

Sherif Soliman,^{1,*} M.D.; Shuja Haque,² M.D.; and Edwin George,³ M.D., Ph.D.

Stalking and Huntington's Disease: A Neurobiological Link?

ABSTRACT: This case report describes a patient with Huntington's Disease (HD) who allegedly stalked her therapist. The patient developed recurrent thoughts about her therapist as well as amorous feelings towards her therapist. She engaged in stalking behavior including unwelcome gifts, multiple telephone calls to the therapist's office and home, and making threats towards the therapist. The patient continued to contact the therapist after the therapist filed a Personal Protection Order. The patient was successfully treated with risperidone and fluvoxamine. Through a focused review of the relevant literature, the authors explore the potential relationship between the patient's obsessional thoughts, amorous feelings towards her therapist, the basal ganglia dysfunction, and the stalking behavior. The authors posit a hypothesis of stalking as a novel early manifestation of HD in this patient. To the best of the authors' knowledge, this is the first reported case of stalking occurring with potentially causal organic lesions.

KEYWORDS: forensic science, forensic psychiatry, stalking, Huntington's Disease, female stalkers, stalkers, etiology of stalking, pathophysiology of stalking, neurobiology of stalking, basal ganglia, caudate, dopamine, serotonin, fluvoxamine, risperidone

Huntington's Disease (HD) is an autosomal dominant neurological disease that is characterized by caudate atrophy, chorea, and cognitive impairment (1). HD is caused by a CAG (Cystosine-Adenine-Guanine) trinucleotide (a DNA segment of three nucleic acids) repeat on the short arm of chromosome 4 and exhibits anticipation, which means that the number of repeats increases with each successive generation. Anticipation causes the disease to manifest at earlier ages with each successive generation. The typical age of onset is in the fourth or fifth decade of life, though prodromal symptoms may precede the chorea. Multiple neuropsychiatric symptoms have been reported in association with HD including depression, obsessions, psychosis, and mania (1–7).

Stalking, a relatively new crime, has various definitions in law and forensic science. For the purpose of this report, we have adopted Meloy's (8) definition, which is "the willful, malicious, and repeated following or harassing of another person that threatens his or her safety." Emerging data have begun to characterize stalkers based upon the methods employed, primary motivations of the stalker, demographic factors of the stalker and the victim, and prior relationships with the victims (8–15). Stalking has been hypothesized to be linked to dysfunction of the subcortical dopaminergic pathways and central serotonergic pathways (11). This hypothesis accounts for both the aggression and the obsessive thinking that are commonly seen among stalkers, which are probably linked to increased dopaminergic drive and decreased serotonergic drive, respectively. This case report describes a patient with HD who exhibited depression, obsessional thoughts, and stalking behavior towards her therapist. These symptoms preceded the onset of the

patient's choreiform movements and are hypothesized to be an early manifestation of dysfunction of the caudate nucleus and other subcortical pathways.

Case Presentation

Ms. A was a 48-year-old divorced female who was admitted to an inpatient psychiatric unit. She had a history of HD, genetically confirmed 1 year prior to admission. The patient was admitted for threatening a female therapist (KS), by whom she had been treated for 15 months in both individual and group therapy. Ms. A made frequent telephone calls to her therapist at home for several months. She gave the therapist unwanted gifts and cards, including a Valentine's Day gift. Ms. A told KS that she was "enamored" with her and became angry when KS attempted to refuse the gifts. The contacts increased and consisted alternately of calling and hanging up, threats of suicide and violence, and expressions of contrition. The telephone calls continued after the therapy was terminated and even after KS filed a Personal Protection Order against Ms. A. The threats escalated and Ms. A physically assaulted KS on one occasion. She did not employ weapons and the assault did not result in injury. Of note, Ms. A had a history of initiating repeated, unwelcome contacts towards a former female roommate prior to the development of HD, prompting her (the roommate) to file a Personal Protection Order. The details of that case are not known.

Ms. A had a history of two prior psychiatric admissions for depression, as well as three suicide attempts. She was treated as an outpatient with nefazodone. She had a history of alcohol abuse and was drinking up to six 12 oz cans of beer in one sitting, 1–2 times per week.

