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Decoding akathisia: The significance of dopamine and dopaminergic pathways - a case report

Decodificando a acatisia: A importância da dopamina e das vias dopaminérgicas - um relato de caso

Decodificando la acatisia: La importancia de la dopamina y las vías dopaminérgicas - un reporte de caso

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Abstract
Background: Dopamine and dopaminergic pathways are crucial in antipsychotic treatment and the emergence of akathisia. Understanding these mechanisms is essential for effectively managing this condition. Objective: This study aims to highlight the management of akathisia in a patient with schizophrenia while underscoring the significance of dopaminergic mechanisms in treatment. Methods: Following the CARE (CAse REports) guidelines, this study presents a case report that serves as a practical representation of clinical scenarios, contextualizing theoretical concepts through real-world examples, enhancing the understanding of rare conditions and unique treatment responses. Case Report and Discussion: A 59-year-old female patient diagnosed with schizophrenia developed severe akathisia after starting risperidone. She exhibited intense restlessness and emotional distress, requiring adjustments to her treatment regimen, including the addition of propranolol, clonazepam, and phenytoin. This case illustrates the intricate relationship between dopamine dysregulation and akathisia, emphasizing the necessity for personalized treatment strategies tailored to the

patient's needs. It highlights the importance of close monitoring and flexible management in addressing adverse effects associated with antipsychotic medications. Furthermore, fostering a supportive therapeutic relationship with the mental health team and incorporating familial support significantly contributed to the patient's overall treatment success. Conclusion**:** Understanding dopaminergic pathways is vital for managing akathisia and schizophrenia. This study advocates for a holistic treatment approach that integrates clinical insights with psychosocial factors to improve the patient's quality of life and treatment adherence.
Keywords: Akathisia; Antipsychotics; Movement disorders; Dopaminergic pathways; Dopamine.

Resumo

Contexto: A dopamina e as vias dopaminérgicas são cruciais no tratamento antipsicótico e no surgimento da acatisia. Compreender esses mecanismos é essencial para gerenciar efetivamente essa condição. Objetivo: Este estudo visa destacar o manejo da acatisia em um paciente com esquizofrenia, sublinhando a importância dos mecanismos dopaminérgicos no tratamento. Métodos: Seguindo as diretrizes do CARE (CAse REports), este estudo apresenta um relato de caso que serve como uma representação prática de cenários clínicos, contextualizando conceitos teóricos através de exemplos do mundo real, aprimorando a compreensão de condições raras e respostas únicas ao tratamento. Relato de Caso e Discussão: Uma paciente de 59 anos diagnosticada com esquizofrenia desenvolveu acatisia severa após iniciar o uso de risperidona. Ela apresentou intensa inquietação e angústia emocional, necessitando de ajustes em seu regime de tratamento, incluindo a adição de propranolol, clonazepam e fenitoína. Este caso ilustra a relação intrincada entre a desregulação da dopamina e a acatisia, enfatizando a necessidade de estratégias de tratamento personalizadas adaptadas às necessidades do paciente. Destaca a importância do monitoramento próximo e do manejo flexível para abordar os efeitos adversos associados aos medicamentos antipsicóticos. Além disso, o desenvolvimento de uma relação terapêutica de apoio com a equipe de saúde mental e a incorporação do apoio familiar contribuíram significativamente para o sucesso geral do tratamento da paciente. Conclusão: Compreender as vias dopaminérgicas é vital para o manejo da acatisia e da esquizofrenia. Este estudo defende uma abordagem de tratamento holística que integra insights clínicos com fatores psicossociais para melhorar a qualidade de vida do paciente e a adesão ao tratamento.
Palavras-chave: Acatisia; Antipsicóticos; Distúrbios do movimento; Vias dopaminérgicas; Dopamina.

Resumen

Contexto: La dopamina y las vías dopaminérgicas son cruciales en el tratamiento antipsicótico y en la aparición de la acatisia. Comprender estos mecanismos es esencial para gestionar eficazmente esta condición. Objetivo: Este estudio tiene como objetivo destacar el manejo de la acatisia en un paciente con esquizofrenia, subrayando la importancia de los mecanismos dopaminérgicos en el tratamiento. Métodos: Siguiendo las directrices del CARE (CAse REports), este estudio presenta un reporte de caso que sirve como una representación práctica de escenarios clínicos, contextualizando conceptos teóricos a través de ejemplos del mundo real, mejorando la comprensión de condiciones raras y respuestas únicas al tratamiento. Reporte de Caso y Discusión: Una paciente de 59 años diagnosticada con esquizofrenia desarrolló acatisia severa después de comenzar a usar risperidona. Presentó una intensa inquietud y angustia emocional, requiriendo ajustes en su régimen de tratamiento, incluyendo la adición de propranolol, clonazepam y fenitoína. Este caso ilustra la relación intrincada entre la desregulación de la dopamina y la acatisia, enfatizando la necesidad de estrategias de tratamiento personalizadas adaptadas a las necesidades del paciente. Destaca la importancia del monitoreo cercano y la gestión flexible para abordar los efectos adversos asociados con los medicamentos antipsicóticos. Además, el desarrollo de una relación terapéutica de apoyo con el equipo de salud mental y la incorporación del apoyo familiar contribuyeron significativamente al éxito general del tratamiento de la paciente. Conclusión: Comprender las vías dopaminérgicas es vital para el manejo de la acatisia y la esquizofrenia. Este estudio aboga por un enfoque de tratamiento holístico que integre conocimientos clínicos con factores psicosociales para mejorar la calidad de vida del paciente y la adherencia al tratamiento.
Palabras clave: Acatisia; Antipsicóticos; Trastornos del movimiento; Vías dopaminérgicas; Dopamina.

