CHAPTER 9

Treatment of ADHD and Disorders of Attention

This chapter explores the nature and causes of ADHD and other disorders of attention. Special consideration is given to diagnosis and matching the right behavioral and pharmacological treatment to the needs of patients and their families.

Topics to be addressed include the following:

- Etiology of ADHD
- Diagnostic assessment of attention disorders
- Psychological and pharmacological treatment
- Case vignettes

Attention-deficit disorders are the most common disorders presenting in childhood. Researchers estimate that approximately 3% to 7% of all school-age children have attention-deficit disorders (Kratochvil, Vaughan, Harrington, & Burke, 2003; Polanczyk et al., 2007; Spencer, Biederman, Wilens, & Faraone, 2002). Attention-deficit/hyperactivity disorder (ADHD) is diagnosed two or three times more often in boys than in girls, and it is commonly comorbid with other mental health concerns such as conduct/antisocial personality, substance abuse, anxiety disorders, and mood disorders including pediatric mania (Nevels, Dehone, Alexander, & Gontkovsky, 2010; Solberg et al., 2018; Strange, 2008). Further, it is estimated that as much as 70% of these youth will demonstrate attention-deficit disorder (ADD) or ADHD symptoms into their adult years (Aviram, Rhum, & Levin, 2001; McCann & Roy-Byrne, 2000). The symptoms for adults with these disorders are almost identical to the symptoms seen in children, but adults tend to display less hyperactivity and more internalized restlessness.

Treatment of ADHD can be complicated because many children who meet diagnostic criteria for the disorder may also have comorbid oppositional and conduct disorders (Wilson & Levin, 2001). Wilson and Levin also estimated that approximately 50% of youth treated for substance abuse meet diagnostic criteria for ADHD. Some clinicians are concerned that treating ADHD with stimulants may increase the risk for substance abuse, including possibly abusing the stimulant, but research suggests that treating ADHD early may in fact reduce this risk (Aviram et al., 2001; Wilson & Levin, 2001). Animal studies have indicated that stimulants such as methylphenidate are far less likely to be abused than are other stimulants such as cocaine (Kollins, 2003, 2008). Kollins also found that an ADHD patient is less likely than those without the diagnosis to abuse methylphenidate and other therapeutic stimulants. Moreover, Kollins (2008) found that comorbidity of other psychiatric disorders—especially bipolar disorder, antisocial personality disorder, and eating disorders—were particularly predictive of polydrug and nonmedical stimulant use. Long-acting preparations may be more beneficial because of their higher potential for increased compliance and lower potential for abuse (Bright, 2008; Nair & Moss, 2009). Bright further maintains that mixed amphetamine salts are more likely to be abused than methylphenidate (40% vs. 15%, respectively). Nair and Moss further state that, despite concern about diversion of the drug, recent data suggest that there may be benefits in preventing substance abuse disorders in patients with adult ADHD.

ETIOLOGY OF ADHD

Molecular genetics and neuroimaging studies confirm that disorders of attention like ADHD are heterogeneous neurobiological disorders, mainly of the dopaminergic and noradrenergic pathways (Adler & Chua, 2002). These researchers further found as much as a 50% concordance rate with other first-degree relatives. Subsequent studies have demonstrated frontal lobe dysfunction in the pathophysiology of ADHD and a dysregulation of the neurotransmitters dopamine and norepinephrine in the frontal lobes, the basal ganglia, the amygdala, and possibly the reticular formation (Zimmerman, 2003). More recently, functional MRI scans have shown consistent irregular neurotransmitter activity in the frontal striatal networks and, most important, in the anterior cingulate gyrus (Makris et al., 2010; Weiss & Murray, 2003). These areas of the brain also act like filters, assisting the patient in screening out irrelevant information. In particular, the anterior cingulate acts as a decision-making discrimination system, acting as a "conflict monitor" when making choices (Van Veen & Carter, 2002). Drugs used in the treatment of attention disorders stimulate these brain centers, allowing them to work faster and more efficiently. This stimulation assists the patient with both attention and retention of information.

