "hypersynchronous delta" pattern reported in cases of NREM sleep parasomnia. Movement artifacts were monitored during the agitated behavior and pulling on bed clothes, which obscured the recording. These movements lasted for 3 minutes, and stage 1 NREM sleep was observed when PSG was artifact-free and the patient was behaviorally asleep. Home recordings also showed, on 1 of the 7 nights of recordings, abrupt onset of activity from SWS. Movement artifacts were noted for the following 5 minutes, and a complete awakening EEG pattern was

TABLE 2. Objective Findings and Treatments

Case	Objective Findings	Psychiatric Diagnoses	Neurological Diagnoses	Sleep Disorders Diagnoses	Treatment	Control of Behavior
1	Normal actigraphy; PSG: stage 2–4 vocalizations	No psychopathology	EEG: (−)	NREM parasomnia	Clonazepam	Controlled
2	Normal actigraphy; PSG: stage 3–4 vocalizations	Mild reactive depression	EEG: (−)	NREM parasomnia	Clonazepam, other BZDs, zolpidem, antidepressants, anticonvulsants	Not controlled
3	Medilog: SWS then movement artifact; PSG: SWS, hypersynchronous delta, vocalizations	Major depressive disorder (moderate)	EEG: (−)	NREM parasomnia	Clonazepam, psychotherapy	Controlled
4	Medilog: sharp transients Fp3–T3; PSG: (−)	No psychopathology	EEG: left mesio-frontal focus; MRI: −	Stage 2 NREM complex partial seizure	Valproic acid, lamotrigine	Controlled
5	Actigraphy: 15 minutes of unexplained movement; PSG: stage 3, hypersynchronous delta, RERA[b] witnessed behavior	Obsessive-compulsive personality trait	EEG: (−)	NREM parasomnia, hypersynchronous delta, sleep-disordered breathing	CPAP,[b] psychotherapy	Controlled
6	PSG: elevated EMG tone in REM	No psychopathology	EEG: (−)	REM behavior disorder	Clonazepam	Controlled
7	Medilog: rapid leg movements with dream; PSG: elevated EMG tone in REM	Major depressive disorder (moderate)	EEG: (−)	REM behavior disorder	Clonazepam, psychotherapy	Controlled
8	PSG: elevated EMG tone in REM	No psychopathology	EEG: (−)	REM behavior disorder	Clonazepam, stress management	Controlled
9	Medilog: hypersynchronous delta in SWS; PSG: normal	Generalized anxiety disorder, major depressive disorder	EEG: (−)	NREM parasomnia, hypersynchronous delta	Sertraline, lorazepam, psychotherapy	Controlled
10	PSG: SWS, arousal, sitting up	Generalized anxiety disorder, major depressive disorder	EEG: (−)	NREM parasomnia	Clonazepam, stress management	Controlled
11[a]	PSG: SWS, hypersynchronous delta, getting up to walk, bruxism, PLMs	Obsessive-compulsive personality trait	EEG: (−)	NREM parasomnia, hypersynchronous delta, PLMs	Clonazepam, stress management	Controlled

[a] Medico-legal case.
[b] CPAP = continuous positive airway pressure; RERA = respiratory event–related arousal.

recorded at the end of the event. The family member who shared the bedroom during the 7 nights of home monitoring reported that the patient was tearing off her clothes and masturbating when the activity was noted on the recording.

The results of the neurological examination and clinical EEGs were normal. However, psychiatric evaluation revealed a positive past history: from age 8 to 11 years, the subject had been repeatedly sexually assaulted by her father. She was placed in protective care from age 12 to 16 years. She had symptoms of posttraumatic stress disorder and depression. The diagnostic of major depressive disorder (moderate) was derived from the psychiatric evaluation. Psychiatric treatment was recommended.

