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Tourette's Disorder and Associated Complex Behaviors: A Case Report

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A case of a man with Tourette's disorder associated with obsessive-compulsive disorder, multiple sexual paraphilias, and aggressive behavior is described. Treatment with haloperidol led to improvement in the characteristic tics of Tourette's disorder as well as to improvement in these three complex-associated behaviors. After haloperidol was discontinued, an exacerbation of tics and the associated behaviors occurred.

INTRODUCTION

Tourette's disorder [Tourette's syndrome (TS)], characterized by involuntary movement and phonation, is invariably classified as a tic disorder. As Trimble [1] recently suggested, however, to refer to TS simply as a tic disorder is to ignore many of the richer manifestations of the condition and to be unfamiliar with its pleomorphic clinical presentations. Indeed, complex behavioral disturbances such as obsessive-compulsive disorder (OCD), inappropriate sexual behavior, and aggressive behavior are often associated with TS. For example, Frankel et al. [2] reported obsessive-compulsive behavior in 52 percent, Pitman et al. [3] in 63 percent, Nee et al [4] in 68 percent, and Stefl [5] in 74 percent of TS patients. Inappropriate sexual behavior has been observed in between 10 percent [6] and 75 percent [7] of TS patients. Aggressive behavior is also associated with TS, with estimates of such behavior ranging from 26 percent [4] to 66 percent [8]. Moreover, these associated complex behaviors may be more disabling and incapacitating for the patient than the tics themselves.

We now present a case of TS associated with OCD, multiple sexual paraphilias, and aggressive behavior. Although the neurobiology of TS is complex, a review of the literature suggests that a disturbance in dopamine (DA) function may contribute to the pathophysiology underlying these associated complex behaviors as well as the tics of TS.

CASE REPORT

Mr. B., a 40-year-old man, presented with suicidal ideation following repeated arrests for genital exhibitionism. Mental status examination revealed a tearful man with intact thought processes, an absence of Schneiderian first-rank symptoms, and a normal cognitive exam. Physical examination included excessive eye blinking, neck

Abbreviations: DA: dopamine OCD: obsessive-compulsive disorder TS: Tourette's syndrome

jerks, nasal sniffling, and throat clearing. SMA-20, CBC, sedimentation rate, VDRL, TFTs, urinalysis, testosterone level, FSH, and LH were normal. A karyotype was 46XY. Sleep-deprived EEG was normal. CT scan of the head revealed a cavum septum pellucidum. WAIS-R revealed a Full Scale IQ of 115, and projective testing showed no psychosis. Mr. B. did not meet DSM-III-R diagnostic criteria for an Axis II diagnosis. Mr. B.'s father has chronically cleared his throat and experienced neck jerks. His brother blinks his eyes excessively and suffers from intrusive, ego-dystonic, violent images. There is no known family history of inappropriate sexual behavior.

At age seven, Mr. B. first experienced frequent eye blinking, facial grimacing, hair twirling, nose twitching, lip pouting, jaw snapping, teeth clicking, finger tapping, diaphragmatic tics, lip and nail biting, nose picking, and a shuffling gait associated with a characteristic hop. In addition, he frequently sniffled, spit, cleared his throat, and produced a guttural sound in his pharynx. These motor and phonic tics had never come to medical attention prior to the current presentation. At eight years of age, a compulsion to touch doorknobs and hot stoves developed. Mr. B. also was compelled to pick the hair off his arms and to count items in his environment. Soon, he experienced intrusive thoughts in his mind. Both the tics and the obsessive-compulsive behaviors have persisted throughout the patient's life, although they have fluctuated in type and severity.

In addition to tics and obsessive-compulsive behavior, Mr. B. has participated in many acts of aggression. At the age of eight, he "accidentally" burned down a barn. He committed several acts of vandalism and robbery as a teenager, including multiple counts of breaking and entering as well as car theft. More recently, Mr. B. has been imprisoned for assault, rape, and murder.

Mr. B. has also demonstrated numerous inappropriate sexual behaviors. At age 11, he began compulsively exposing his genitals to females up to two to three times a day. In addition, the patient has masturbated up to seven times each day with women's underwear, participated in voyeuristic activities, compulsively touched female breasts amidst large crowds, made almost daily obscene telephone calls, and performed sadistic acts toward his ex-wife. Although remorseful over the ego-dystonic sexual behaviors and aggressive crimes, Mr. B. feels compelled to perform these acts.

Initially, Mr. B. was thought to have an adjustment disorder due to the stress of again being arrested for exhibitionism; however, the presence of excessive eye blinking, neck jerks, and phonic tics led us to obtain a longitudinal history for symptoms of TS. After completing the work-up, diagnoses of TS, OCD, and multiple sexual paraphilias were made.

