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Diagnosis, Evaluation, and Management of Trichotillomania

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Synopsis

Trichotillomania, or chronic hairpulling, is a common condition that affects primarily women. The disorder can cause significant psychosocial impairment and is associated with elevated rates of psychiatric comorbidity. In the current paper, the phenomenology, etiology, assessment and treatment of the disorder is discussed.

Keywords

Trichotillomania; diagnosis; obsessive-compulsive spectrum disorders; body-focused repetitive behaviors

Nature of the Problem

Trichotillomania (TTM), or hair-pulling disorder, is characterized by the repeated removal (or pulling) of hair from the body, resulting in significant hair loss. Estimates of the prevalence and gender distribution of this disorder vary due to changing diagnostic criteria, but recent prevalence studies suggest TTM impacts between 0.6% to 3.6% of adults (Christenson, Pyle, & Mitchell, 1991). Furthermore, up to 11.03% of college-aged individuals pull their hair at least occasionally (Hajcak et al., 2006), and many young children display hair pulling, although the behavior usually spontaneously remits by the time the child reaches 4 or 5 years of age.

TTM is generally more common in women than in men, but there are some discrepancies. Most research has shown that the gender ratio is skewed toward females at a 9:1 ratio (Christenson, 1995), but other studies have shown little or no gender differences (Reeve, 1999; Duke et al., 2009). A significant number of people struggle with hair pulling at some point in their lifetime, with not all developing full-fledged TTM. In clinical samples, TTM most commonly manifests at ~13 years of age (Christenson, Mackenzie, & Mitchell, 1991), and the majority of individuals display a chronic but fluctuating course (Flessner et al.,

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2009). Community samples show similar epidemiology, but some have suggested that previous diagnostic criteria (e.g., DSM-IV-TR) excluded many individuals with hair pulling problems (Duke et al., 2009).

Many who suffer from TTM experience shame, struggle with low self-esteem, and report repeated efforts to conceal hair loss. Individuals with TTM will often avoid pulling in social situations and prefer to pull while alone or while engaged in sedentary activities, illustrating the ability to suppress pulling to avoid stigma. Creating a vicious circle, negative affective experiences such as stress and anxiety often exacerbate pulling.

Beyond the obvious cosmetic and social consequences of hair pulling (Duke et al., 2009), the disorder is frequently associated with functional deficits. For example, a large internet-based survey (N = 1,697) on the effects of TTM found that persons with TTM suffered mild to moderate life impairment in many functional domains (Woods et al., 2006).

Compounding this problem, many medical and psychological practitioners possess inadequate knowledge about the disorder and its effective treatment (Marcks, Wetterneck, & Woods, 2006), resulting in clients reporting they often receive uninformed and ineffective care (Woods et al., 2006). Significant portions of people with TTM avoid social and recreational activities, and TTM interferes with occupational duties at least once a month (e.g., failing to pursue promotions or avoiding job interviews). Likewise, mild to moderate difficulties in academic functioning are evident; including school absences, difficulties in performing school responsibilities, and difficulty studying. Finally, psychological interference from TTM is evident in three domains: alcohol and substance abuse to cope with the effects of the disorder, TTM symptoms leading to the development of other emotional problems, and elevated levels of anxiety, depression, and stress. Overall, adults with TTM (Woods et al., 2006) report mild to moderate perceived functional disability across work, social, and family domains.

Clinical Features

Early conceptualizations portrayed TTM as highly mechanistic and simple (Greenberg & Sarner, 1965; Delgado & Mannino, 1969; Jonas, 1970; Azrin & Nunn, 1977; Chauhan, Jain, & Dhir, 1985; Dawber, 1985; Muller, 1990), but more recent accounts differ by highlighting the behavioral heterogeneity and diverse phenomenology found in clinical cases (O'Sullivan et al., 2000; Flessner et al., 2009).

The method by which individuals remove the hair differs between individuals. Most commonly, the hands, particularly the thumb and forefinger, are used to remove the hair. However, tweezers and other cosmetic devices are sometimes used. Typically, one or two hairs are pulled at a time, and multiple hairs can be pulled out during a pulling episode. The most common site from which pulling occurs is the scalp, followed by the eyebrows/eyelashes. Pubic hair, once believed to be a relatively rare site of pulling, is now understood to be common in those with TTM (Woods et al., 2006)

Rituals and behavioral patterns often precede pulling, such as combing through the hair, feeling individual hairs, tugging at hairs, and visually searching the scalp and hairline. Hairs

may not be pulled at random, but can be chosen based on specific characteristics (e.g., hairs with certain lengths, colors, textures, placement on the hairline).

