JAOA CLINICAL PRACTICE

Obsessive-compulsive disorder: Identification, neurobiology, and treatment

JACKIE L. NEEL, DO
VIVIAN M. STEVENS, PHD
JOAN E. STEWART, DO

Obsessive-compulsive disorder (OCD) is a common psychiatric disorder. It may go unrecognized, however, as many patients are embarrassed by their symptoms and are thus reluctant to report them. Recent research findings on OCD point to neurologic dysfunction in the circuitry of the orbitofrontal cortex and basal ganglia. The advent of the use of serotonin reuptake inhibitors (SRIs) as well as behavioral therapy has greatly improved treatment outcomes for patients with OCD.

Given the likelihood that these patients are encountered in primary care consultations, physicians have the opportunity to play a crucial role in the early identification and proper treatment of OCD.

(Key words: obsessive-compulsive disorder, *Diagnostic and Statistical Manual of Mental Disorders, DSM–IV*, serotonin reuptake inhibitor, behavioral therapy, PANDAS, orbitofrontal cortex, basal ganglia)

Obsessive-compulsive disorder (OCD) is described in the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (*DSM–IV*), as a disorder involving recurrent obsessions, compulsions, or both.[1] Obsessions are defined in *DSM–IV* as persistent thoughts, images, or impulses that cause marked distress and are typically experienced as senseless and intrusive.[1] Compulsions are repetitive acts—either mental or behavioral—that are done in response to obsessions in an effort to reduce distress or prevent a dreaded event.[1] The patient usually recognizes his or her symptoms as unusual or bizarre but because of fear or embarrassment, the patient will often present to the primary care physician with emotional or physical complaints rather than disclose underlying obsessions and compulsions. A 17-year period from symptom onset to treatment has been noted.[2]

Obsessive-compulsive disorder has an estimated lifetime prevalence rate of 2% to 3%.[3] The course of the disorder tends to be chronic, but it can vary from cases with complete remission to those that are chronic and unremitting. The mean age of onset is about 20 years,[4] but as many as 80% of patients have onset before age 18.[5] The disorder tends to occur at an earlier age in males,[4] who are also more likely to have a concomitant tic disorder.[5] In adults, OCD is equally common among men and women. Stressful life circumstances are often associated with the onset or exacerbation of OCD symptoms. The disorder can manifest itself during pregnancy or during the postpartum period.[4]

The two cases that follow illustrate common presentations of OCD.

Pediatric obsessive-compulsive disorder

A 7-year-old boy was seen in his family physician's office after his parents became concerned with a change in his school performance and behavior at home. The patient's teacher stated that he was unable to complete written assignments because of constant erasing and that he repeatedly asked the same questions, disrupting the class. She also stated that he spent too much time in the bathroom washing his hands.

The patient seemed unable to control these behaviors, even with the threat of missing recess to complete unfinished schoolwork. He also was often late to school in the morning because he had to put his shirt, socks, and shoes on and take them off several times before leaving home. His parents were frustrated and blamed themselves for being unable to change these behaviors with either rewards or punishments.

The family physician diagnosed the patient with OCD and prescribed a daily dose of 10 mg paroxetine hydrochloride (Paxil) and provided him with a referral to a child psychologist. The child psychologist educated and supported the child and his parents, giving the child some cognitive-behavioral tools to help manage his disorder. Although still present, the intensity of the patient's behavioral symptoms gradually diminished over the next 3 to 4 months and he was able to function successfully at home and school.

Adult obsessive-compulsive disorder

A 24-year-old woman presented to her family physician's office 3 months after the birth of her first child. She was tearful and reported feelings of guilt due to withdrawing from the care of her son. Although the patient was not getting out of bed for other activities, she spent long periods in handwashing—to the extent that dermatitis developed on her hands. Further ques-

Dr Neel is an assistant professor of psychiatry at Oklahoma State University College of Osteopathic Medicine in Tulsa, Okla. Also at Oklahoma State University College of Osteopathic Medicine, Dr Stevens is an associate professor of behavioral science and Dr Stewart is an associate professor of family medicine.