Treatment was begun with haloperidol 0.25 mg per day with weekly increases of 0.25 mg. Baseline and weekly ratings of tics, OCD symptoms, inappropriate sexual behavior, and aggressive impulses were obtained. After six weeks, at a dose of 1.5 mg of haloperidol per day, a significant reduction had occurred not only in the motor and phonic tics but also in each of the associated complex behaviors. Using a modified version of the Tourette Syndrome Global Scale [9], the total TS score, based on the frequency of nine motor and two phonic tics improved from 41 to 20. Using the OCD Inventory Scale [2], which was developed to solicit information about OCD from patients with TS, an improvement in scores from 95 to 51 was observed. The obsession to exhibit genitalia went from 5 (always present) to 2 (sometimes present), while the frequency of masturbation with accompanying fantasies of exhibitionism decreased from twice a day to once in every four days. A measure of aggressive impulses (sum of

questions 8,19,23,24, and 39 from OCD Inventory) [2] improved from 15 to 3. At no time during Mr. B.'s hospitalization was there any indication that he had exposed himself or acted on aggressive impulses. In addition, the frequency and intensity of tics and compulsive behaviors were noticeably reduced. Following an additional four weeks of treatment with haloperidol, however, the patient was removed from the hospital and taken to prison because the series of arrests for exhibitionism that had precipitated the hospitalization violated his probation. In prison, haloperidol was immediately discontinued. Follow-up ratings obtained 14 weeks later revealed a worsening of all symptoms with a TS score of 41, an OCD Inventory score of 83, an obsession to exhibit genitalia score of 4 (frequently present), a masturbation frequency of once a day, and an aggressivity score of 11.

DISCUSSION

Recent reports suggest that TS should be reconceptualized as a more complex behavioral condition in which tics form but one aspect of the syndrome [1,10]. A pleiotrophic array of behaviors occurs in frequent association with TS, and some, such as OCD, are considered an integral part of the syndrome [1,10]. Including inappropriate sexual behavior and aggressive behavior as associated features of TS is, however, currently a point of contention in the field. Some authors view the inappropriate sexual behavior and aggressive behavior of TS as part of a spectrum of disinhibited behavior resulting from an imbalance of mesencephalic-mesolimbic dopamine (DA) pathways [11]. In contrast, other authorities suggest that an increased incidence of these associated behaviors occurs only in those TS patients who have a comorbid diagnosis of attention deficit disorder with hyperactivity [12]. In the present case, these associated complex behaviors were far more incapacitating and disabling to the patient than the characteristic motor and phonic tics of TS.

Because temporal lobe epilepsy, genetic abnormalities, hormonal imbalances, psychotic disorders, sociopathy, and central nervous system structural lesions may be associated with inappropriate sexual behavior and aggressivity, these conditions were ruled out prior to making the diagnosis of TS. Other than tics, the only abnormality identified in Mr. B.'s work-up was a cavum septum pellucidum cavity on CT scan of the brain. Interestingly, Robertson et al. [6] recently reported that only two of 73 TS patients had abnormal CT scans of the brain. Both of these patients were self-destructive head bangers and both scans showed cavum septum pellucidum cavities.

It is not surprising that the motor and phonic tics were reduced with haloperidol, a DA antagonist. In the present case, however, the three associated behaviors also improved with the use of haloperidol. Although this response had not fully been anticipated, a review of the literature suggested that a disturbance in DA function may contribute to the pathophysiology of each of the three associated behaviors, and to the tics of TS.

Although perturbations in other neurotransmitter [13] and neuropeptide [14] systems have been demonstrated in TS, the most consistent evidence supports a dysregulation of DA neurotransmission [13,15,16]. For example, homovanillic acid, a DA metabolite, is decreased in the cerebrospinal fluid of TS patients [13,15], while withdrawal from chronic neuroleptic medication may precipitate a Tourette-like syndrome [17]. Similarly, the DA antagonists haloperidol and pimozide partially reduce TS symptoms [18], whereas DA releasing agents such as methylphenidate and

amphetamine acutely exacerbate symptoms in some patients with TS [19]. Cocaine, which potentiates the effects of DA by blocking presynaptic reuptake, has been reported to exacerbate TS symptoms [20,21]. In contrast, most antidepressants, anxiolytics, and mood stabilizers are not effective treatments for TS [12].

Obsessive-compulsive behaviors have also been associated with a disturbance in DA function. Ellinwood [22] described patients who assembled and disassembled objects repeatedly in a ritualized manner subsequent to the abuse of high-dose amphetamine. Devinsky [16] hypothesized that obsessions occurring in encephalitis lethargica resulted from damage to the periaqueductal gray and midbrain tegmentum with an associated decrease in DA levels and subsequent development of supersensitive DA receptors. In a recent review, Pitman [23] found that various animal models of compulsive behavior have in common relative DA hyperactivity in the basal ganglia. Cocaine has been reported to exacerbate obsessive-compulsive behavior in patients with OCD [24,25]. Finally, it was recently shown that co-morbid occurrence of tic-spectrum disorders or schizotypal personality disorder was more frequently associated with a response to neuroleptic addition in OCD patients refractory to serotonin reuptake inhibitors alone [26]. This indirect evidence suggests that in some OCD patients DA dysregulation may contribute to the pathophysiology of obsessive-compulsive symptoms.