Post-pulling behavior is also clinically relevant and idiosyncratic. While some individuals simply discard pulled hairs, others may play with the hair between their fingers, inspect the hair, bite the hair between the teeth, or ingest all or parts of the hair. Ingesting hairs can result in undigested masses of hair called trichobezoars, which can potentially cause gastrointestinal injuries (Bouwer & Stein, 1998). Clinicians should carefully assess whether clients eat pulled hairs and seek referral to a gastroenterologist if symptoms such as abdominal pain, nausea, vomiting, and constipation are present. If left untreated, trichobezoars can cause bowel obstruction, intestinal bleeding, acute pancreatitis, obstructive jaundice, or a perforated bowel (Bouwer & Stein, 1998; Muller, 1987).

The environmental and affective context surrounding pulling should also be noted. Situational variables that often increase pulling include watching television, reading a book, doing homework, or grooming in front of the mirror (Flessner et al., 2007). Many people report specific emotional states (e.g., stress or anxiety), a sense of tension, or an urge to pull that precedes an episode, which in turn is alleviated after pulling (Woods et al., 2006).

Recent research has illuminated several distinct pulling styles of TTM, which may correspond to specific triggering factors. Christenson, Pyle, and Mitchell (1991) showed that a small percentage of people with TTM pulled either completely outside of their awareness or while completely focused on pulling, but most (80%) engaged in both styles of pulling at different times. Christenson and Mackenzie (1994) designated these two pulling styles as “automatic” and “focused.” “Automatic” pulling is performed out of conscious awareness; often while engaged in a sedentary task. Individuals engaged in “automatic” pulling sometimes do not become aware of it until they later notice the consequences (e.g., a pile of hairs on the ground, a new bald spot). Conversely, focused pulling appears to be a purposeful process. Examples of focused pulling include doing so because pulling feels pleasurable, reduces stress, removes hairs that look “out of place,” or removes hairs deemed by some physical characteristic to be good for pulling. It has been suggested that focused pulling may constitute an attempt to regulate affect and/or aversive cognitions (Begotka, Woods, & Wetterneck, 2004; Woods, Wetterneck, & Flessner, 2006). As previously mentioned, most individuals with TTM display both styles in separate contexts.

Diagnostic Criteria

Trichotillomania (Hair Pulling Disorder) is listed in the Diagnostic and Statistical Manual of Mental Disorders – Fifth Edition (DSM-5; American Psychiatric Association [APA], 2013) under the new category of Obsessive-Compulsive and Related Disorders. Additionally, two criteria were removed in the new edition. DSM-IV-TR required that those with TTM experience a preceding urge to pull hair that is subsequently relieved after pulling or have increased tension while attempting to refrain from pulling (APA, 2000). However, in the DSM-5 revision process, it was argued that these criteria excluded many with significant hair pulling related issues (Stein et al., 2010). The current diagnostic system for TTM requires five criteria.

Criterion A requires that the person purposefully remove hair from any region of the body. Pulling may be associated with one or multiple sites. Although some may pull hairs in a concentrated area, resulting in easily identifiable bald spots, others may distribute their pulling over a larger area, causing thinning of the hair. The latter is more difficult to identify, and sometimes a distributed pattern of pulling is done purposefully in order to conceal hair loss.

Criteria B and C require the individual to have attempted to decrease or stop pulling and that the pulling causes significant distress or impairment in at least one important area of functioning, respectively. It is important to note that many individuals pluck hair for cosmetic purposes, so TTM should not be diagnosed if attempts to stop have not been made and if the behavior does not cause significant distress or functional problems.

Criteria D and E are used to differentiate the main features of trichotillomania with other medical and psychological conditions that might explain hair pulling or alopecia. These will also be discussed later in the section on differential diagnosis.

Comorbidities

Although TTM alone can cause problems, those with the disorder tend to have at least one comorbid diagnosis, which most often involves mood or anxiety disorders (Christenson, Pyle, & Mitchell, 1991; Diefenbach, Mouton-Odum, & Stanley, 2002; Woods, Wetterneck, & Flessner, 2006). A clinical sample within a treatment study reported common co-occurring major depression (28.6%) and OCD (10.7%) (Woods, Wetterneck, & Flessner, 2006). One study reported that over a third of adults with TTM sought treatment for another psychological disorder, with mood and anxiety disorders being the most frequent of those complaints (Woods et al., 2006). In children with TTM, it has been shown that 38.3%–39.1% of treatment seekers had at least one comorbid diagnosis, with the most common being generalized anxiety, depression, social phobia, OCD, attention deficit/hyperactivity disorder, and oppositional defiant disorder (Franklin et al., 2008; Tolin et al., 2007). In another study, 23.6% of young children with TTM endorsed at least one diagnosis of an anxiety disorder, attention-deficit/hyperactivity disorder, OCD, a mood disorder, and a tic disorder (Walther et al., 2013), while another found frequent co-occurring developmental problems, chronic pediatric concerns, and family stressors (Wright & Holmes, 2003).