Address correspondence to Jackie L. Neel, DO, Oklahoma State University College of Osteopathic Medicine, 1111 W 17th St, Tulsa, OK 74107-1898.

E-mail: *neel@osu-com.okstate.edu*

tioning by her physician revealed her intense fear of contaminating and thus killing her child. Her fears of life-threatening bacteria were intensified by any contact with surfaces in the bathroom, which is where she went to wash her hands—thus leading to a cycle of perceived contamination and subsequent rewashing. The only relief she obtained from her anxiety was while handwashing and when she was away from her infant.

The young woman had no active thought of harming her child, but because of her level of dysfunction and the severity of her symptoms, the patient was hospitalized. While hospitalized, the patient was diagnosed with OCD and received fluoxetine hydrochloride (Prozac), which was titrated up to 80 mg daily, in addition to undergoing intensive cognitive-behavioral therapy. She responded well to treatment and, after 2 weeks was discharged. The patient continued both modes of therapy, continuing cognitive-behavioral therapy on a weekly basis. Gradually, the patient was able to reassume—and enjoy—her responsibilities as a mother.

Her symptoms occasionally increased in intensity, particularly when she was under increased situational stress; however, 6 months after her hospitalization, she could dismiss any residual obsessive thoughts as symptoms of OCD that need not impact her functioning.

Diagnosis

As observed in these case vignettes, diagnosis requires familiarity with OCD symptoms as well as a willingness on the part of the primary care physician to explore beyond the more general complaints of childhood behavioral problems and adult anxiety or depression.

The symptoms of OCD can manifest in various ways (*Table 1*). Common obsessive themes include fear of contamination and fear of causing accidental harm to others. Obsessions can also include aggressive or sexual themes, pathologic doubting, or discomfort with asymmetry. Common ritualistic behaviors include checking, washing, repeating and counting, and repeated requests for reassurance. In addition to these active obsessive rituals, patients may engage in passive compulsions, such as refusing to shake hands with other people to avoid contamination. While obsessions and compulsions have been reported within the general population,[6] an OCD diagnosis according to *DSM–IV* requires that patients have marked distress over their OCD symptoms, that the symptoms be time-consuming, or that those symptoms significantly interfere with a person's usual functioning or relationships.[1]

Patients are usually able to recognize the irrational or excessive nature of their obsessions or compulsions and are distressed by their symptoms, though in some cases, patients do not possess this insight. Even when patients do recognize the low likelihood that feared consequences would occur in the absence of ritualizing, they find themselves giving in to the irresistible urges to ritualize. Anxiety decreases following the compulsive act; but, in a short while, intrusive thoughts recur. To relieve anxiety, patients repeat the behavior. This repetition results in powerful learned behavior. With time, OCD may dominate a person's life and other psychiatric difficulties may develop as a result.

There is a high degree of comorbidity associated with OCD. There is a lifetime history of major depression, as defined in *DSM–IV*, in two thirds of patients with OCD.[1,7] The depression that develops may, in some patients, be a secondary depression in response to dealing with the illness itself. There is also a high incidence of anxiety disorders in patients with OCD—in particular, phobias, social phobia, separation anxiety, generalized anxiety disorder, and panic disorder.[7] Substance abuse may also result as the patient attempts to "self-medicate" to mitigate the anxiety that OCD symptoms cause. Attention deficit–hyperactivity disorder must also be considered as a possible differential or comorbid diagnosis.