Ms. A's mother left early in her childhood and she was raised by her paternal grandparents. Her maternal family history is unknown and her paternal family history is negative for HD. She reports a history of recurrent sexual abuse by a male family member. She served in the military in a noncombatant role. She described her sexual orientation as bisexual and was married to a male

¹Department of Psychiatry, Wayne State University, 2751 E. Jefferson, Suite 400, Detroit, MI.

²Department of Psychiatry, John D. Dingell VAMC, 4646 John R. Street, Detroit, MI.

³University Health Center 8D, 4201 St. Antoine, Detroit, MI.

*Present Address: Northcoast Behavioral Healthcare, 1708 Southpoint Drive, Cleveland, OH.

Received 2 Oct. 2006; and in revised form 4 Mar. 2007; accepted 11 April 2007; published 3 Aug. 2007.

partner for 4 years and divorced due to alleged physical abuse against her. She had a legal history of two Personal Protection Orders filed against her (including the one by KS).

On examination, Ms. A was a thin female who appeared older than her age. She had mild choreiform movements of her upper extremities bilaterally and a wide based gait. She had poverty of speech. Her mood was depressed with a blunt affect. Thought blocking was evident. She denied auditory or visual hallucinations. She described recurrent thoughts of her former therapist (KS) and expressed a desire to call her and express amorous feelings towards her. Alternately, she would express anger towards KS. She did not express a belief that KS was in love with her. She endorsed passive suicidal ideation. She was alert and oriented to person, place, and time. She had minimal insight about the inappropriateness of her conduct.

Two neuropsychological evaluations were conducted, 19 months apart. They revealed a full scale IQ of 72 and 65, respectively. The results indicated a decline in intellectual function compared with estimates of premorbid function. Additionally, impaired memory, executive function, and complex problem solving were noted. The impairment in executive function was consistent with marked deficiencies in tending to her daily activities and was suggestive of early stage dementia.

The patient continued to contact KS while in the hospital. She became agitated on several occasions when she was denied access to the telephone. In fact, she tried to climb over the counter to use the telephone at the nursing station. Ms. A remained in the hospital for *c.* 4 months. She was treated with fluvoxamine (antidepressant) and risperidone (antipsychotic), titrated to 100 mg three times daily and 2 mg twice daily, respectively. The patient reported a decrease in both the frequency and intensity of the thoughts about her previous therapist and the contacts ceased and have remained in remission for 5 years.

Discussion

The stalking behavior observed in Ms. A was typical in many ways of that observed among other female stalkers, with the notable exception that Ms. A's stalking behavior manifested itself at a later age than the typical female stalker. In addition, the stalking behavior was correlated with the onset of Ms. A's HD. These observations suggest the possibility that the stalking behavior was an early manifestation of basal ganglia pathology.

Meloy and Boyd (9) reported on a cohort of 83 female stalkers. They noted that the mean age of the stalkers was 37 (SD 9.5) and that 45% had a history of sexual abuse, as did Ms. A. In a study of 40 female stalkers, Purcell et al. (10) found that 40% of the victims were prior professional contacts, often mental health workers, as in the present report. In addition, they found that 48% of female stalkers targeted female victims, although Meloy and Boyd (9) found that only 33% targeted female victims. Telephone contacts, Ms. A's method of choice, were found by Purcell et al. (10) to be the most common method of stalking employed by women, with 97.5% of the sample utilizing the telephone to stalk their victims. Ms. A threatened her victim, as did 50% of the cohort studied by Purcell et al. (10) and 65% of the cohort studied by Meloy and Boyd (9). Most notably, Ms. A appeared to be motivated by amorous feelings towards her victim and a desire to establish intimacy. A desire to establish intimacy was the most frequent motivation in both cohorts. One significant difference is that Ms. A was somewhat older than the average female stalker in both of the aforementioned studies.

The stalking behavior observed in Ms. A potentially was an early manifestation of caudate dysfunction due to HD. Ms. A

exhibited two symptoms related to her stalking behavior that are probably linked to the basal ganglia lesions associated with HD. Namely, she exhibited obsessive thoughts about her therapist and amorous feelings towards her therapist.