Other common comorbidities include skin-picking (excoriation) and other BFRBs (e.g., nail and cheek biting). Skin picking and hair pulling share many phenomenological characteristics and have higher than expected comorbidity rates (Snorrason, Belleau, & Woods, 2012). Additionally, Stein et al. (2010) reported that 70% of persons with TTM have another BFRB, most frequently skin picking and nail biting. Excoriation Disorder is located within the same category as TTM in the DSM-5, but nail and cheek biting are currently only diagnosable under the “Other Specified Obsessive-Compulsive and Related Disorder” category followed by the specifier of “body-focused repetitive behavior disorder” (APA, 2013). These other BFRBs appear to have the same clinical features as TTM apart from the locus of the behavior being another physical target.

Etiology

Various etiological factors are believed to impact the emergence and/or maintenance of TTM. Below, animal models and findings from fields of human neuroimaging, neurochemistry, and neuropsychology are discussed.

Animal Models

Animal analogues to TTM have been used to try to understand the underlying pathology of the disorder. Many of these have focused on the neuroscience of habits and stereotypes as correlated constructs to hair pulling (Berridge et al., 2005; Korff et al., 2008). Several animal grooming behaviors have been put forth as models of TTM, including fur pulling (Reinhardt, 2005), barbering (Garner et al., 2004; Kalueff et al., 2006), and feather picking (Bordnick et al., 1994; Garner et al., 2003; Grindlinger & Ramsay, 1991; Jenkins, 2001; Seibert et al., 2004). Although animal models may eventually provide useful data regarding the pathological processes that we have previously discussed, there is still a large gap between these speculations and what is actually known about TTM.

Imaging

Neuroimaging studies investigating the structure and function of TTM pathology have targeted areas that are known to be involved in OCD (Chamberlain et al., 2009). Although the literature on the neuroanatomical structure and function of TTM is sparse and does not offer clear conclusions about the disorder's etiology, what is known from imaging research about TTM is reviewed below.

Several imaging studies have focused on structures known to be related to motor control, motor learning, and reward learning. One study, using magnetic resonance imaging (MRI), found no differences in caudate volumes between TTM cases and controls (Stein et al., 1997). Other studies found reduced left inferior frontal gyrus and left putamen volumes and increased right cuneal cortex volumes in those with TTM versus controls ($n=10$ per group) (Grachev, 1997; O'Sullivan et al., 1997). Another study found that TTM patients ($n = 14$) had smaller cerebellar volumes than controls ($n = 12$) (Keuthen et al., 2007b).

More recently, several studies have examined whether there are abnormalities in neural circuitry in those with TTM. In a sample of comorbidity-free patients, Chamberlain et al. (2008) found increased grey matter densities in brain regions involving affect regulation, motor habits, and top-down cognition in those with TTM ($n = 18$) compared to controls ($n = 19$). Furthermore, another study using diffusion tensor imaging found reduced integrity in white matter density within the anterior cingulate, presupplementary motor area, and temporal cortices in those with TTM ($n = 18$) versus controls ($n = 19$) (Chamberlain et al., 2010). Such results are consistent with findings in OCD, where white matter density was abnormal in the fronto-striatal-thalamic pathways (Menzies et al., 2008). In the study done by Chamberlain and colleagues, fractional anisotropy did not, however, predict TTM severity. Only recently have researchers demonstrated that mean diffusivity of white matter in the fronto-striatal-thalamic pathway was significantly correlated with longer TTM duration and increased TTM severity (Roos et al., 2013). These results provide initial

support for functional abnormalities in the brains of those with TTM regarding the processing and learning of sensorimotor functions.

