The Abnormal Involuntary Movement Scale (AIMS) and Tardive Dyskinesia in Persons With Developmental Disability: the Benefit of Videotaped Exams

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Several methodologies now exist for appropriate screening and quantification of movement disorders that complicate treatment with neuroleptic medications. Neuroleptic-induced tardive dyskinesia is most often identified through the use of multi-item rating scales, such as the Abnormal Involuntary Rating Scale (AIMS). The authors review the AIMS and other rating scales, and present their experience with videotaping AIMS examinations over time. Videotaping of such examinations provides several advantages, including enhancement of inter-rater reliability, permanent visual archiving of movement disorders, and improved examination of uncooperative individuals.

Keywords: abnormal involuntary movement scale (AIMS), antipsychotic medications, developmental disability, intellectual disability, mental retardation, movement disorders, neuroleptic-induced tardive dyskinesia, psychiatric disorder, rating scales, videotaping

Neuroleptic-induced tardive dyskinesia (TD) is characterized by involuntary repetitive movements, and must be differentiated from other movement disorders, which may produce similar dysfunction. It is thought to arise as a result of "denervation hypersensitivity" following chronic blockade of dopaminergic neuron systems in the nigrostriatal portion of the brain, and has been classically associated with exposure to typical antipsychotics. There is now evidence that atypical antipsychotics may also result in TD in susceptible individuals, although at about half the frequency associated with typical antipsychotics.

With the recognition of TD as a neuroleptic side effect, much effort has focused on appropriate methods to screen and monitor individuals who are at risk. This has been particularly necessary for individuals with mental retardation/developmental disabilities (MR/DD), who are often treated with neuroleptics. Many individuals with MR/DD are unable to report any side effects of medication management, and many classic TD symptoms are unreported or under-reported even by individuals without MR/DD. Beginning in the late 1970's, attempts were made to develop objective instruments to monitor for TD and other neuromuscular side effects. Since then, three major pathways or methods of assessment of TD have been investigated. These include:

1. The use of mechanical/visual instrumentation.
2. Frequency and/or duration measurements of movements.
3. Multi-item rating scales, which score abnormal movements in multiple body areas.

Each has its advantages and limitations, which are discussed in turn.

Instrumentation

Instrumentation has included the use of ambulatory accelerometers, electromyography, force gauges, position transducers, and Doppler ultrasound. The advantages of such techniques are their reliability compared to subjective assessment, as well as the potential for detecting subclinical dyskinesia. Their major limitation is the difficulty in their application outside of laboratory settings, and in office-based clinical settings. For example, Nilsson and colleagues described their technique of Digital Movement Analysis (DMA), an instrumental approach utilizing digital image processing of a video signal tracking paper dots placed around a patient's mouth. The DMA was reported to have acceptable correlation with clinical assessment utilizing the
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has been demonstrated to be rapid and reliable, and can be administered by multiple members of a treatment team.23 For these reasons, the AIMS has become a part of many standardized assessments for TD, in a variety of clinical populations. For example, the AIMS is offered as a suitable screening instrument for TD in several sets of psychotropic guidelines; and, a number of community mental health centers, hospitals, and states utilize the AIMS in persons receiving neuroleptics in state institutions.2,15

In spite of this standardization, reliability, and detailed instruction, the AIMS also has some drawbacks. It requires rapid judgments on the part of the examiner, subjective interpretation of several variables, and has some problems with inter-rater reliability.19 These have been well-characterized by Munetz and Benjamin,23 who concluded that, with appropriate education and supervision, AIMS could be reliably performed by non-physician screeners. Others have recently cautioned, however, that even experienced, well-trained raters using the AIMS may underestimate the presence of some motor abnormalities, compared to instrumental assessment of dyskinetic movements.7

For these reasons, there would appear to be several advantages to videotaping of exams such as the AIMS. First, the videotaping of movement disorders and/or the performance of rating scales can be utilized for teaching/training purposes, using repeated individual tapes to demonstrate and standardize performance, in the hope of improving inter-rater reliability. This use of videotaping to teach the AIMS and train raters has been well-described.9,10 Barnes and Trauer reported on their videotaped AIMS ratings of 94 psychiatric inpatients receiving typical antipsychotic medications, stating that re-rating reliability, inter-rater reliability, and test-retest reliability were all high, based on the videotaped protocol.