A potential source of confusion in the diagnosis of OCD is the differentiation from obsessive-compulsive personality disorder (OCPD), which shares some symptom manifestations, such as checking and extreme orderliness. The individual with OCPD, however, usually is less disturbed or secretive about symptoms. Thoughts and rituals, as experienced by the person with the OCPD, are perceived as less intrusive and senseless than those same symptoms are to people with OCD. These symptoms also tend to be of a more mundane nature to those with OCPD. The individual with OCPD is usually controlling, rigid, perfectionistic, and withholding. The person with OCPD has lifelong personality traits that he or she incorporates without distress, whereas the person with OCD has neuropsychiatric symptoms and finds those symptoms disturbing.[7]

A number of disorders have been related to OCD because of shared characteristics; some, such as Gilles de la Tourette syndrome, are linked etiologically to basal ganglia dysfunction—as is OCD. Other disorders are only presumed to share at least some brain circuitry due to similar symptomatology. A broad designation of OCD spectrum disorders was described by Hollander et al[2] to include the following: body dysmorphic disorder, somatoform disorders, hypochondriasis, depersonalization disorder, anorexia nervosa and/or bulimia, trichotillomania, pathologic gambling, paraphilias, multiple tics syndrome, onchyphagia (nail biting), delusional disorder, Sydenham's chorea, Parkinson's disease, epilepsy, autistic disorder, and other pervasive developmental disorders. It is clear that a wide variety of psychiatric and neurologic disorders may be accompanied by symptoms of OCD.

Neurobiology

Psychologic theories developed by Freud cited the compulsive rituals of OCD as a defense mechanism against unconscious impulses.[4] Recent theories look for the neurologic basis of these impulses; in such studies, OCD has been consistently linked to malfunction of the orbitofrontal cortex and basal ganglia.[4] Further, disease processes known to affect these

Table 1
Presentations of Obsessive-Compulsive Disorder and Associated Ritualistic Behaviors

Type	Feared outcome(s)	Example(s)
Checking	Harm befalling others — Making a mistake	Repeatedly verifying that stoves, faucets, irons, and electrical appliances are turned off — Repeatedly verifying that windows are closed and doors are locked — Retracing route driven to ensure no one was accidentally hit and/or looking under vehicle to ensure the same
Washing	Spreading illness to others or self	Excessive hand washing and showering and/or excessive use of toiletries — Excessive cleaning — Fear of dirt, germs, chemicals, poisons, radiation, feces, bodily fluids, and perceived contaminants
Repeating and counting	Making a mistake — Harm befalling others	Cycle of erasing and rewriting — Turning lights on and off repeatedly and mechanistically — Repeating a word or prayer "until things feel right"
Ordering and symmetry	_____	Fearful of letting others touch possessions — Straightening and rearranging objects "until things feel right"
Hoarding	An item is now needed that was disposed of	Difficulty disposing items, which may result in severely limited living space as objects accrue in home
Harming obsessions	Losing control and harming another person, despite lack of violent intentions	Refuses to be near knives or other sharp objects — Refuses to be alone with children
Religious or sexual obsessions	Harm befalling others or self	Engages in cognitive rituals
Primary obsessional slowness	_____	Acts are performed in an extremely slow fashion
Pure obsessionals	_____	Obsessive thought content in the absence of accompanying rituals

areas of the brain, such as Sydenham's chorea, Huntington's chorea, localized brain tumors, and Von Economo's encephalitis, have been associated with symptoms of OCD.[8]

Using positron emission tomography studies, Rauch et al[9] have observed brain activation patterns in patients with OCD versus control subjects. In that study, OCD patients did not activate right or left inferior striatum in response to procedural learning tasks (those out of our awareness), as controls did. Instead, patients with OCD appeared to access the medial temporal regions of the brain—those regions more associated with conscious and emotional memory.

It is hypothesized that if corticostriatal regions are dysfunctional in patients with OCD, those patients may access conscious mechanisms to accomplish what would come automatically to the unimpaired brain. As a consequence, inappropriate thoughts repeatedly intrude and the conscious thought process must attempt to suppress them, along with the accompanying behavior and anxiety. A neurologic deficit in the function and/or circuitry of the orbitofrontal cortex, the caudate nucleus, and the thalamus has been proposed.[10] The hypothesized brain circuitry, as well as sites of therapeutic intervention, is depicted in *Figure 1*.[11]

In early-onset cases, one theory suggests a developmental abnormality involving the normal "pruning" of excess neurons that occurs during brain maturation. This theory is supported by findings in morphometric magnetic resonance imaging studies of treatment-naïve pediatric patients with OCD in whom increased ventral prefrontal cortical anterior cingulate volumes were found.[12]