Case 4 also had a history of masturbation. The behavior was reported as violent, stereotypic, and associated with leg movements in synchrony with the masturbation movements. Vocalization was often present. The sleep history indicated the presence of childhood sleepwalking. Masturbation had occurred for at least 12 years and had led to multiple bruises to the penis and rejection by girlfriends. Psychiatric evaluation indicated anxiety about "losing control" during sleep and guilt about this behavior, but otherwise the findings were unremarkable. The subject had lived without a bed partner for many years because of this behavior. The abnormal behavior was not seen during PSG, and the recording did not orient the diagnosis. The clinical EEG demonstrated the presence of pathology during wakefulness and sleep, with sharp transient and spike waves suggestive of a right mesiofrontal focus but no seizure activity. The abnormal behavior occurred during one of the home recordings and was associated with EEG spikes and spike waves with mesiofrontal focus activity. The bed partner confirmed the abnormal behavior.

Behavior harmful to bed partner or others with sexual assault. As shown in Table 1, all remaining patients are in this category. Once again this is a heterogeneous group. Only one woman is in this group; the six other subjects are men. Clinically, the violence was the focus in three of the seven individuals, and these subjects were all male.

There was a positive personal history of sleepwalking in childhood and teenage years in five of the seven subjects. The sleepwalking episodes were associated with night terrors in one case. Another case had a history of recreational drug use in the late teens and early twenties that had ceased more than 7 years earlier.

PSG in the sleep laboratory showed evidence of pathological sleep in six of the seven cases.

The following findings were observed in three male cases: presence of high chin muscle tone, movements, presence of EEG patterns of REM sleep, and presence of EEG patterns and rapid eye movements typical for REM sleep in conjunction with high chin muscle tone and body movements. This is a pattern found in REM sleep behavior disorders. This pattern was found even in the absence of abnormal behavior on the video.

The three other male cases had the following: presence of abrupt movements beginning from SWS during the first sleep cycle with sitting up (or getting up) while mumbling or emitting inappropriate sentences and looking confused and disoriented. The technician intervened to bring the patients back to bed. The abrupt onset of movements was preceded by high-voltage synchronous slow waves for 15 to 20 seconds in two of the three cases. The pattern was one of NREM sleep parasomnia, with the abnormal behavior seen out of SWS. The diagnosis of NREM sleep parasomnia was made.

A Medilog home recording was also obtained for case 8. The patient had a polygraphic pattern of REM sleep behavior disorder during the laboratory recording. On home recording, the patient had a similar pattern of REM sleep with high EMG and abrupt onset of movement artifacts. The bed partner reported rapid movements of the legs and feet and heavy breathing as if the patient was running. The time and duration of the event on home monitoring and the bed partner's report coincided with the movement artifact recording.

PSG showed the presence of two other sleep disorders, each in patients with NREM sleep parasomnia: presence of obstructive sleep apnea syndrome with loud snoring and a Respiratory Disturbance Index of 28 events per hour of sleep, with the lowest oxygen saturation (89%) in case 5, presence of periodic leg movement (PLM) syndrome (mild), and bruxism during sleep in case 11.

PSG was noninformative in one case (case 9). However, home recordings showed the presence of abrupt onset of movement artifact, out of SWS, with high-voltage, slow synchronous waves just before the movement artifacts. The bed partner reported that the woman sat in her bed, picking at her bedclothes and uttering unintelligible words. The duration of the behavior and the time of the report coincided with the movement artifact recording. The sleep disorder diagnosis of NREM sleep parasomnia was made.

In summary, no sexual assault was observed during polygraphic recordings in the laboratory, but in six of seven subjects, a polygraphic pattern of either NREM sleep parasomnia or REM sleep behavior disorder was documented. NREM sleep parasomnia was documented by home monitoring in the last case.

An abnormal active behavior was documented in association with an abnormal polygraphic pattern in all seven cases. Obstructive sleep apnea syndrome and PLMs were also documented in two of the seven subjects. All subjects had a sleep disorder.

The results of the clinical neurological evaluation and the clinical EEG evaluations were within the normal range in all seven subjects.

Psychiatric evaluation uncovered obsessive-compulsive traits and anxiety about the lack of control of nocturnal behavior in case 5. The psychopathology was more significant in cases 7, 9, and 11.