Studies on possible functional deficits have used Positron Emission Tomography (PET), Single Photon Emission Computed Tomography (SPECT), and functional MRI (fMRI) methods (Chamberlain et al., 2009). Using PET, Swedo et al. (1991) found that patients with TTM ($n = 10$) had higher resting cerebral glucose metabolic rates in the bilateral cerebellum and right parietal cortex relative to controls ($n = 20$). Additionally, a qualitative study on identical twins with TTM ($n = 2$) showed decreased perfusion of the temporal lobes during SPECT, with the more severely affected twin displaying more extensive temporal involvement (Vythilingum et al., 2002). Another study found that serotonin reuptake inhibitor treatment for TTM ($n = 10$) was associated with significant decreases in symptom severity and reduced activity in frontal cortical regions, the left putamen, and right anterior-temporal lobe as measured by SPECT (Stein et al., 2002). Finally, one study utilized fMRI to measure brain activity during an implicit sequence-learning task and found no differences between those with TTM and controls (Rauch et al., 2007).

Neurochemistry

Several neurotransmitter and neuropeptide systems have been thought to contribute to TTM pathology. Unfortunately, most of this evidence has been informed by looking at treatment response to medications designed to impact these symptoms. Nonetheless, we will review the literature on several molecular systems that have been implicated in the disorder.

Much of the molecular research on TTM has focused on the monoaminergic systems (e.g., the serotonin, dopamine, and norepinephrine systems). Swedo et al., (1989) showed that clomipramine significantly reduced symptoms of TTM relative to desipramine, providing support for involvement of the serotonergic system. There is evidence in animal models that the dopamine system plays a significant role in stereotypic and grooming behaviors (Berridge et al., 2005; Cooper & Dourish, 1990; Iglauer & Rasim, 1993; Korff et al., 2008), and stereotypic behaviors, such as hair pulling, have been shown to increase after a dosage of dopaminergic agents (Martin et al., 1998) and decrease in response to dopamine blockers (Stein & Hollander, 1992; Stein et al., 1998; Van Ameringen et al., 1999, 2010). The norepinephrine system is relatively understudied in TTM, but some have suggested that the stop-signal response deficiency in patients with TTM is demonstrative of norepinephrine system involvement (Chamberlain et al., 2009). There is currently no study to our knowledge that shows a treatment response for norepinephrine agents in TTM.

The limited research on the glutamate system has resulted in reports of TTM responding to *N*-acetylcysteine (Odlaug & Grant, 2007; Coric, et al., 2007). A placebo-controlled trial of this amino acid for adults with TTM yielded significant reductions in hair pulling symptoms (Grant, Odlaug, & Kim, 2009), though it was found to be ineffective in children (Bloch et al., 2013). The authors of the adult trial suggested that *N*-acetylcysteine affects glutamate interactions in the nucleus accumbens, thereby reducing repetitive behaviors.

Neuropsychological and Cognitive-Affective Variables

Some have proposed that neuropsychological deficits play a role in the pathology of TTM. Little evidence has been shown for increased neurological soft signs in TTM patients (Stein et al., 1994), but Chamberlain et al. (2009) noted a number of specific impairments seen in certain neuropsychological tasks in persons with TTM. For example, TTM patients performed relatively poorly on a stop-signal task, which is thought to measure motor inhibitory control, yet displayed no abnormalities on a task assessing cognitive flexibility when compared to persons with OCD (Chamberlain et al., 2006).

Cognitive-affective neuroscience has proposed relevant processes in the pathology of TTM, particularly those involved in the interaction with aversive stimuli (both internal and external), reward-driven repetitive behaviors, and disrupted control of behavior. Hair pulling behavior can be driven by different types of negative affect, such as high negative arousal (e.g., stress) and insufficient levels of arousal (e.g., boredom) (Christenson et al., 1993). In TTM, hair pulling can be performed in response to negative affect, leading to emotional relief in the short term at the expense of strengthening pulling in the long term.

In addition to the pulling that is reinforced by the relief of negative affect, a process common in OC-related disorders, Lochner et al. (2005) noted that hair pulling is often pleasurable and showed that OCD and comorbid TTM often cluster together with pathological gambling and hypersexual behavior. As such, TTM may involve a pathological response to reward from both simple motor and complex stereotypic behaviors.

Disruption of control has also been proposed as a causal mechanism in disorders with varying degrees of motor dysfunction (e.g., Tourette Syndrome, OCD, TTM). There has been a growing interest in control mechanisms involved in both simple motor acts and executive decision making, leading some to the notion that disorders of unwanted repetitive behaviors constitute a compulsive-impulsive spectrum of disorders (Stein, 2000).

Patient Evaluation Overview

Because TTM often occurs in private, is concealable, and could have numerous etiologies, a comprehensive, multi-modal, multi-informant assessment is important. Below, the various forms of TTM assessment are discussed.