Gerlach et al.11 described videotaped AIMS and St. Hans Rating Scales (SHRS), utilizing raters with three different levels of experience with the scales. The same 30 patients were rated three times—a live rating during which videotaping was done, evaluation two weeks later from the videotape, and two weeks later from the same videotape. As might be predicted, inter-rater reliability was correlated with rater experience. Of interest, however, was the authors’ report that there were no changes in scoring the AIMS
between the live, and subsequent videotaped ratings.

In other reports of this nature, Kalachnik et al.17 used videotapes pre- and post-testing to assess the result of training multiple mental health disciplines to use the DISCUS. In other teaching applications, videotaping has also been utilized to distinguish dyskinesia from stereotypy in children with autism26; and to establish and standardize raters in a multi-site VA cooperative trial of Vitamin E for tardive dyskinesia.29 Clearly, there appears to be an established justification for videotaping movement disorders for the purpose of educating and standardizing assessment.

Second, the videotaping of movement disorders, whether as part of the performance of rating instruments like the AIMS or not, provides a permanent record of any movements seen. Such a process would seem to move the assessment of movement disorders another step beyond what can be captured by even the most sophisticated and standardized formats utilizing paper and pencil recordings. This is particularly true if the videotaped recording can be archived for future reference. In the authors’ experience (in performing regular AIMS exams on persons with DD over the last 20 years), it is not unusual for there to be disagreement among treatment staff regarding whether some facial, limb, or truncal movement has recently developed, or has been “present but missed” by even regular assessments.

Surprisingly, very few reports of such long-term archiving of videotaped clinical contacts appear in the literature. Karsteadt et al.18 used videotaping to compare patients with Parkinson’s disease, before and after treatment with a protein redistribution diet. Mackenzie et al.19 reported on their use of videotaping of anesthesiology procedures over two years, and noted that these videotapes had utility not only for education, but could also function in quality assurance and certification of providers. Although recordings of cardiac catheterization and other invasive surgical procedures are now routinely archived, it is still rather unusual to produce and keep videotaped clinical contacts, as part of the patient’s permanent medical record.

Given the increasing need for accurate documentation of all patient-care activity, it is remarkable that systems have not made more use of videotaping, which could provide a permanent record of patient care. All current clinicians are familiar with the old accreditation maxim which states, “If it isn’t documented, it didn’t happen.” Videotaping of exams performed on a regularly scheduled basis (such as the AIMS), would seem to lend itself particularly to this utilization. AIMS exams are relatively brief contacts, are performed at pre-determined intervals, and are directly intended to document the progression/lack of progression of movements which can easily be captured and quantified on videotape. Particularly for patients in whom movement disorders (dyskinesias in particular) have been discovered, subsequent videotaping and archiving allows the clinician to return to previous recordings, in order to facilitate direct comparison of movement abnormalities past and present. Such comparisons can permit tracking responses to treatment, and/or progression of dyskinesia over time, in a manner not as easily quantified with paper/pencil AIMS exams.

Case Studies

Case 1.

Ms. S is a 32-year-old African-American woman, with profound cognitive impairments and profound deficits in adaptive behavior. The etiology of her developmental disability is unknown. She attended several school programs as a child and early adolescent, while residing with her family, but these proved to be unsuccessful in promoting habilitation, and she was admitted to a state developmental center at age 14.

Ms. S engages in various acts of inappropriate behavior, including aggression to others, and stripping of her clothing. Both seem to be a mechanism allowing her to express frustration, or to gain the attention of her caregivers, as her communication skills are very limited. She has no oral expressive language or other communication ability, and her receptive language skills, although better, are also significantly compromised.