DIAGNOSTIC ASSESSMENT OF ATTENTION DISORDERS

Attention disorder symptoms for adults and children are essentially the same; however, adults may exhibit less hyperactivity and report more restlessness and agitation. As stated in the DSM-5 diagnostic criteria, considering a childhood history of ADD or ADHD is necessary for the adult diagnosis. A strong family history is usually found. Another important item to remember is the DSM-5 criterion that requires the patient to demonstrate symptoms and behaviors in more than one setting. Various testing and evaluation instruments can assist in making the diagnosis. Common tools used by professionals include: Conners' Rating Scales—Revised (CRS-R), Conners' Adult ADHD Rating Scales (CAARS), Conners' Continuous Performance Test - 3rd Edition (CPT-3), the Attention Deficit/Hyperactivity Disorder Test, the ADHD Problem Checklist, and the Test of Variables of Attention (TOVA) . Once again, to determine if the patient truly has this disorder, the clinician should review all of the DSM criteria and rule out other conditions such as a mood disorder, learning disability, or physical condition (e.g., thyroid abnormality) that could contribute to these symptoms.

PSYCHOLOGICAL AND PHARMACOLOGICAL TREATMENT

Only a few controlled studies have considered the efficacy of psychological treatments for ADHD. Most available studies have emphasized the need for social-skills training, time-management techniques, vocational and career appraisal, and life coaching in addition to addressing poor self-esteem and other stereotypes experienced by these patients (Bemporad, 2001; Weiss & Murray, 2003). Further, studies examining behavioral techniques, such as metacognitive therapy (MCT), and more structured techniques find that such approaches are significantly more effective than traditional unstructured talk therapy for ADHD (Philipsen et al., 2007; Safren et al., 2010; Solanto et al., 2010). These authors and others stress the need for daily coping strategies, including meal planning, conflict resolution, and parenting skills. Good patient education is also necessary to help patients and their families understand the condition and to formulate realistic expectations (Barkley, 2002).

The best treatment approach for attention disorders involves both a psychological and pharmacological approach (Emilsson et al., 2011; Meijer, Faber, van den Ban, & Tobi, 2009).

The use of stimulants and other antidepressants that potentiate levels of dopamine and norepinephrine show the greatest promise. In fact, the pharmacologic treatment of ADHD remains one of the most promising of any disorder in the DSM-5, with a response rate of 70% to 90% in most cases (Strange, 2008). Table 9.1 lists the psychostimulants used in the treatment of ADHD. These are the same stimulants mentioned in Chapter 5 for augmentation of antidepressants. These medications tend to be dose dependent—that is, higher doses typically correspond to better response rates. Typical side effects include hypertension, insomnia, headaches, weight loss, and growth retardation in children. Growth retardation varies from patient to patient and may be mitigated by brief drug holidays, or if pronounced, a treatment interruption (Findling, Childress, Krishnan, & McGough, 2008). In some cases, research on growth suppression is lacking, with insufficient follow-up on patients' final heights (Goldman, 2010). Insomnia is usually controlled by using stimulants with shorter half-lives that wear off before bedtime but may sometimes be treated with the addition of nonstimulant ADHD medications such as guanfacine (Intuniv) (Adler, Reingold, Morrill, & Wilens, 2006; Spencer, Greenbaum, Ginsberg, & Murphy, 2009).

As clinicians know, the potential for abuse with stimulants is high, so they may need to determine the risk of using these substances with patients who have a history of abuse. Also patients who are taking MAOIs; lithium; neuroleptics such as haloperidol (Haldol) and chlorpromazine (Thorazine); certain antidepressants such as amitriptyline (Elavil), nortriptyline (Pamelor), and imipramine (Tofranil); and certain analgesics should refrain from using stimulants unless they are monitored closely.

If the patient is a child who needs to be able to focus during school, after school, and for evening homework, the clinician should consider the longer acting stimulants, such as Adderall XR (a brand of amphetamine salts), Adzenys XR-ODT (a variety of amphetamine with a higher ratio of dextroamphetamine to levoamphetamine), or Concerta (a brand of methylphenidate). If the child has problems with sleeping, the clinician should consider stimulants with shorter half-lives, such as standard dextroamphetamine (Dexedrine) or methylphenidate (Ritalin), or the addition of nonstimulant medications such as guanfacine (Intuniv) that may counteract the insomnia. The longer acting stimulants such as Metadate ER and Ritalin SR (i.e., types of methylphenidate) have a polymer, multiparticulate bead system that allows for breakdown and delivery over several hours. Concerta is a bit more ambitious. It has an outer capsule that delivers an immediate dose and an inner core that is released over 12 hours by gastrointestinal pressure through a laser-drilled hole in the membrane. Once empty, the capsule is passed in the stool. Methylphenidate is also available in a transdermal patch (Daytrana). A transdermal patch eliminates the need for multiple dosing throughout the day and may be helpful for children who show an exaggerated gag reflex when taking oral medications.