In case 7, psychiatric evaluation revealed a complex situation. The wife reported infrequent and hurried sex with her husband, whom she described as distant and reluctant during wakefulness. Nocturnal sex was more satisfactory to her, even if associated with bruises at times. The patient was raised in a rigid, inexpressive, and strongly religious family, and at age 17 he had considered a career in church and celibacy. Psychiatric diagnoses were obsessive-compulsive personality disorder and major depressive disorder (moderate). Psychiatric treatment was recommended.

During psychiatric evaluation case 9 revealed that a family friend assaulted her at a young age. Although she had undergone psychotherapy from the age of 6 to 8 years, her treatment was discontinued when the family moved. The experience was never mentioned after that. The patient had symptoms of generalized anxiety disorder and major depressive disorder. Psychiatric treatment was recommended.

Case 11 was the medical-legal case. The subject had a significant and long-lasting history of sleep difficulties that included enuresis, night terrors, and sleep-onset insomnia. He had been very affected by his father's revelation of a 3-year history of homosexual behavior and separation from the family during adolescence. The patient's history was remarkable for shyness and obsessive-compulsive personality traits. His strict religious conviction led him to abstinence from sexual activities and other social behaviors that he considered inappropriate, such as drinking alcohol. Stress management psychotherapy was recommended.

In summary, personality disorders, major depressive disorder, and/or generalized anxiety disorder were diagnoses in many of the subjects with harmful behavior toward others, but none was found to have dissociative disorders.

Treatments

Table 2 indicates the treatments that were initiated on the basis of the findings of different evaluations and recommendations of the different specialists. Clonazepam was the drug of choice for NREM sleep parasomnia and REM sleep behavior disorder. The dosage ranged from 0.5 to 2 mg at bedtime. Lorazepam, sertraline, and psychotherapy were the recommended treatments when there were associated psychiatric conditions (case 9). Stress management psychotherapy was performed in case 11, and psychotherapy, in cases 3, 5, and 7.

Nasal continuous positive airway pressure therapy was applied in case 5. Case 4 was treated with valproic acid and lamotrigine.

Case 2 underwent many drug trials after failure of clonazepam, such as other benzodiazepines, zolpidem, antidepressants, and anticonvulsants (carbamazepine, valproic acid, gabapentin). Hypnotics reduced the moaning but did not eliminate them. Behavioral approaches, white noise, and supportive psychotherapy also failed. Thus, the patient was left untreated and had intermittent follow-up.

Follow-Up

The duration of follow-up was at least 12 months and up to 5 years (case 2).

There was one other treatment failure, case 7. After 5 months of psychotherapy the patient interrupted treatment against medical advice. He continued to take clonazepam as initially prescribed and reduced its dosage to 0.5 mg after 12 months. Although the nocturnal aggressive sexual behavior has not recurred for 18 months, his wife believes that their sexual relationship is still impaired.

Treatment has eliminated the atypical behavior in all other subjects. Symptoms have been absent for 9 months to 5 years. Clonazepam is still regularly taken by cases 1, 6, 8, and 11. Anticonvulsant therapy has been pursued in case 4, and continuous positive airway pressure in case 5. Drug therapy was discontinued after failure in case 2 and after 2 years of complete remission in cases 3, 5, and 9.

DISCUSSION

Atypical sexual behavior during sleep is not mentioned when "violence during sleep" is reported. It is also seldom reported in medicine. Rosenfeld and Elhajar (10) reported two cases. The first presented with a combination of nocturnal eating, sleepwalking, and sex during sleep. The second was a medical-legal case involving a 45-year-old man with a history of sleepwalking who was accused of fondling his daughter's friend. PSG was not performed.

In 1986, Wong (11) reported the case of a 34-year-old man with episodes of nocturnal masturbation that

he considered "somnambulism variant." Hurwitz et al. (12) and Shapiro et al. (13) cited in abstracts individuals who engaged in sleep-related sexual behavior. All had prior histories of parasomnia, and Alves et al. (14) suggested an overlap between the syndromes of REM sleep behavior disorder and somnambulism in one case. Episodes resolved with clonazepam (15). All of our patients were identified as having a sleep disorder with automatic behavior. These disorders included 1) disorders of arousal that contain confusional arousal, sleep terror, and sleepwalking (these disorders are also labeled as NREM sleep parasomnias because of their occurrence outside NREM sleep); 2) REM sleep behavior disorder; and 3) nocturnal partial complex seizure, fronto- and inferomesio temporal.