1. Introduction

1.1 Movement Disorders and Akathisia

One of the most prevalent side effects associated with dopaminergic antagonists is the emergence of extrapyramidal symptoms, which can substantially exacerbate the patient's psychiatric condition. These drug-induced movement disorders encompass a spectrum of symptoms, both acute and tardive, including parkinsonism, dystonia, dyskinesia, neuroleptic malignant syndrome, and akathisia. Such adverse reactions can result in considerable discomfort, manifesting as abnormal movements, changes in muscle tone, gait disturbances, bradykinesia, rigidity, and tremors. Moreover, these symptoms are frequently

associated with a decline in social functioning (Ali et al., 2021; Friedman, 2020; Musco et al., 2019).

The presence of extrapyramidal symptoms not only negatively impacts patient adherence to treatment and their perception of therapeutic efficacy but also exacerbates social stigma, triggers suicidal behaviors, heightens violent impulses, and consequently contributes to increased mortality rates among individuals with schizophrenia. The diagnostic confusion between these movement disorders and the negative symptoms of schizophrenia can lead to inappropriate treatment approaches, thereby delaying effective intervention and worsening the overall clinical condition (Ali et al., 2021; Musco et al., 2019; Yang et al., 2022).

Despite their high prevalence, drug-induced movement disorders resulting from dopamine antagonists remain inadequately explored within medical research. The increasing utilization of these medications has led to a growing incidence of motor symptoms as side effects. Early identification of these disorders not only enhances patient care but also positively influences prognosis and the selection of appropriate therapeutic interventions. As antipsychotics are increasingly prescribed for various clinical conditions, the capacity of mental health professionals to identify and differentiate these disorders becomes crucial. Continued investment in training is essential to ensure the provision of quality care and minimize adverse outcomes. Furthermore, fostering close collaboration between clinical practice and research is vital for advancing our understanding and management of these disorders, ultimately aiming to achieve significant improvements in patients' quality of life (Sienaert et al., 2019).

Akathisia, a specific movement disorder frequently induced by medications, particularly antipsychotics, arises from dysfunction in the striatal circuitry of the basal ganglia. The primary mechanism underlying this condition is the blockade of dopamine D_2 receptors, predominantly induced by first-generation antipsychotics, which possess a higher affinity for these receptors and consequently increase the risk of developing extrapyramidal symptoms, including akathisia. In contrast, second-generation antipsychotics exhibit a reduced potential to induce this adverse effect due to their lower affinity for D_2 receptors (Lopes et al., 2024).

The manifestation of akathisia syndrome encompasses a diverse array of both subjective and objective symptoms. Subjectively, patients may experience internal restlessness primarily in the lower limbs, but this can extend to the arms and trunk. Additional symptoms may include a compulsion to move, anxiety, internal tension, dysphoria, and, less commonly, emotional states such as fear, anger, or exacerbation of psychotic symptoms. Objectively, akathisia can present as restlessness, complex repetitive movements of the limbs, persistent tremors, and behaviors such as repetitive leg crossing and pacing (Friedman, 2020).

Individuals with affective disorders, particularly those suffering from bipolar depression, appear to be more susceptible to antipsychotic-induced akathisia than those with schizophrenia. Furthermore, individuals in states of delirium, those abusing substances (alcohol and drugs), and residents of palliative care units have also been identified as vulnerable to developing this condition (Poyurovsky & Weizman, 2020).

1.2 Dopamine and Akathisia

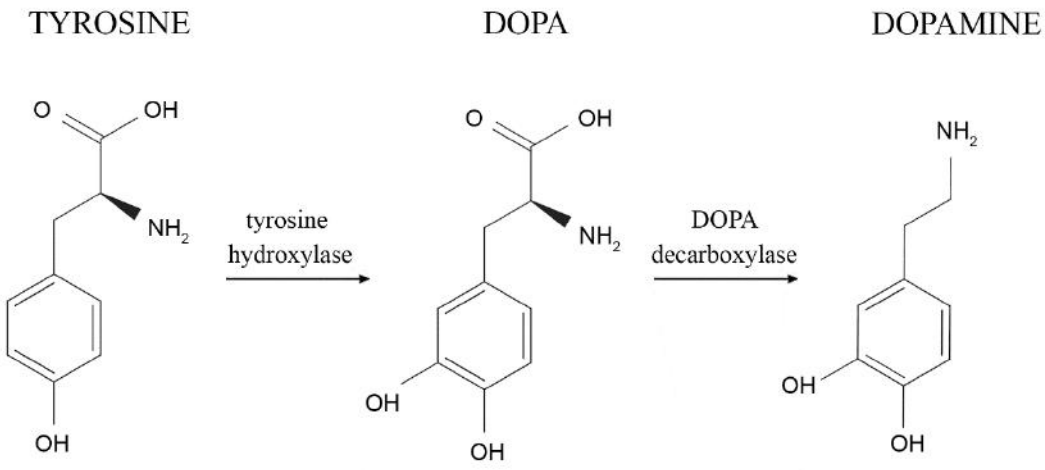
Understanding the role of dopamine and its pathways is fundamental to grasping the pathophysiology of akathisia. Dopamine, a key neurotransmitter in the central nervous system, regulates motor control, reward, and various behavioral processes. Disruptions in dopaminergic signaling are central to the development of akathisia, especially in the context of antipsychotic treatment. By examining the intricate balance between dopamine receptors and their interactions with other neurotransmitter systems, we can better comprehend the mechanisms underlying this movement disorder and its clinical implications (Lopes et al., 2024).