Lisdexamfetamine (Vyvanse) is a prodrug psychostimulant of dextroamphetamine available in doses of 30, 50, and 70 mg. The use of a prodrug may greatly reduce the potential for abuse because it depends on first-pass hepatic metabolism. The current formulation is designed to be activated in the liver, and, therefore, any alteration of the original form has decreased pharmacological activity. While research on the long-term use of stimulants is lacking in adults, lisdexamfetamine appears generally well tolerated and effective for long-term use in children with ADHD (Findling et al., 2008). Further, it does not appear to be a significant contributor to insomnia in adults with ADHD (Adler, Goodman, Weisler, Hamdani, & Roth, 2009).

Any patient with ADHD should see a physician for a complete physical. Patients with glaucoma, hypertension, and tic disorders should be evaluated and counseled by their primary care physician before starting stimulants.

Table 9.1 Psychostimulant Medications

Trade Name	Generic Name	Child/Adult Typical Dose (mg/day)	Level of Insomnia
Adderall,	amphetamine/mixed salts	5–30/5–60	**
Adderall-XR[3]		12.5–30/12.5–50	***
Mydayis[3]			***
Cylert	pemoline	37.5–112.5	**
Dexedrine	dextroamphetamine	5–10/5–60	*
Dextrostat			*
Dexedrine Spansules			**
Desoxyn	methamphetamine	5–25/5–30	*
Evekeo	amphetamine sulfate	2.5–40/5–40	*
Adzenys XR-ODT		3.1–18.8/12.5–18.8	**
Dyanavel XR Oral Susp		2.5–5	**
Focalin[1]	dexmethylphenidate	5–30/5–40	*
Focalin XR[2]		5–40	***
Ritalin[1]	methylphenidate	10–30/10–40	*
Ritalin-SR		10–60	**
Methylin-ER		10–60	**
Metadate-ER[2]		10–60	**
Aptensio XR		10–60	**
Quillivant XR		10–60	**
QuilliChew ER		10–60	**
Cotempla XR-ODT		8.6–51.8	**
Daytrana Transdermal		12.5–37.5 cm^2	***
Concerta[3]		18–54	***
Vyvanse	lisdexamfetamine	30–70	***

[1] Effective for 2–6 hours
[2] Effective for 6–8 hours
[3] Once per day dosing
* Minimal neurotransmission; **Moderate neurotransmission; ***Significant neurotransmission; **** Major neurotransmission

In addition to the psychostimulants, antidepressants and alpha-adrenergic agonists are used in the treatment of ADHD (see Table 9.2). The response from antidepressants and alpha-2 agonists is usually not as robust as stimulants, however. Alpha-2 agonists such as clonidine (Catapres) and guanfacine (Tenex and Intuniv) may enhance prefrontal cortical regulation of attention and impulse control. With optimal prefrontal cortical regulation, the locus ceruleus fires to relevant, but not irrelevant, information, thus improving overall attention (Strange, 2008).

Table 9.2 Antidepressants and Alpha-Adrenergic Agonists Used in the Treatment of ADHD

Trade Name	Generic Name	Typical Dose (mg/day)
Catapres, Kapvay	clonidine	0.2–0.9
Effexor	venlafaxine	50–300
Effexor XR		75–300
Intuniv	guanfacine extended release	1–4
Norpramin	desipramine	150–300
Pamelor	nortriptyline	75–125
Strattera	atomoxetine	40–100
Tenex	guanfacine	1–9
Wellbutrin	bupropion	75–450
Wellbutrin SR	bupropion	100–400
Wellbutrin XL	bupropion	150–450

Since the use of alpha-2 agonists may lower blood pressure, regular monitoring and cardiac evaluation are advised. These medications may be a good alternative for patients who cannot tolerate stimulants or the problems with insomnia they may cause. As mentioned in Chapter 5, antidepressants must be prescribed cautiously for children and adolescents because of the FDA warning about an increase in suicidal thinking and behaviors. For more complete information on medication side effects, see Chapter 5 or the Appendix.