Inappropriate sexual behavior also occurs in conjunction with DA dysfunction. Fairweather [27] noted exhibitionism, sadism, bestiality, pedophilia, sexual assault including rape, and "addiction to masturbation" among 275 postencephalitic parkinsonian patients. Quinn et al. [28] described dopaminergic drugs unmasking sexual deviations in two parkinsonian patients. Shapiro [29] reported the case of a postencephalitic parkinsonian patient who developed a marked increase in libido that led to exhibitionism during levodopa therapy. Cocaine reportedly produces hypersexuality secondary to the potentiation of DA neurotransmission [30]. Comings and Comings [31] reported a man whose familial form of exhibitionism associated with TS responded rapidly and completely to treatment with haloperidol. Lastly, it was recently demonstrated that haloperidol and pimozide dose-dependently reduced copulatory behavior in intact, sexually active male rats [32].

Disturbances of DA transmission may also be associated with aggressive behavior. Apomorphine and amphetamine, both DA agonists, induce fighting in male rats. The apomorphine-induced fighting can be enhanced by the addition of tail-pinch (a manipulation which activates the nigrostriatal DA pathway), while the amphetamine-stimulated aggression is strongly and specifically reduced by DA antagonists [33]. Violent behavior is also frequently observed during cocaine intoxication [30]. In addition, of Fairweather's 275 postencephalitic parkinsonian patients, 203 exhibited violence toward other people, while 83 had tendencies to destroy property [27]. Similarly, in monkeys, increased aggressiveness has been induced with agents that stimulate DA receptors [34].

This report describes a case of TS associated with OCD, inappropriate sexual behavior, and aggressive behavior. Recently, it has been suggested that obsessive-compulsive behavior and aggressive behavior [6] as well as inappropriate sexual behavior [35] are linked to central features of TS. Although it would be an oversimplification to propose a common neurochemical diathesis shared by these phenomena, indirect evidence suggests that a disturbance in DA function may contribute, in part, to the pathophysiology of each of these behaviors. Certainly it is not possible to support a

DA involvement in the tics and associated behaviors of TS based on this single case report; however, preliminary results presented in this report and others [4,6,8,31] suggest that not only the tics of TS but also these associated complex behaviors respond, at least in part, to DA blockade. Certainly nonspecific therapeutic effects secondary to sedation or the hospitalization in general may have contributed to the patient's improvement. The present case suggests, however, that the often disabling, incapacitating complex behaviors of TS should be considered targets of pharmacotherapy rather than simply associated phenomena. Continued investigative efforts at the basic and clinical neuroscientific level are essential to characterize further the pathophysiology of TS and these associated complex behaviors.