A newly described subgroup of children with tics and/or OCD is thought to develop, or have exacerbation of symptoms, following infection with Group A β-hemolytic streptococci.[13] This group has been identified by the name PANDAS (pediatric autoimmune neuropsychiatric disorders associated with streptococcal infections); OCD's pathogenesis in these patients is thought to be through an autoimmune process.[13]

Studies of Sydenham's chorea in children and adolescents revealed that obsessive-compulsive symptoms were

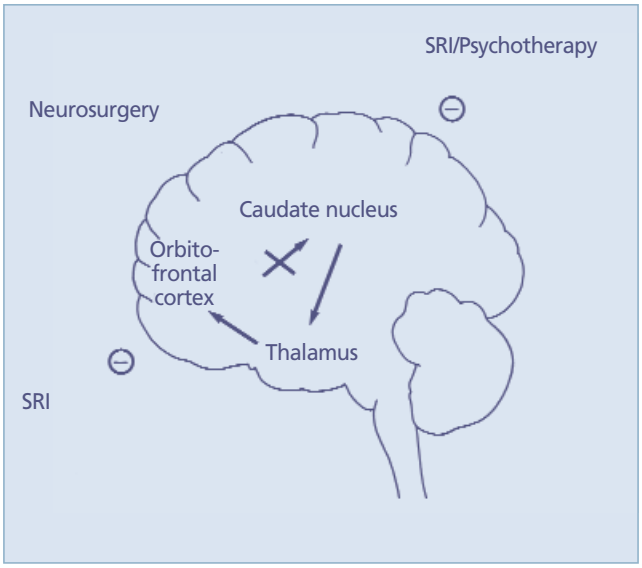

Figure 1. *Neurocircuitry of obsessive-compulsive disorder and effects of various therapeutic interventions. Current evidence supports neurologic dysfunction in the circuitry of the orbitofrontal cortex, basal ganglia, and thalamus as the source of obsessive-compulsive disorder. Patients' symptoms can be interrupted by SRIs, cognitive-behavioral therapy, and psychosurgery at sites along this circuitry. Image reproduced with permission of Pierre Blier, MD, PhD.*[11]

present in nearly three quarters of the children evaluated. Neuropsychologic and neuroimaging studies have shown evidence of basal ganglia dysfunction in both Sydenham's chorea and OCD, as well as the presence of similar antineuronal antibodies in both disorders.[13] Immunomodulatory therapy may prove to be beneficial for this subgroup of patients with OCD. Modes of therapy including antibiotic prophylaxis, intravenous immunoglobulin, and plasmapheresis are currently under investigation.[14]

There has not been identification of a mendelian pattern of inheritance or of an OCD gene; however, there are multiple studies that identify familial patterns to at least a subset of this illness. This pattern is seen more frequently in those individuals afflicted with early-onset and severe cases of OCD.[15] In a study of 145 first-degree relatives of 46 children and adolescents with OCD, Lenane et al[16] found 25% of fathers and 9% of mothers also had OCD. There also appears to be a genetic link to Gilles de la Tourette syndrome with OCD rates of 11.5% among 338 biological relatives of 86 patients with Gilles de la Tourette syndrome.[5]

Treatment

As mentioned, OCD is a chronic anxiety disorder that tends to wax and wane over a patient's lifetime. The best management comes for the patient for whom drug treatment and cognitive-behavioral techniques are combined.[17] Serotonin reuptake inhibitors (SRIs) are the drugs of choice in the treatment of OCD. A metanalysis of drug response in OCD treatment yielded improvement rates of 21.6% to 61.3%.[18] Even this level of response can dramatically improve the quality of a patient's daily life.

Clomipramine hydrochloride (Anafranil) was the first FDA-approved drug to treat OCD. Although it is a potent serotonin reuptake blocker, it is a tricyclic antidepressant by chemical structure. It is less selective than the SRIs and results in more adverse side effects. The more selective agents have a much better side effect profile and appear to be nearly as efficacious as clomipramine hydrochloride in comparison studies.