The relationship between disorders of the basal ganglia and symptoms of Obsessive Compulsive Disorder (OCD) has been previously established (1–5,7,16–21). Patzold and Brune (3) reported a case of a 42-year-old woman with HD who experienced obsessions successfully treated with sertraline. Cummings and Cunningham (1) have reported two cases of OCD occurring in patients with HD. De Marchi and Mennella (2) have reported a 34% lifetime prevalence of OCD in an HD pedigree, with a higher incidence in patients affected by HD. They hypothesized that the OCD may represent a nonspecific effect of basal ganglia lesions or an earlier phenotype of the HD genotype. OCD symptoms occurring in HD have been putatively linked to lesions of the caudate nucleus seen in HD. This observation is consistent with data linking basal ganglia lesions to OCD (1–5,7,16–21).

The amorous feelings Ms. A displayed towards KS are also of interest and are potentially linked to a lesion of the caudate nucleus. In a functional magnetic resonance imaging study of 17 subjects who were "in love," Aron et al. (22) found that the right caudate nucleus was one of the areas activated when subjects were shown photographs of their love object. The head of the caudate nucleus is known to degenerate in HD.

Meloy and Fisher (11) have hypothesized that the obsessive thoughts and amorous feelings related to stalking are caused in part by low activity of the central serotonergic pathways and increased dopaminergic activity. Fisher et al. (23) hypothesized that romantic attachment is correlated with similar phenomena. These hypotheses are consistent with the observation that Ms. A's obsessive thoughts and stalking behavior remitted with selective serotonin reuptake inhibitor and antipsychotic treatment, which increases serotonergic drive and suppresses dopaminergic activity, respectively.

The stalking behavior exhibited by Ms. A potentially represented an early manifestation of basal ganglia, especially caudate dysfunction with subsequent dysregulation of serotonergic and dopaminergic pathways. The fact that Ms. A's stalking behavior correlated with the onset of HD, an illness known to cause degeneration of the caudate nucleus, supports the hypothesis advanced by Meloy and Fisher (11) that stalking is linked to basal ganglia pathology.

The possibility that stalking behavior in this patient was an early manifestation of caudate dysfunction is an intriguing one. However, this preliminary report has several limitations. First, this is a single case, thus, the findings must be regarded as speculative. Second, functional neuroimaging was not performed on this patient, which would have been helpful in establishing patterns of activation to stimuli associated with her victim. Third, Ms. A had multiple other factors that could have contributed to the stalking behavior. The patient had premorbid maladaptive personality traits, unstable early attachment, declining intellect, and had difficulty terminating a romantic relationship before she had HD. Attachment pathology has been linked to stalking (11).

Future Directions

This is a unique case of HD occurring as a correlate of stalking behavior. The pathophysiology of HD is known to involve the caudate nucleus. A lesion of the caudate nucleus could account some of the symptoms associated with this patient's stalking behavior. While the possibility that the stalking behavior was an early manifestation of basal ganglia dysfunction is an intriguing one, there are several limitations of the present study. Because this is a

single case, it is possible that the association between HD and stalking observed here was coincidental.

This hypothesis should be investigated further. For example, it would be interesting to see whether functional neuroimaging studies of stalkers using pictures of their victims compared with age matched controls reveal differential activation of basal ganglia structures in response to pictures of the victims. This approach would be akin to the manner in which Bartels and Zeki (24) studied the mechanisms underlying attraction. Another potential approach would be to discern whether there is an epidemiological link between basal ganglia disease and stalking behavior by screening patients with known basal ganglia disease for a history of stalking or difficulties terminating relationships. Stalking is a complex phenomenon probably caused by a combination of multiple psychological, biological, and sociological factors. This case will hopefully serve to provoke thought about the possible biological factors that contribute to stalking.

Acknowledgments

The authors wish to thank Richard Balon, M.D., Phillip Resnick, M.D., and Nashaat Boutros, M.D. Each has critically reviewed the case report and given feedback.