Physical Examination

Hair pulling usually results in patches of hair loss that are irregularly shaped and contain many broken hairs with different lengths. In some cases, TTM patients also pick at the skin around the hair follicles, resulting in inflammation and erythema. Dermatological assessment begins with examining the type of hair loss to determine whether it is scarring or nonscarring. If the hair follicles are not permanently damaged and one can see the follicular openings, the loss is nonscarring and the hair will grow back once pulling remits (Mostaghimi, 2012). Scarring occurs when the follicles are permanently damaged from constant stress and removal. In this case, the follicle openings are covered in scar tissue and the hair will not resume normal growth (Mostaghimi, 2012). Mostaghimi (2012) offers a

detailed description of other conditions causing hair loss that should be differentiated from TTM.

Diagnostic Interview

During the clinical interview, TTM can be assessed using a semi-structured diagnostic interview. Major interviews, such as the Structured Diagnostic Interview for DSM-IV (SCID; First et al., 1995), do not assess for TTM, but the Trichotillomania Diagnostic Interview (TDI) (Rothbaum & Ninan, 1994) is a semi-structured diagnostic inventory that corresponds to DSM-IV-TR criteria. Currently, there is no validated measure that aligns with DSM-5 criteria. However, Lochner et al., (2012) used a questionnaire adapted from the SCID-I/P (First et al., 1998) that included additional questions addressing DSM-5 criteria.

Behavioral Assessment

TTM severity can be assessed by measuring hair loss (e.g., photograph ratings, measuring bald spots, collecting pulled hair), but this approach has challenges (Franklin & Tolin, 2007). First, patients sometimes are reluctant to allow a clinician to examine, or photograph, areas from which they pull. Second, the process of collecting these types of data may increase the sense of shame already experienced by the patient. Third, the reliability and validity of these types of measures for TTM have not been extensively evaluated aside from inter-rater reliability, which has been found to be strong (Diefenbach et al., 2005). For these reasons, product measures are not often used in favor of self- or clinician-completed measures.

Another key approach to assessing TTM involves conducting a functional assessment of hair pulling. A functional assessment assumes that all behavior is tied to its antecedents (i.e., the events preceding a behavior) and consequences (i.e., the events following the behavior). Antecedents to hair pulling can be external (e.g., settings or events that become temporally associated with pulling) or internal (e.g., cognitions, emotions, or physical sensations that precede pulling). Consequences of pulling can be punishing (e.g., the loss of hair and/or feeling of ugliness) or reinforcing (e.g., the pleasurable physical sensation of pulling, control over negative emotions or aversive cognitions). Although not used as a measure of symptom improvement, the functional assessment aids in understanding factors that influence how and when a person pulls and ultimately guides treatment planning.

Clinician Rating Scales

NIMH Trichotillomania Scale (Swedo et al., 1989)—This semi-structured clinical interview is composed of two separate clinical indices: the NIMH Trichotillomania Severity Scale (NIMH-TSS) and the NIMH Trichotillomania Impairment Scale (NIMH-TIS). The NIMH-TSS asks five questions regarding several key features of TTM: time spent pulling in the past week, time spent pulling the previous day, degree of resistance to pulling urges, distress associated with pulling, and functional impairment. Each question has scores ranging from 0–5, resulting in a total score of 0–25, with greater scores reflecting a greater level of symptom severity. The NIMH-TSS has demonstrated adequate psychometric properties in adults (Diefenbach et al., 2005) and acceptable reliability in children (Franklin et al., 2011). The NIMH-TIS scale consists of one item and has scores ranging from 0–10,

with greater scores reflecting greater impairment. It has demonstrated good inter-rater reliability and convergent validity in adult samples (Diefenbach et al., 2005; Stanley et al., 1999; Swedo et al., 1989).

Yale-Brown Obsessive-Compulsive Scale-Trichotillomania (Y-BOCS-TM; Stanley et al., 1999; Stanley et al., 1993)—The Y-BOCS-TM is a 10-item clinician-rated scale that is based upon the Y-BOCS and measures hair pulling severity. Scores on the individual items range from 0–5, resulting in a total severity score ranging from 0–50. There are two subscales: intrusive thoughts regarding hair pulling and actual pulling behaviors. The Y-BOCS-TM has demonstrated variable psychometrics in adult samples, as evidenced by low internal consistency, fair to excellent inter-rater reliability, adequate test-retest reliability, and mixed convergent validity (Stanley et al., 1999; Stanley et al., 1993). Despite the moderately acceptable psychometric properties, the Y-BOCS-TM has been successfully used to assess progress in treatment outcome studies (Stanley et al., 1997; Van Ameringen, et al., 2010).