Table 2
Dosage Ranges and Potential Side Effects of Drugs Used to Treat Obsessive-Compulsive Disorder

Drug	Daily dosage, mg	Potential side effects
■ **Serotonin reuptake inhibitors (SRIs)**		
☐ Citalopram hydrobromide (Celexa)	10 - 60	Insomnia
☐ Fluoxetine hydrochloride (Prozac)	10 - 80	Sexual dysfunction
☐ Fluvoxamine maleate (Luvox)	50 - 300	Nausea
☐ Paroxetine hydrochloride (Paxil)	10 - 60	Diarrhea, headache
☐ Sertraline hydrochloride (Zoloft)	50 - 225	Withdrawal, agitation
■ **Tricyclic antidepressant (TCA)**		
☐ Clomipramine hydrochloride	25 - 300	Anticholinergic symptoms (dry mouth, constipation, confusion), orthostatic hypotension, sexual side effects, weight gain, cardiac conduction abnormalities,* lowered seizure threshold, sedation

* Physicians should obtain an electrocardiogram for at-risk patients.

- ✔ Inquire about the presence of distressing or disturbing thoughts that the person finds hard to get rid of or ignore.
- ✔ Determine whether these thoughts involve themes common to obsessive-compulsive disorder, such as fears about being contaminated by dirt or germs, making a mistake, or unintentionally hurting someone.
- ✔ Inquire about whether certain actions are performed over and over again, such as handwashing, checking locks on doors or windows, or counting silently to oneself.
- ✔ Determine whether there is discomfort when items are not symmetrical or if actions must be continued until stopping "feels right."

Figure 2. *Areas to cover when inquiring about the symptoms of obsessive-compulsive disorder.*

Obsessive-Compulsive Foundation (OCF)
337 Notch Hill Rd
North Branford, CT 06471-1826
Phone: (203) 315-2190
E-mail: *info@ocfoundation.org*
Web site: *http://www.ocfoundation.org*

Anxiety Disorders Association of America (ADAA)
11900 Parklawn Dr, Ste 100
Rockville, MD 20852-2624
Phone: (301) 231-9350
E-mail: *anxdis@adaa.org*
Web site: *http://www.adaa.org*

Books

Foa EB, Wilson R. *Stop Obsessing! How to Overcome Your Obsessions and Compulsions. New York, NY:* Bantam Doubleday Dell Publishers; 2001.

Steketee G, White K. *When Once is Not Enough: Help for Obsessive-Compulsives* . Oakland, Calif: New Harbinger Publications; 1990.

Rapoport JL. *The Boy Who Couldn't Stop Washing: The Experience and Treatment of Obsessive Compulsive Disorder.* New York, NY: New American Library; 1997.

Figure 3. *Suggested resources.*

In general, higher dose ranges of SRIs may be required for maximum benefit in patients with OCD. Further, because OCD is a lifelong disorder, exacerbations of symptoms occur frequently when medication is discontinued.[16] *Table 2* lists information on dosage ranges and potential side effects for pharmacologic agents helpful in treating patients with OCD.

If a response is not obtained at maximal tolerated doses in two or more single medication trials, an augmentation with an additional agent may be necessary. Clomipramine hydrochloride may be added to an SRI in low daily doses of 25 mg to 50 mg; however, higher doses of clomipramine hydrochloride could potentially lead to toxicity due to competitive inhibition. The levels of tricyclic antidepressants in patients' blood should be measured regularly to ensure patient safety if the two classes of drugs are used together. For high levels of anxiety (ie, those that paralyze the patient from completing behavioral goals), benzodiazepines are useful in treatment regimens. If a tic or thought disorder is present, antipsychotic drugs should be added to the prescribed SRI. Haloperidol at low daily doses of 0.5 mg to 5 mg is a commonly used drug for this purpose. In several small studies, the atypical antipsychotics (eg, olanzapine, risperidone) have also proven efficacious.[19] Buspirone hydrochloride may also be added to the SRI for treatment-resistant cases. It is important to note that any medication trial for patients with OCD should last a minimum of 10 to 12 weeks.[20] Although it is rarely used, psychosurgery (eg, subcaudate tractotomy, anterior capsulotomy, or limbic leucotomy) that interrupts efferent pathways between the orbitofrontal cortex and basal ganglia has proven effective in up to 67% of severe unresponsive cases.[21]

