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ADHD TREATMENT IN ADOLESCENTS: CASE REPORT ON THE INTEGRATION OF PHARMACOLOGICAL THERAPY AND PRECISION SPORTS

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ABSTRACT

Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder characterized by inattention, hyperactivity, and impulsivity, often associated with academic, social, and occupational impairments. This study reports the case of a 15-year-old adolescent diagnosed with ADHD at age 9, whose therapeutic trajectory illustrates the challenges and benefits of transitioning from stimulant to non-stimulant medications. Initial treatment with immediate-release methylphenidate resulted in significant side effects, such as irritability and anxiety, leading to switching to extended-release methylphenidate, which brought partial improvements. At age 14, atomoxetine was introduced, resulting in more stable emotional control, reduced anxiety symptoms, and improved academic and sports performance.

The practice of archery, a precision sport, played a complementary role in the treatment, promoting focus, self-regulation, and motor control skills. The case demonstrates the efficacy of atomoxetine in the management of emotional comorbidities, such as anxiety, and highlights the importance of a multidisciplinary approach, integrating pharmacological therapy and structured extracurricular activities. In addition, it reinforces the need for continuous monitoring and therapeutic adjustments based on the individual needs of patients.

The results of this report contribute to the literature by demonstrating the clinical and psychosocial benefits of personalized interventions in the management of ADHD, especially in adolescents who face high cognitive and emotional demands. Future studies are recommended to explore the integration of different therapeutic approaches in ADHD, maximizing clinical and functional results.

Keywords: ADHD. Atomoxetine. Adolescent. Archery. Pharmacological Therapy. Precision Sports.

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Revista ARACÊ
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INTRODUCTION

Attention Deficit Hyperactivity Disorder (ADHD)** is a neurodevelopmental condition characterized by symptoms of inattention, hyperactivity, and impulsivity, which often lead to impairments in multiple domains of an individual's life, such as academic, social, and occupational performance (American Psychiatric Association, 2014). With a high global prevalence in children and adolescents, ADHD is widely recognized as a heterogeneous disorder, whose clinical presentation can vary significantly depending on genetic, environmental, and cultural factors (Faraone et al., 2021).

The pharmacological management of ADHD typically includes stimulants, such as methylphenidate, which are widely considered the first-line treatment due to their efficacy in alleviating core symptoms (Cortese et al., 2018). However, some patients do not respond adequately to stimulants or experience significant side effects, such as anxiety and irritability, which limit their treatment adherence (Storebø et al., 2015). For these cases, non-stimulant options, such as atomoxetine, are often indicated. Atomoxetine, a selective norepinephrine reuptake inhibitor, is effective in reducing symptoms of inattention and impulsivity, with additional benefits in reducing anxiety symptoms in patients with ADHD (Garnock-Jones & Keating, 2009).

Adolescents with ADHD face particular challenges in environments that require high concentration and emotional control, such as sports competitions. Studies suggest that precision sports, such as archery, may benefit individuals with ADHD, as they promote the development of self-regulation and fine motor control skills while providing a structured environment for practicing focus and attention strategies (Nazeer, Mansour, & Gross, 2014; Gander, 2011).

This report describes the case of an adolescent diagnosed with ADHD at the age of 9, whose initial treatment with methylphenidate was associated with significant side effects, such as irritability and anxiety. After therapeutic transitions and the introduction of atomoxetine, the patient showed substantial improvements in emotional control, academic performance, and performance in archery, an activity that requires advanced cognitive and behavioral skills.

CLINICAL CASE REPORT

A 15-year-old male patient, a student and competitive archery athlete, attended the consultation accompanied by his father. He reported a diagnosis of Attention Deficit

Revista ARACÊ
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Hyperactivity Disorder (ADHD) at the age of 9 when his parents sought psychiatric help due to difficulties maintaining concentration in school activities and reports of impulsivity in the classroom and at home. Treatment was initiated with immediate-release methylphenidate (1 tablet, twice a day). However, the father reported that the patient experienced episodes of intense irritability and recurrent anxiety attacks.

At the age of 12, the treatment was changed to extended-release methylphenidate, with partial improvement in irritability and anxiety symptoms, but persistence of difficulties in specific high-stress contexts, such as sports competitions. Six months ago, atomoxetine 80 mg daily was introduced, with reports of a significant reduction in anxiety symptoms and better emotional control, especially in challenging situations such as archery tournaments. The patient reported good academic performance, with improved organizational skills and concentration during studies. He also reported feeling more confident in sports competitions, attributing this to better management of his emotions.