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REFERENCES

1. Trimble M: Psychopathology and movement disorders: A new perspective on the Gilles de la Tourette syndrome. J Neurol Neurosurg Psychiatry (Special Supplement):90–95, 1989
2. Frankel M, Cummings JL, Robertson MM, Trimble MR, Hill MA, Benson DF: Obsessions and compulsions in Gilles de la Tourette's syndrome. Neurology 36:378–382, 1986
3. Pitman RK, Green RC, Jenike MA, Mesulam MM: Clinical comparison of Tourette's disorder and obsessive-compulsive disorder. Am J Psychiatry 144:1166–1171, 1987
4. Nee LE, Caine ED, Polinsky RJ, Eldridge R, Ebert MH: Gilles de la Tourette syndrome: Clinical and family study of 50 cases. Ann Neurol 7:41–49, 1980
5. Stefl ME: Mental health needs associated with Tourette syndrome. Am J Public Health 74:1310–1313, 1984
6. Robertson MM, Trimble MR, Lees AJ: The psychopathology of the Gilles de la Tourette syndrome: A phenomenological analysis. Br J Psychiatry 152:383–390, 1988
7. Eldridge R, Sweet R, Lake CR, Ziegler M, Shapiro AK: Gilles de la Tourette's syndrome: Clinical, genetic, psychologic, and biochemical aspects in 21 selected families, Neurology 27:115–124, 1977
8. Moldofsky H, Tullis C, Lamon R: Multiple tic syndrome (Gilles de la Tourette's syndrome). Clinical, biological and psychological variables and their influence with haloperidol. J Nerv Ment Dis 159:282–292, 1974
9. Harcherick DF, Leckman JF, Detlor J, Cohen DJ: A new instrument for clinical studies of Tourette's syndrome. J Am Acad Child Psychiatry 23:153–160, 1984
10. Robertson MM: The Gilles de la Tourette syndrome: The current status. Br J Psychiatry 154:147–169, 1989
11. Comings DE: A controlled study of Tourette syndrome. VII. Summary: A common genetic disorder causing disinhibition of the limbic system. Am J Hum Genet 41:839–866, 1987
12. Shapiro AK, Shapiro ES, Young JG, Feinberg TE (ed): Gilles de la Tourette Syndrome, Second Edition. New York, Raven Press, 1988
13. Cohen DJ, Shaywitz BA, Young JG, Carbonari CM, Nathanson JA, Lieberman D, Bowers MB Jr, Maas JW: Central biogenic amine metabolism in children with the syndrome of chronic multiple tics of Gilles de la Tourette. J Am Acad Child Psychiatry 18:320–341, 1979
14. Leckman JF, Riddle MA, Berrettini WH, Anderson GM, Hardin M, Chappell P, Bissette G, Nemeroff CB, Goodman WK, Cohen DJ: Elevated CSF dynorphin A [1–8] in Tourette's syndrome. Life Sci 43:2015–2023, 1988
15. Singer HS, Butler IJ, Tune LE, Seifert WE Jr, Coyle JT: Dopaminergic dysfunction in Tourette syndrome. Ann Neurol 12:361–366, 1982
16. Devinsky O: Neuroanatomy of Gilles de la Tourette's syndrome. Arch Neurol 40:508–514, 1983
17. Klawans HL, Falk DK, Nausieda PA, Weiner WJ: Gilles de la Tourette syndrome after long-term chlorpromazine therapy. Neurology 28:1064–1068, 1978

18. Shapiro E, Shapiro AK, Fulop G, Hubbard M, Mandeli J, Nordlie J, Phillips RA: Controlled study of haloperidol, pimozide, and placebo for the treatment of Gilles de la Tourette's syndrome. Arch Gen Psychiatry 46:772–730, 1989
19. Feinberg M, Carroll BJ: Effects of dopamine agonists and antagonists in Tourette's disease. Arch Gen Psychiatry 36:979–985, 1979
20. Mesulam MM: Cocaine and Tourette's syndrome. N Engl J Med 315:398, 1986
21. Factor SA, Sanchez-Ramos JR, Weiner WJ: Cocaine and Tourette's syndrome. Ann Neurol 23:423–424, 1988
22. Ellinwood EH Jr: Amphetamine psychosis. I. Description of the individuals and process. J Nerv Ment Dis 144:273–283, 1967
23. Pitman RK: Animal models of compulsive behavior. Biol Psychiatry 26:189–198, 1989
24. Leonard HL, Rapoport JL: Relief of obsessive-compulsive symptoms by LSD and psilocin. Am J Psychiatry 144:1239–1240, 1987
25. McDougle CJ, Goodman WK, Delgado PL, Price LH: Pathophysiology of obsessive-compulsive disorder. Am J Psychiatry 146:1350–1351, 1989
26. McDougle CJ, Goodman WK, Price LH, Delgado PL, Krystal JH, Charney DS, Heninger GR: Neuroleptic addition in fluvoxamine-refractory obsessive compulsive disorder. Am J Psychiatry 147:652–654, 1990
27. Fairweather DS: Psychiatric aspects of post-encephalitic syndrome. J Ment Sci 93:201–254, 1947
28. Quinn NP, Toone B, Lang AE, Marsden CD, Parkes JD: Dopa dose-dependent sexual deviation. Br J Psychiatry 142:296–298, 1983
29. Shapiro SK: Hypersexual behavior complicating levodopa (l-dopa) therapy. Minn Med 56:58–59, 1973
30. Post RM: Cocaine psychoses: A continuum model. Am J Psychiatry 132:225–231, 1975
31. Comings DE, Comings BG: A case of familial exhibitionism in Tourette's syndrome successfully treated with haloperidol. Am J Psychiatry 139:913–915, 1982
32. Pfaus JG, Phillips AG: Differential effects of dopamine receptor antagonists on the sexual behavior of rats. Psychopharmacology 98:363–368, 1989
33. Antelman SM, Caggiula AR: Norepinephrine-dopamine interactions and behavior. Science 195:646–653, 1977
34. Goldstein M, Battista AF, Ohmotto T, Anagnoste B, Fuxe K: Tremor and involuntary movements in monkeys: Effect of L-dopa and of a dopamine receptor stimulating agent. Science 179:816–817, 1973
35. Sandyk R, Regis Kwo-on-Yuen PF, Awerbuch G, Banford CR: Inappropriate sexual behavior and denervation supersensitivity of limbic and midbrain LHRH receptors in Tourette's syndrome. J Clin Psychopharmacol 8:295–296, 1988