The Psychiatric Institute Trichotillomania Scale (PITS; Winchel et al., 1992)—The PITS is a semi-structured clinician administered scale that measures the number of body sites used for pulling, extent of hair loss, time spent pulling hair, resistance to urges, negative affect, and functional impairment. It has 6 items that are scored on a 0–7 scale, resulting in possible scores from 0 to 42. The psychometric data are mixed, with low internal consistency, good inter-rater reliability, and acceptable convergent validity (Winchel et al., 1992; Diefenbach et al., 2005; Stanley et al., 1999). There are no published data on test-retest reliability or discriminant validity.

Patient Rating Scales

Massachusetts General Hospital Hairpulling Scale (MGH-HPS; Keuthen et al., 1995; O’Sullivan et al., 1995)—The MGH-HPS is one of the most widely used self-report measures of TTM, possessing satisfactory psychometric properties (Diefenbach et al., 2005; Keuthen et al., 1995; O’Sullivan et al., 1995). It consists of two factors: “Severity” and “Resistance and Control” (Keuthen et al., 2007a). The MGH-HPS consists of 7 items that are scored on 5-point Likert scale, with higher scores indicating greater symptom severity. The scale is particularly useful in documenting change in symptoms throughout treatment.

Trichotillomania Scale for Children (TSC; Diefenbach et al., 2003)—The TSC is a self-report questionnaire that measures clinical features of hair pulling in children and adolescents. There are child and parent versions, both containing 15 items that are evenly divided into three subscales: severity, distress, and impairment. Items are scored on a 0–2 scale with higher numbers reflecting more severe symptoms. Two independent studies have shown promising psychometric properties (Diefenbach et al., 2003; Tolin et al., 2008).

The Milwaukee Inventory for Styles of Trichotillomania – Adult and Child Versions (MIST-A and MIST-C; Flessner et al., 2008b; Flessner et al., 2007)—The MIST-A and MIST-C were developed to assess different pulling styles in both adults

and children. The authors labeled these pulling styles “focused” and “automatic.” Exploratory factor analysis on the MIST-A revealed a two-factor solution, including a “focused” factor and an “automatic” factor. Similar analyses on the MIST-C showed the same factor structure. Both scales demonstrated adequate internal consistency and good construct and discriminant validity. Further research revealed significant differences between pulling styles, such as high automatic pulling being associated with greater stress and high focused pulling being associated with higher TTM severity, depression, and functional impact (Flessner et al., 2008a).

Diagnostic Dilemmas

It is important to understand other psychological conditions that can be confused with TTM. At first glance, some of these conditions have similar behavioral patterns, but differ in terms of the function of hair pulling and appropriate treatment.

TTM, OCD, and other problematic repetitive behaviors have been conceptualized under the umbrella of OC Spectrum Disorders. Thus, it will not come as a surprise that TTM and OCD can be difficult to distinguish. However, there are several differences between TTM and OCD. First, persons with TTM often derive pleasure from hair pulling whereas those with OCD do not usually find pleasure during the performance of ritualistic behaviors. Second, TTM typically lacks the unwanted, intrusive, and repetitive thoughts preceding the behavior that are characteristic of OCD (Stanley et al., 1993; Stanley et al., 1992). Third, there is a tendency for individuals with TTM to only perform one repetitive behavior as opposed to the multiple and complex rituals that are characteristic of OCD (Stanley et al., 1992). Finally, TTM and OCD tend to differ in their responsiveness to selective serotonin reuptake inhibitors (Hale, 1996) with OCD showing positive response and TTM showing no response.

Body Dysmorphic Disorder (BDD) can also be difficult to differentiate from TTM. People with BDD tend to pull exclusively in order to “fix” a perceived physical defect (e.g., hairline symmetry), whereas those with TTM tend to lack a cognitive fixation on hair-related cosmetic issues (except in advanced cases of TTM where the concern is on the hair loss). Although individuals with TTM may report pulling hairs that they believe are “out of place” or “don’t look right,” this type of pulling is subsumed under a larger pattern of pulling that is reinforced by physical gratification rather than a cognitive fixation (Woods et al., 2006). Another easily identifiable difference is that individuals with BDD will pull because they believe doing so will make them more physically attractive, whereas those with TTM are frequently embarrassed or ashamed at the results of their hair pulling.