Many experts who treat patients with ADHD have found that a combination of psychotherapy, stimulants, and antidepressants offers a complete and direct treatment approach to the condition. Stimulants work for most patients, and in some cases antidepressants offer symptom relief. Atomoxetine (Strattera) is a stimulating antidepressant that increases levels of norepinephrine. It has been shown to be effective in both children and adults, it may be slightly more effective in younger children (6–7 years) than in older children (8–12 years), but younger children may report greater rates of GI upset and somnolence (Kratochvil, Milton, Vaughan, & Greenhill, 2008). Antidepressants with stimulating qualities often are prescribed alone for the condition. Bupropion (Wellbutrin) is most often the antidepressant of choice because it does not interfere with most stimulants and offers enriched levels of dopamine and norepinephrine. Some research may suggest that males and females may respond to bupropion differently. Males appear to respond to bupropion regardless of ADHD type. Females with combined type, but not inattentive type, responded better than those with other ADHD types (Wilens et al., 2005). Though not FDA approved, tricyclics such as desipramine have been shown to be efficacious, but side effects and cardiotoxicity may preclude their use with some patients.

Medications are typically given by titrating doses upward until complete symptomatic relief is obtained. It is not uncommon for parents to request drug holidays for children in the nonschool, summer months. This practice often helps allow growing periods for the child since many stimulants can stunt growth.

Many parents today are concerned about placing their child on drugs, especially stimulants. They will often cite newspaper articles and pieces from popular magazines suggesting that behavioral therapy alone is sufficient. Some parents believe that diet alone will improve their child's symptoms. Although sugary snacks certainly do not help children with ADHD, the connection between sweets and behavior is not conclusive. In most cases, children and adults with moderate-to-severe cases of ADHD do not respond adequately to dietary changes, behavioral interventions, and environmental changes alone. The clinician should educate the parents and the patient about the benefits of medications. The proof will be apparent in the child's behavior and academic performance. Nothing else, aside from counseling, is better for raising self-esteem and ensuring a healthy sense of independence.

CASE VIGNETTES

Case 1

CLINICAL HISTORY

Jacob is an eight-year-old African American boy who lives with his mother and younger sister. His parents are separated, and he sees his father on twice-per-month visits. While Jacob has always been a very active child who loves sports and anything related to video games and wrestling, even his father has noticed that his behavior has gotten a bit out of control. He has noticed that Jacob can be a bit hard to discipline and doesn't seem to listen when he is spoken to directly. In consultation with his teacher and principal, and after speaking with the school counselor, who has spoken with Jacob about several of his detentions after class, it was determined to refer him to the school psychologist for learning disabilities evaluation.

Jacob is essentially a happy child, but he often disrupts his second-grade class with excessive talking and walking around the room, although he returns to his seat when asked. He also often interrupts the teacher to ask to use the restroom or sharpen his pencil. He also blurts out answers and won't let others answer questions without interrupting them. The teacher has also noticed that he can't seem to wait his turn in both board games and in games on the playground. She is concerned about his grades, and he appears to be having trouble with retention of information from one subject to another. Reading comprehension is especially difficult for him.

Various evaluation questionnaires were given to Jacob, his teacher, the principal of his school, and his parents. It is clear that these behaviors are problematic in several settings. In fact, Jacob failed a spelling quiz because he forgot to study for it. He also forgot to take home a permission slip for a field trip to the zoo and was not allowed to go. He frequently loses books, backpacks, and sporting equipment. His coach said he might not be able to stay on the team if he forgets to attend another practice after school.

POSTCASE DISCUSSION AND DIAGNOSIS

After examining the questionnaires completed by Jacob, his parents, his teacher, and his principal, Jacob was referred to the school psychologist for a battery of tests. The results confirm that Jacob appears to have significant evidence for Attention-Deficit/Hyperactivity Disorder, Predominantly Hyperactive Type (F90.1). Jacob's father also had this condition when he was younger, but he did not continue to have symptoms into his adult years. There is no history of other mental illness or substance use in his family, and his sister appears to be without a learning difficulty.

[redacted]