Behavioral therapy, using the components of exposure and response prevention, has also been shown to be an effective mode of treatment for patients with OCD.[22] Behavioral exposure involves introducing patients to fear-eliciting stimuli in a gradual fashion and preventing them from engaging in their subsequent and accompanying ritualistic behaviors. Cognitive techniques may also be indicated to help correct distorted thought patterns that contribute to or underlie symptoms of OCD.[23]

Screening, psychoeducation, and collaborative care

The family physician may be the first healthcare professional to see a child or an adult with OCD. To increase recognition of this disorder, family physicians should routinely include questions about intrusive thoughts, rituals, or tics in their review of systems. Sensitivity when inquiring about symptoms is essential, however, as patients are usually aware that these symptoms seem unusual or irrational. Physicians should look for clues to the diagnosis, such as chapped hands or repeated requests for HIV testing without clinical indication. Physicians should also screen for depression, which commonly coexists with OCD. Several assessment and screening instru-

ments have been developed to aid in identifying OCD, such as the Yale-Brown Obsessive Compulsive Scale.[24] Areas to cover when inquiring about OCD symptoms are shown in *Figure 2*.

When a diagnosis of OCD is made, it is extremely important for physicians to reassure their pediatric and adult patients that they have a disease and that they are not "at fault" for these behaviors. The analogy of a "brain hiccup" is a good way to describe the symptoms of OCD to pediatric patients.[25] Older patients can benefit from discussions about the neurobiologic basis of the disorder and the role that rituals play in strengthening obsessive-compulsive behavior.

If initial pharmacologic interventions are ineffective, the primary care physician may obtain psychiatric consultation as well as a patient referral for cognitive-behavioral treatment. Psychoeducation of the patient's family members, in addition to the patient, will reduce enabling behavior and aid in the recovery of patients with OCD, who may involve family members to help clean, check, or participate in other OCD rituals. There are a number of books and resources that can also be recommended to patients and their families (*Figure 3*).

When a pediatric patient is being treated for OCD, the child's physician, parent(s), and daytime caregivers (eg, school faculty, daycare workers, babysitter, nanny) need to work together to provide an understanding and supportive environment for the child. In more severe cases, daytime caregivers may need to be educated about OCD to be able to send a positive message to classmates and intervene quickly if teasing occurs.

Comment

Obsessive-compulsive disorder is a neurologically based illness with emotional, mental, and behavioral symptoms. Because OCD is often covert in presentation, diagnosis requires more vigilance than other common psychiatric disorders. Primary care physicians can greatly benefit their patients by screening more actively for this disorder. Once the diagnosis is made, education and treatment intervention can greatly enhance the quality of life for individuals with OCD.

References

1. First MB, ed. Obsessive-compulsive disorder. In: *Diagnostic and Statistical Manual of Mental Disorders.* 4th ed. Washington, DC: American Psychiatric Association; 1994:417-423.

2. Hollander E, Kwon JH, Stein DJ, Broatch JW, Rowland CT, Himelein CA. Obsessive-compulsive and spectrum disorders: overview and quality of life issues. *J Clin Psychiatry* 1996;57(suppl 8):3-6.

3. Rothenberg A. Diagnosis of obsessive-compulsive illness [review]. *Psychiatr Clin North Am* 1998;21:791-801,vi.

4. Kaplan HI, Sadock BJ. Anxiety disorders. In: *Synopsis of Psychiatry: Behavioral Sciences/Clinical Psychiatry.* 8th ed. Baltimore, Md: Lippincott Williams & Wilkins; 1998:609-617.

5. Pauls DL, Alsobrook JP II, Goodman W, Rasmussen S, Leckman JF. A family study of obsessive-compulsive disorder. *Am J Psychiatry* 1995;152:76-84.