Neurodevelopmental disorders, such as Autism Spectrum Disorder and Stereotypic Movement Disorder, can also include repetitive hair pulling. However, in TTM, hair pulling may seem driven, but unlike stereotypies, it is not purposeless, and the movements are not always rhythmic. Also, neurodevelopmental disorders manifest during early childhood, whereas TTM often emerges later (APA, 2013).

Some have noted that disorders involving affect regulation and self-injurious behaviors (e.g., Borderline Personality Disorder-BPD), can have features similar to TTM (Franklin & Tolin,

2007). Although there are surface similarities, in that self-injury and pulling may regulate emotion and lead to noticeable physical damage, there are important differences between the two conditions. First, individuals engaging in self-injurious behavior often do so to purposely experience pain (Linehan, 1993), whereas individuals with TTM do not generally experience this phenomenon. Second, self-injury tends to be more episodic, compared to pulling, which is more habitual in nature (Simeon et al., 1997).

Treatment

Management Goals

The goals of treatment for TTM are left to the individual patient. For some patients, complete abstinence from pulling is the goal, whereas for others, a significant reduction in the frequency of pulling combined with significant hair growth is an acceptable outcome. In any case, the patient should understand that the focus of treatment, both biological and behavioral, is that the disorder is effectively managed, but not necessarily cured.

Multiple reviews of treatment efficacy in TTM have been published in the last decade (e.g., Bloch et al., 2007; Duke et al., 2010; Franklin, Zgrabbe, & Benavides, 2011). As a result, a thorough review will not be conducted here, but the summary of the evidence supporting the efficacy of various treatments for TTM will be presented.

Pharmacologic Treatments

The most commonly prescribed class of medication for adults with TTM are the SSRIs (Woods et al., 2006). However, in a meta-analysis of pharmacologic treatment studies, SSRIs failed to beat the pill placebo condition (Bloch et al., 2007). Clomipramine, has demonstrated some moderate effectiveness over placebo, but the pharmacologic agent with the strongest empirical support in adults with TTM is the amino acid N-acetylcysteine (NAC). Grant and colleagues (2009) found that 56% of those receiving NAC were treatment responders compared to 16% in the placebo condition. In addition, the data showed that NAC had very few side effects. Unfortunately, a recent replication of the study in children was negative (Bloch et al., 2013). Overall, despite the high utilization rate as a treatment for TTM, evidence supporting the use of pharmacotherapy to treat TTM is scarce.

Nonpharmacologic Treatments

Nearly all treatments for TTM with strong empirical support for their efficacy contain two primary elements; Habit Reversal Training (HRT) and stimulus control. Although these elements are described in detail elsewhere (Woods & Twohig, 2008), a brief description of each is provided below.

Stimulus control involves identifying situational factors that trigger pulling or sensory factors that maintain pulling and then teaching the patient to eliminate, reduce contact with, or otherwise modify these factors in a way that reduces pulling. For example, many people with TTM pull in front of mirrors or when bright lights are on in their bathroom. Stimulus control interventions would include covering or removing mirrors and replacing bright bulbs with dimmer lights. Likewise, pulling may occur when sitting on the couch with one's arm

on the armrest. A simple stimulus control intervention may involve teaching the patient to sit in the middle of the couch so the hand is not so close to the head. Stimulus control interventions also include the modification of sensory stimuli. For example, people with TTM often receive tactile reinforcement by rolling the recently pulled hair between the fingers. As a way to modify this sensory input, the person with TTM may be encouraged to put bandages on the fingers they use to pull. By engaging in these stimulus control interventions, the response effort used to pull becomes greater, triggers to pull are reduced, and the sensory reinforcement for pulling is attenuated. All of these factors can help reduce the pulling.

HRT is a behavioral treatment for a number of repetitive behaviors (Azrin & Nunn, 1977; Woods & Miltenberger, 1995). HRT involves three primary elements; awareness training, competing response training, and social support. Awareness training involves developing, with the patient, a very detailed description of the pulling episode. After response description takes place, the patient is taught, in session, to acknowledge every time his or her hand begins to move toward the location of the pulling. If the patient correctly acknowledges this, he or she is praised by the therapist, and if the patient fails to notice, the therapist points it out. This awareness exercise continues until the patient is highly aware of the pulling activity.

After awareness is enhanced, the patient is taught to do a behavior that physically prevents the pulling from occurring. This is called the competing response, and the patient is asked to do the competing response whenever he or she notices pulling has started or when it is about to start. Patients are encouraged to do the competing response for one minute whenever either of these two events occurs. A typical competing response for hair pulling is to make a fist.