Nearly since her admission, she has received treatment with neuroleptic medication, initially thioridazine, followed by risperidone, benztpzine, and most recently, quetiapine. She has more recently also received vitamin supplements in an effort to address apparent neuroleptic-related dyskinesia.

During videography of Ms. S’ behavior in preparation for routine psychiatric consultation at age 26, it was discovered that she had a fine, involuntary tremor of the tongue. Her AIMS score,
based on the assessment of the video, was 7, surrounding movements of her lips, perioral area, and tongue. The movements were seen for the first time following an increase in benztropine. These movements were not present at all times, so that the video provided a good pre-intervention baseline. After reviewing the video, risperidone was gradually replaced by quetiapine, and benztropine decreased. This cross titration took place gradually over two years. Videotape-based AIMS scores during this interval ranged from 0-7. Following the discontinuation of risperidone, benztropine was also reduced, and ultimately discontinued. Nearly immediately, her oro-lingual movements increased, with a maximum AIMS score at that time of 17. Vitamins E and B6 (pyridoxine) were added, and increased to 1600U and 200mg. per day, respectively. Over the last two years, videotaped AIMS scores have ranged from 2-8, with continued involuntary movement of her lips and tongue. Over the entire interval, the use of videotaped AIMS exams has served as a useful tool, providing an initial baseline, subsequent archiving, and ongoing monitoring of clinical response to specific pharmacological treatment approaches of these involuntary movements. The use of videotaping has been particularly useful in Ms. S, an individual with very little ability to cooperate with directions during AIMS examination.

Third, the videotaping of AIMS exams in persons with MR/DD can be of benefit in one additional manner. The specific protocol of performing the AIMS requires the cooperation of the subject; in opening/closing his or her mouth, sitting in a particular posture, standing, etc. Many of these activities are beyond the cooperative capacity of many persons with MR/DD. In this subgroup, truly adequate AIMS are probably not possible. But, videotaping the individual for a brief time before the AIMS is performed, and then videotaping the attempt at the AIMS, provides a record that can be viewed later for actual scoring. In the authors’ experience, it is not unusual for individuals with severe/profound MR/DD to be unable to cooperate with the specific directions of performing the AIMS, and/or resist by leaving the exam area. In these persons, quiet and unobtrusive videotaping of the individual, prior to initiation of contact, sometimes provides much more useful information regarding the presence of any movement abnormalities, than does attempting the AIMS itself.

Finally, based on this frequent difficulty with cooperation, we have found that scoring the AIMS from the videotaped exam sometimes produces a higher (more abnormal) score than that obtained during the live exam. This is contrasted with the report of Gerlach et al., who found no difference between live AIMS scoring and the subsequent rating of the videotaped exam. Gerlach et al. performed videotaping of 30 psychiatric patients with tardive dyskinesia, who presumably were able to cooperate adequately with the AIMS performance requirements. In contrast, Granger et al. and Sprague et al. have documented the difficulty with cooperation with systematic assessment by persons with developmental disability, particularly those with severe and profound disability. Inadequate cooperation has been hypothesized to result in an underestimation of the prevalence and severity of tardive dyskinesia in such persons, and the possibility of false negative assessments of at-risk individuals. This observation can make “live” scoring not only difficult, but also inaccurate. Subtle movement abnormalities may be overlooked during live exams, but can be observed and more accurately quantified later from videotape.

Case 2.

Mr. E is a 52-year-old Caucasian man. Severe intellectual impairments and profound adaptive behavior deficits place his overall level of developmental disability in the severe range. Mr. E had an uncomplicated birth and appeared to have developed normally until the age of three, when subtle regression began to occur with respect to socialization and language. There was a brief note in his records indicating possible head trauma at age two; otherwise, it was unclear why this regression occurred. Over the next seven years, his development stopped, language was mostly lost, and his behavior deteriorated. At age ten, he was placed in a children's psychiatric facility and was diagnosed as “psychotic and retarded.” During this stay, treatment with chlorpromazine was initiated.