The patient is a competitive archery athlete, requiring a high level of concentration, fine motor control, and emotional management. He trains approximately 15 hours per week and competes in state and national tournaments. He reported that the sport contributes to his self-esteem and ability to focus on specific tasks.

Academic performance was initially impaired before diagnosis and treatment, with below-average grades and difficulty completing tasks. Currently, he shows good academic performance, praised by teachers for improvements in concentration and organization.

MENTAL STATUS EXAMINATION

- **Appearance**: Well-dressed, with appropriate hygiene, relaxed posture, and cooperative behavior during the consultation.
- **Behavior**: Attentive and interested in discussing his clinical condition, responding directly to questions.
- **Mood/Affect**: Reported feeling calm and confident; affect congruent with his report.
- **Thought Process**: Coherent, logical, and well-organized, with no intrusive thoughts or excessive worries.
- **Cognition**: Concentration and attention were preserved during the interview; reported good control during activities requiring prolonged focus.
- **Insight**: Demonstrated a good understanding of his condition and recognized the importance of treatment for his academic and sports performance.

Revista ARACÊ
ISSN: 2358-2472

CASE EVOLUTION

INITIAL PHASE (9-12 YEARS)

- **Treatment**: Immediate-release methylphenidate (1 tablet, twice a day).
- **Results**: Partial improvement in attention, but frequent episodes of irritability and anxiety attacks. Academic performance remained average, and the patient showed resistance to medication due to reported side effects.

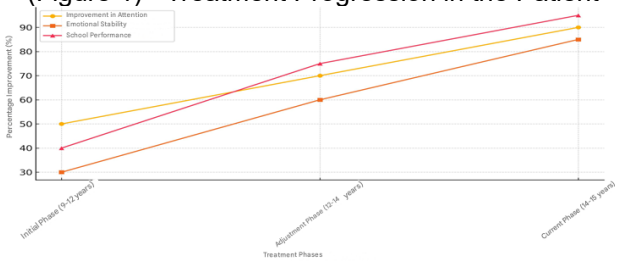
ADJUSTMENT PHASE (12-14 YEARS)

- **Treatment**: Transition to extended-release methylphenidate (Concerta).
- **Results**: Reduction in episodes of irritability, greater emotional stability in routine situations, but the persistence of anxiety symptoms in high-stress situations, such as sports competitions. Academic performance began to improve, with above-average grades.

CURRENT PHASE (14-15 YEARS)

- **Treatment**: Introduction of atomoxetine 80 mg/day, with discontinuation of methylphenidate.
- **Results**: Significant reduction in anxiety symptoms and improvement in emotional control during sports activities. The patient reported an increased ability to maintain prolonged focus, essential for archery, and greater self-confidence in competitions. Academic performance was described as excellent, with improvements in organizational skills and greater engagement in class.

(Figure 1) - Treatment Progression in the Patient



Source: Created by the author himself.

Adaptation to Treatment

The case illustrates the successful transition from stimulant treatments (methylphenidate) to atomoxetine, a non-stimulant medication that has proven effective in

Revista ARACÊ
ISSN: 2358-2472

reducing anxiety symptoms often associated with ADHD in adolescent patients (Cortese et al., 2018).

Impact on Sports

Atomoxetine provided greater emotional stability and the ability to focus—fundamental for precision sports such as archery—aligning with studies that highlight its efficacy in contexts requiring high cognitive demand (Newcorn et al., 2008; Kratochvil et al., 2008).

DISCUSSION

The case presented illustrates the complexity of pharmacological and clinical management of Attention-Deficit/Hyperactivity Disorder (ADHD) in adolescents, especially in situations where the side effects of first-line medications compromise therapeutic success. This patient, diagnosed with ADHD at the age of 9, has a clinical trajectory that highlights the challenges and strategies necessary to tailor treatment to individual needs.

Reasons for Medication Change

The initial use of immediate-release methylphenidate, widely considered the first-line treatment for ADHD, was associated with significant side effects in this patient, including irritability and anxiety attacks. These symptoms are frequently reported in 20%-30% of patients treated with stimulants such as methylphenidate and can be attributed to increased dopamine and norepinephrine release, which may exacerbate stress responses in susceptible individuals (Storebø et al., 2015; Cortese et al., 2018).

The transition to extended-release methylphenidate (Concerta) at age 12 was justified by an attempt to minimize plasma fluctuations of the medication, which can contribute to mood changes and adverse effects in some patients (Gerlach et al., 2017). While there was a reduction in episodes of irritability, the patient continued to experience anxiety symptoms in high-stress contexts, such as sports competitions. This is consistent with studies showing that, in some cases, stimulants may not alleviate anxiety symptoms and may even exacerbate them (Garnock-Jones & Keating, 2009).