To provide encouragement to use the competing response, a social support person is typically identified and asked to help the patient in two ways. First, the support person is asked to remind the patient to use the competing response, when the patient fails to use the competing response correctly. Second, the support person is asked to genuinely praise the patient if he or she sees the patient use the competing response correctly.

Combined, there is strong evidence that the combination of Stimulus Control and HRT is an effective treatment for TTM (Bate et al., 2011). There are also notable limitations. First, evidence suggests that while pulling can be reduced, the negative emotional experiences that often trigger pulling are not necessarily reduced (Woods et al., 2006), thus leaving patients potentially vulnerable to a focused style of pulling. Second, and perhaps related, there is growing evidence that long-term maintenance of treatment gains is less than ideal. For these reasons, and because of a growing understanding that TTM often involves both automatic and focused styles, researchers have begun to incorporate additional treatment components addressing the aspects of pulling that deal with emotion regulation.

Twohig and Woods (2004) and Woods, Wetterneck, and Flessner (2006) incorporated stimulus control and HRT components into an acceptance-based treatment designed to teach patients to mindfully accept unpleasant urges, emotions, cognitions and sensory experiences

rather than react to them in a controlling fashion. Evidence from these initial studies were promising, and showed that this acceptance-enhanced behavior therapy for TTM reduced both pulling severity and co-occurring psychiatric symptoms while generally maintaining treatment gains at the 3-mo follow-up. Similarly, Keuthen et al. (2012), utilized dialectical behavior therapy, a treatment focused on teaching patients to more effectively regulate their emotion, and demonstrated the superiority of DBT over a minimal attention control condition (Keuthen et al., 2012). In a review of all treatments for TTM, Bloch et al. (2007) found that behavior therapy was the most effective intervention for TTM.

Conclusions

TTM is a poorly understood disorder that requires extensive empirical investigation. Despite what we know about TTM, those with the disorder report not receiving adequate treatment from medical professionals (Woods et al., 2006). However, the information presented in this review can help provide one with the tools to accurately diagnose and educate people about the causes and treatments for TTM.

Diagnosis clearly starts with a thorough clinical interview and functional assessment. Building a comprehensive understanding of how hair pulling functions for the individual is paramount, particularly in consideration of the diverse phenomenology and behavioral heterogeneity of the disorder. Additionally, a physical examination of pulling sites and alopecia is recommended in order to differentiate TTM with unrelated dermatological and medical conditions. As discussed, there are several useful measures for diagnosing the disorder, determining the severity of the symptoms, assessing functioning impairment, and tracking treatment progress.

Research has given preliminary insights to the neuroanatomical underpinnings of TTM. Such structures include the basal ganglia, prefrontal cortex, and midbrain. Existing neuroimaging data on TTM do not provide systematic conclusions regarding etiology, but the burgeoning research could eventually lead to innovative early diagnostic modalities and detection systems for all OC-spectrum disorders.

Several pathological mechanisms have been implicated for their role in TTM, including cognitive-affective processes, neuropsychological deficits, and neurotransmitter systems. It appears that sensorimotor skill deficits indeed exist in TTM patients, but the extent of our understanding is still quite limited. Some have used psychoactive medications to treat TTM with success, but the research results provide little more than speculative offerings toward the efficacy of these approaches.

Diagnostic approaches to TTM must consider the phenomenological similarity of other psychological disorders, particularly OCD and BDD. Careful inquiries regarding the cognitions and environmental contexts associated with pulling should allow for the clinician to determine the proper diagnosis. Additionally, one should be careful to screen for other disorders that can either rule out or complicate a TTM diagnosis. The physical examination of hair loss should rule out any medical explanations and confirm TTM to be the cause. Finally, one should be aware that TTM often co-occurs with other body-focused repetitive

behaviors (e.g. skin picking and nail biting). Assessing for these common comorbidities may prevent a harmful behavior from going unnoticed (as one may be more salient than the other) and allow for simultaneous treatment to be considered.

Although evidence exists for the use of N-acetylcysteine as a pharmacologic treatment for TTM, effective management should also involve some form of behavior therapy, incorporating the elements of HRT and stimulus control. In adults with the condition, it is likely beneficial to add components designed to help patients learn effective emotion regulation skills.

Abbreviations

TTM	Trichotillomania
HRT	Habit reversal training

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Key Points

Trichotillomania is a fairly common condition that primarily affects women

Trichotillomania has multiple possible etiologies

A multi-modal, multi-informant strategy should be utilized in the assessment of TTM

Effective pharmacological treatments exist for adults with TTM

Effective behavior therapies exist for those with TTM, but long-term maintenance is unclear