Moaning is a known symptom of confusional arousal. Can we affirm that both of our cases fit this subcategory of disorder of arousal? It seems probable in case 1, who responded well to clonazepam. It is more difficult to state it in case 2. Her disorder may be related to the recently reported four cases of groaning during stage 2 NREM sleep. Vertrugno et al. (16) labeled this clinical syndrome "catathrenia." Regardless, this case fits the label of "atypical behavior during sleep." All other cases presented with a disorder of automatic behavior. Seven subjects (64%) had a history of childhood sleepwalking with sleep talking, recurrent nightmares, and/or sleep terrors. These childhood histories were obtained from subjects who were diagnosed with either NREM sleep parasomnia or REM sleep behavior disorder when seen in the sleep clinic. The fact that the atypical sexual behavior disorder was seen in association with three major sleep disorders with automatic behavior emphasizes the need to thoroughly evaluate the patient by exploring all parasomnia diagnoses.

Several of our patients had psychopathology. We do not know to what extent the psychiatric disorders played a role in the observed behaviors. We decided, however, to treat the psychiatric disorders. The combination of specific treatment of the parasomnia, uncovered at testing, and of the psychiatric disorder had a symptomatic effect and led to control of the behavior in 10 of 11 patients. This result is still present up to 5 years later, a positive outcome.

Many of our cases are good examples of violence during sleep. Violence and atypical sexual behavior during sleep can be forensic problems. Thus, a systematic evaluation of these cases must be performed. "Harmful behavior during sleep" refers to injury to oneself or others committed while in a sleep state or while in a state of incomplete awakening from sleep. "Legal responsibility for one's actions" implies and requires that a person be conscious of the actions and able to control them. "Consciousness" occurs in a continuum: one can be unaware, partially aware, or fully aware. The legal defense of sleep-related abnormal behavior has been that the harmful act is committed under a state of sleep or incomplete alertness, rendering the individual not responsible or accountable for that action. The harmful activity is a behavior, not a diagnosis, and therefore requires careful definition, rigorous description, and accurate quantification.

We suggest the following when faced with a report of atypical sexual behavior, particularly if the behavior is harmful to the patient or others. The history must include 1) a detailed description of the event and characterization of the degree of amnesia; 2) current, past, and family sleep disorders; 3) social habits, such as sleep deprivation, drug use, and alcohol intake; 4) current and past medical records and family medical history; 5) employment records (to check for difficulties potentially related to sleep disorders); and 6) determination of the frequency of the abnormal behavior and its stereotypic nature. Furthermore, the history must include interviews with the spouse or bed partner and family members, questioning the following items: description of the event and prior ones; timing of the behavior during the sleep/wake cycle; frequency of behavior; age of onset and associated life events or trauma; degree of amnesia noted; attitude of the subject when fully awake after the event; attitude after previous sleep-related disturbances, if reported; and association of the abnormal behavior with daytime activities (stress, alcohol intake, sleep deprivation, etc.). A complete psychiatric evaluation is mandatory, because dissociative states and early dementia can be associated with abnormal behavior during the night (17). Because complex partial seizures may be potentially responsible for the behavior, an appropriate neurological workup, including EEG studies, must be performed.

The sleep tests must address the questions asked. Nocturnal PSG must be accompanied by systematic video monitoring. One night of PSG may not reveal the existence of a parasomnia in a given patient and may need to be repeated in the laboratory. We have also used repeated home monitoring. The disadvantage of home monitoring is the absence of video monitoring; however, family and bed partners can bring important reports to be added to a recorded event. Actigraphy is helpful only to document the frequency of nocturnal activity and its timing of occurrence on a 15-day or 3-week period.

We found that review of the case and test results, with all involved specialists present, was helpful to establish diagnoses and to plan treatment approaches.

In summary, atypical sexual behavior during sleep

is often not reported, but it may be harmful to the patient and bed partner. We have no knowledge of its frequency. Systematic questioning of patients with parasomnia may uncover the problem.

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