References

- Cummings JL, Cunningham K. Obsessive-compulsive disorder in Huntington's Disease. *Biol Psychiatry* 1992;31(3):263–70.
- De Marchi N, Mannella R. Huntington's Disease and its association with psychopathology. *Harv Rev Psychiatry* 2000;7(5):278–89.
- Patzold T, Brune M. Obsessive compulsive disorder in Huntington disease: a case of isolated obsessions successfully treated with sertraline. *Neuropsychiatry Neuropsychol Behav Neurol* 2002;15(3):216–9.
- Anderson KE, Louis ED, Stern Y, Marder KS. Cognitive correlates of obsessive and compulsive symptoms in Huntington's Disease. *Am J Psychiatry* 2001;158:709–801.
- Leroi I, Michalon M. Treatment of the psychiatric manifestations of Huntington's Disease: a review of the literature. *Can J Psychiatry* 1998;43:933–40.
- Wheelock VL, Tempkin T, Marder K, Nance M, Myers RH, Zhao H, et al. Predictors of nursing home placement in Huntington Disease. *Neurology* 2003;60:998–1001.
- Rosenblatt A, Leroi I. Neuropsychiatry of Huntington's Disease and other basal ganglia disorders. *Psychosomatics* 2000;41(1):24–30.
- Meloy JR. The clinical risk management of stalking: someone is watching over me. *Am J Psychother* 1997;51(2):174–85.
- Meloy JR, Boyd C. Female stalkers and their victims. *J Am Acad Psychiatry Law* 2003;31:211–9.
- Purcell R, Pathe M, Mullen PE. A study of women who stalk. *Am J Psychiatry* 2001;158:2056–60.
- Meloy JR, Fisher H. Some thoughts on the neurobiology of stalking. *J Forensic Sci* 2005;50:1472–80.
- Kamphuis JH, Emmelkamp PMG. Stalking—a contemporary challenge for forensic and clinical psychiatry. *Br J Psychiatry* 2000;176:206–9.
- Mullen PE, Pathe M, Purcell R. Stalking: new constructions of human behavior. *Aust N Z J Psychiatry* 2001;35:9–16.
- Palarea RE, Zona MA, Lane JC, Langhinrichsen-Rohling J. The dangerous nature of intimate relationship stalking: threats, violence, and associated risk factors. *Behav Sci Law* 1999;27:269–83.
- Purcell R, Pathe M, Mullen PE. Stalking: defining and prosecuting a new category of offending. *Int J Law Psychiatry* 2004;27:157–69.
- Aouizerate B, Guehl D, Cuny E, Rougier A, Bioulac B, Tignol J, et al. Pathophysiology of obsessive-compulsive disorder: a necessary link between phenomenology, neuropsychology, imagery, and physiology. *Prog Neurobiol* 2004;72:195–221.
- Maia AS, Barbosa ER, Menezes PR, Miguel Filho EC. Relationship between obsessive-compulsive disorders and diseases affecting primarily the basal ganglia. *Rev Hosp Clin Fac Med Sao Paulo* 1999;54(6):213–21.
- Diler RS, Kibar M, Avci A. Pharmacotherapy and regional cerebral blood flow in children with obsessive compulsive disorder. *Yonsei Med J* 2004;45:90–9.
- Ho Pian KL, van Megen HJ, Ramsey NF, Mandl R, van Rijk PP, Wynne HJ, et al. Decreased thalamic blood flow in obsessive compulsive disorder patients responding to fluvoxamine. *Psychiatry Res* 2005;138:89–97.
- Saxena S, Brody AL, Ho ML, Zohrabi N, Maidment KM, Baxter LR Jr. Differential brain metabolic predictors of response to paroxetine in obsessive-compulsive disorder versus major depression. *Am J Psychiatry* 2003;160:522–32.
- Thobois S, Jouanneau E, Bouvard M, Sindou M. Obsessive-compulsive disorder after unilateral caudate nucleus bleeding. *Acta Neurochir* 2004;146:1027–31.
- Aron A, Fisher H, Mashek DJ, Strong G, Li H, Brown LL. Reward, motivation and emotion systems associated with early-stage intense romantic love. *J Neurophysiol* 2005;94:327–37.
- Fisher HE, Aron A, Mashek D, Li H, Brown LL. Defining the brain systems of lust, romantic attraction and attachment. *Arch Sex Behav* 2002;31(5):413–9.
- Bartels A, Zeki S. The neural basis of romantic love. *Neuroreport* 2000;11:3829–34.

Additional information and reprint requests:
 Sherif Soliman, M.D.
 Northcoast Behavioral Healthcare
 1708 Southpoint Drive
 Cleveland, OH 44109
 E-mail: docsoli@gmail.com