6. Rachman S, de Silva P. Abnormal and normal obsessions. *Behav Res Ther* 1978;16:233-248.

7. Rasmussen SA, Eisen JL. The epidemiology and differential diagnosis of obsessive compulsive disorder [review]. *J Clin Psychiatry* 1992;53(suppl):4-10.

8. Jenike MA. Obsessive compulsive disorder. *Compr Psychiatry* 1983;24:99-115.

9. Rauch SL, Savage CR, Alpert NM, Dougherty D, Kendrick A, Curran T, et al. Probing striatal function in obsessive-compulsive disorder: a PET study of implicit sequence learning. *J Neuropsychiatry Clin Neurosci* 1997;9:568-573.

10. Rauch SL, Jenike MA. Neurobiological models of obsessive-compulsive disorder [review]. *Psychosomatics* 1993;34:20-32.

11. Blier P. Neurological basis of antidepressants and anti-obsessional response [presentation]. Psychiatric Neuroscience: A primer for clinicians. Boston, Mass; April 7, 2000.

12. Rosenberg DR, Keshavan MS. AE Bennett Research Award. Toward a neurodevelopmental model of obsessive-compulsive disorder. *Biol Psychiatry* 1998;43:623-640.

13. Swedo SE, Leonard HL, Garvey M, Mittleman B, Allen AJ, Lougee L, et al. Pediatric autoimmune neuropsychiatric disorders associated with streptococcal infections: clinical description of the first 50 cases. *Am J Psychiatry* 1998;155:264-271.

14. Perlmutter SJ, Garvey MA, Castellanos X, Mittleman BB, Giedd J, Rapoport JL, et al. A case of pediatric autoimmune neuropsychiatric disorders associated with streptococcal infections [clinical case conference]. Am J Psychiatry 1998;155:1592-1598.

15. Nestadt G, Samuels J, Riddle M, Bienvenu OJ III, Liang KY, LaBuda M, et al. A family study of obsessive-compulsive disorder. *Arch Gen Psychiatry* 2000;57:358-363.

16. Lenane MC, Swedo SE, Leonard H, Pauls DL, Sceery W, Rapoport JL. Psychiatric disorders in first degree relatives of children and adolescents with obsessive compulsive disorder. *J Am Acad Child Adolesc Psychiatry* 1990;29:407-412.

17. Greist JH. An integrated approach to treatment of obsessive compulsive disorder [review]. *J Clin Psychiatry* 1992;53(suppl):38-41.

18. Piccinelli M, Pini S, Bellantuono C, Wilkinson G. Efficacy of drug treatment in obsessive-compulsive disorder. A meta-analytic review. *Br J Psychiatry* 1995;166:424-443.

19. Boschert S. Many choices for augmentation in refractory OCD. *Clin Psychiatry News* Nov 2000;28:12.

20. Jefferson JW, Greist JH. The pharmacotherapy of obsessive-compulsive disorder. *Psychiatric Ann* 1996;26:202-209.

21. Mindus P, Jenike MA. Neurosurgical treatment of malignant obsessive compulsive disorder [review]. *Psychiatr Clin North Am* 1992;15:921-938.

22. Abramowitz JS. Does cognitive-behavioral therapy cure obsessive-compulsive disorder? A meta-analytic evaluation of clinical significance. *Behavior Ther* 1998;29:339-355.

23. March JS, Frances A, Carpenter D, Kahn DA. Treatment of obsessive-compulsive disorder [Expert Consensus Guideline series]. *J Clin Psychiatry* 1997;58(suppl 4):1-73.

24. Goodman WK, Price LH, Rasmussen SA, Mazure C, Fleischmann RL, Hill CL, et al. The Yale-Brown Obsessive Compulsive Scale. I. Development, use, and reliability. *Arch Gen Psychiatry* 1989;46:1006-1011.

25. March JS, Mulle K. *OCD in Children and Adolescents: A Cognitive-Behavioral Treatment Manual.* New York, NY: Guilford Press; 1998:61.