The decision to introduce atomoxetine six months ago reflects an evidence-based approach to treating residual symptoms and emotional comorbidities such as anxiety. Atomoxetine, a selective norepinephrine reuptake inhibitor, is particularly effective in

Revista ARACÊ
ISSN: 2358-2472

patients who do not tolerate stimulants well or present with anxiety comorbidities, as observed in this case (Newcorn et al., 2008; Kratochvil et al., 2008). Studies suggest that atomoxetine improves attention and reduces impulsivity in a manner comparable to stimulants while providing additional anxiolytic effects due to its role in regulating noradrenergic activity (Cortese et al., 2018).

Side Effects and Associated Risks

Each stage of the treatment was accompanied by considerations regarding side effects. During the initial use of immediate-release methylphenidate, irritability, and anxiety episodes were well-documented adverse effects (Storebø et al., 2015). The transition to the extended-release formulation aimed to reduce these adverse events, supported by studies demonstrating better tolerability due to reduced plasma level fluctuations of the medication (Gerlach et al., 2017).

With atomoxetine, the most frequently reported side effects include nausea, drowsiness, and occasionally appetite loss. Compared to stimulants, it has a more favorable side effect profile for patients with anxiety comorbidities, like this adolescent. Literature also indicates that atomoxetine positively impacts emotional control and self-regulation skills, which can be particularly beneficial for high-precision and cognitively demanding sports like archery (Cortese et al., 2018; Garnock-Jones & Keating, 2009).

Impact on Academic and Sports Performance

The patient's reported improvement in academic and sports performance following the introduction of atomoxetine reflects its role in stabilizing ADHD symptoms and reducing anxiety. Studies suggest that ADHD can impair performance in activities requiring high concentration, planning, and fine motor control—fundamental skills in archery (Nazeer, Mansour, & Gross, 2014; Kratochvil et al., 2008). Atomoxetine has demonstrated efficacy in improving these functions, providing a more uniform effect throughout the day without the abrupt action peaks observed with stimulants (Newcorn et al., 2008).

The reduction in anxiety symptoms allowed the patient to manage the stress associated with competitions better—an advantage frequently highlighted in athletes with ADHD treated with atomoxetine (Garnock-Jones & Keating, 2009). This effect is consistent with findings that associate atomoxetine with significant improvements in emotional self-regulation in high cognitive-demand situations (Cortese et al., 2018).

Revista ARACÊ
ISSN: 2358-2472

Clinical Implications and Final Considerations

This case reinforces the importance of a personalized approach in ADHD management, considering side effects and the specific needs of each patient. The gradual transition from stimulants to atomoxetine proved effective, highlighting the latter as a viable alternative for patients with suboptimal responses to stimulants or emotional comorbidities such as anxiety.

The case illustrates how therapeutic adjustments can positively impact not only academic performance but also high-demand extracurricular activities such as competitive sports. This report also emphasizes the importance of continuously monitoring patient progress and adjusting treatment as necessary to maximize benefits while minimizing associated risks.

This case contributes to the existing literature by highlighting the interaction between pharmacological treatment, emotional control, and sports performance. It underlines the need for future investigations to explore how different interventions can be optimized to meet the specific demands of adolescents with ADHD.

CONCLUSION

The presented case illustrates the importance of a personalized therapeutic approach in managing Attention-Deficit/Hyperactivity Disorder (ADHD), particularly in adolescent patients with specific needs and challenges associated with emotional comorbidities such as anxiety. The transition from stimulants to atomoxetine, based on scientific evidence, resulted in significant benefits for the patient, both in controlling ADHD symptoms and in emotional regulation. This change had a direct impact on quality of life, with significant improvement in academic and sports performance.

Precision sports practice, such as archery, emerged as an effective complementary tool, promoting the development of self-regulation, focus, and motor control skills. The integration of pharmacological treatment with structured extracurricular activities amplified therapeutic benefits, providing the patient with a platform to apply and consolidate the cognitive and behavioral improvements achieved with atomoxetine.

This report reinforces the need for continuous and individualized assessment, considering the impact of therapeutic interventions on different aspects of the patient's life. Additionally, it highlights the relevance of investigating the role of specific sports activities as part of a multidisciplinary approach to ADHD management. Future studies are

Revista ARACÊ
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necessary to explore how combined strategies can optimize clinical outcomes, expanding the reach of successful interventions and offering greater support to patients with ADHD and comorbidities.

The clinical experience presented contributes to the literature by demonstrating that therapeutic adjustments based on individual needs can lead to substantial improvements in functionality and overall well-being, emphasizing the role of personalization in the successful management of ADHD in adolescents.

Revista ARACÊ
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