Per record review, multiple trials of neuroleptic medication had been attempted, including thioridazine, trifluoperazine, fluphenazine, perphenazine, piperacetazine, and most recently, quetiapine and loxapine. He had also been treated for many years for extrapyramidal side effects of the neuroleptic medication; initially with trihexyphenidyl for many years, and subsequently
with benzotropine. He had also been treated with fluvoxamine and later escitalopram.

Mr. E’s psychiatric diagnoses include obsessive compulsive disorder, pervasive developmental disorder, pica, and orofacial dyskinesia. He typically appears anxious, and sometimes hyperventilates. His receptive language is poor, and he often will not respond at all to requests for interaction. If approached, he appears preoccupied, and is often intent on finding inedible objects to ingest. His expressive language ability is also poor, and mostly echolalic, which also limits his ability to communicate and cooperate.

His initial movement abnormalities date to age 44, occurring for the first time during a very gradual tapering of thioridazine. Benzotropine was stopped at age 45, and thioridazine two years later. He remained neuroleptic-free for nearly one year, when quetiapine was introduced, and ultimately increased to 400mg. per day. Based on little positive response to quetiapine, loxapine was cross-titrated with quetiapine, and ultimately increased to 125mg. per day. Over the next year, Vitamins B6 and E were added, for worsening signs of orobuccal dyskinesia. Through this interval, typical live AIMS scores (performed by RNs on a quarterly basis) ranged from 0-10, with an average score of 4.1. For the same interval, videotaped AIMS (scored after viewing of the videotape) ranged from 4-12, with an average score of 7. In Mr. E, surrounding his difficulty in cooperating with the exam, (or even tolerating the presence of examiners), the videotaped exams appeared to provide a much more valid record, and reliable scoring, than did live examinations.

**Conclusions**

Over the last 15 years, the development of atypical antipsychotic medications has seemed to attenuate somewhat the concern, and perhaps the actual risk, for the onset of neuroleptic-induced movement disorders. This may be most true for the incidence of neuroleptic-induced tardive dyskinesia in particular. In spite of this apparent decreased risk, individuals who are treated with these agents remain at risk for these movement disorders, and many individuals with developmental disability continue to receive older, typical antipsychotics. For this reason, methods of identifying, labeling, quantifying, and treating such movement disorders in persons with developmental disability remains a prominent concern for caregivers, families, and treatment teams.

Several methods of monitoring movement disorders have been advanced and developed, including the use of instrumentation, frequency counts, and multi-system rating scales. Lack of applicability in the clinical setting, and time intensity for personnel; have combined to limit the widespread use of both instrumentation and frequency count methodologies. Currently, both appear impractical as screening or monitoring methods for general clinical use. As such, the use of multi-system rating scales is currently the standard of care in most settings. The Abnormal Involuntary Movement Scale is the most widely utilized, and has the apparent advantages of being rapidly administered, by multiple members of the medical team, and with good inter-rater reliability.

We present a possible evolution in the use of the AIMS examination, namely the use of videotaped exams, which we have found useful in persons with developmental disabilities who are treated with neuroleptic medications. Videotaping has allowed for teaching of examiners, and for improving inter-rater reliability. It has also provided a permanent archive of any movement disorders identified, so that examiners can follow the course of such conditions over time and changing therapies. Such documentation may also provide some medical-legal benefit.

Finally, it remains our anecdotal belief that videotaping (with subsequent scoring from the videotape) provides more accurate scoring than can be done in “live” AIMS exams, particularly with uncooperative individuals. To our knowledge, there is no prospective study comparing “live” to videotaped AIMS exams in persons with developmental disability, in the manner of Gerlach et al. Such a study would be an extremely useful contribution to the field, and would perhaps provide an additional justification for the use of videotaping.

**References**