Dopamine, an essential catecholamine in the nervous system, is synthesized from the amino acid tyrosine. This process

begins with the transformation of tyrosine into DOPA by the enzyme tyrosine hydroxylase. Subsequently, DOPA undergoes decarboxylation through the enzyme DOPA-decarboxylase, resulting in the formation of dopamine. This neurotransmitter has a multifunctional role in various physiological and behavioral processes. Besides serving as a precursor to norepinephrine and epinephrine, dopamine influences several systems, including cardiovascular, renal, pancreatic, and gastrointestinal functions, while also having a significant impact on movement and neuropsychiatric functioning (Braverman, 2024).

Figure 1 provides a representation of the biochemical pathway involved in the conversion of tyrosine to dopamine, highlighting the key enzymatic steps and intermediates in the neurotransmitter synthesis process.

Figure 1 - Tyrosine to Dopamine Conversion.



Source: Own elaboration (2024).

Adenylyl cyclase, an enzyme located in the cell membrane, plays a crucial role in intracellular signaling by converting adenosine triphosphate (ATP), which is responsible for cellular energy storage and transfer, into cyclic adenosine monophosphate (cAMP). This conversion is triggered by the activation of specific receptors on the membrane. In neurons, cAMP acts as an intracellular messenger that transmits signals into the cell, subsequently activating various signaling pathways essential for fundamental functions, including learning, memory, and voluntary movement control. Therefore, the interaction between adenylyl cyclase and cAMP is vital in modulating cellular behavior and the complex functions of the nervous system (Stahl, 2021).

Dopamine receptors are classified into two primary families (D1 and D2), each eliciting specific responses through their coupling to G proteins. The D1 family, encompassing D1 and D5 receptors, stimulates adenylyl cyclase, thereby promoting cAMP synthesis. Conversely, the D2 family, comprising D2, D3, and D4 receptors, couples to Gi/Go proteins, inhibiting adenylyl cyclase and reducing cAMP synthesis (Braverman, 2024).

Notably, dopamine receptors can also act independently of G proteins through direct interactions with ion channels and cAMP-independent regulation of protein kinase B. This complex interplay between dopamine and its receptors is crucial for various aspects of brain function and is associated with conditions such as schizophrenia, bipolar disorder, and reward-related behaviors (Braverman, 2024).

The distinct functions of D1 and D2 family receptors further highlight their importance in neurological processes: D1 receptors are primarily involved in the control of voluntary movement, reward, addictive behavior, learning, and memory, while

D2 receptors are crucial in regulating psychotic behavior associated with schizophrenia and bipolar disorder. The roles of D3, D4, and D5 receptors in the brain remain under investigation, underscoring the significance of dopamine and its receptors in health and disease, positioning them as central elements within the intricate neural network (Braverman, 2024).

Table 1 presents a comprehensive overview of the two primary families of dopamine D1 and D2 along with their associated receptors, intracellular signaling pathways, and main functions.

Table 1 - Dopaminergic Families.

FAMILY	RECEPTORS	INTRACELLULAR SIGNALING PATHWAYS	MAIN FUNCTIONS
D1	D1 and D5	Activation of cAMP signaling pathway	Control of voluntary movement, reward, learning, addictive behavior and memory
D2	D2, D3, and D4	Inhibition of cAMP signaling pathway	Regulation of psychotic behavior, such as in schizophrenia and bipolar disorder

Source: Own elaboration (2024).

1.3 Dopaminergic Pathways

There are five classic dopamine pathways that are crucial for understanding the mechanisms underlying schizophrenia and the side effects associated with dopaminergic blockers, such as akathisia. Although recent advances in neuroscience propose more modern and refined approaches to comprehend these pathways, the traditional perspective on these neurotransmission routes will be adopted for didactic purposes.

Mesocortical Pathway

The mesocortical pathway (MCP) originates in the ventral tegmental area (VTA) and extends to the prefrontal cortex. Its branches in the dorsolateral prefrontal cortex (DLPFC) regulate cognition and executive functions, while the ventromedial branches (VMB) are linked to emotional processing. In schizophrenia, the MCP appears hypoactive, correlating with negative symptoms such as social isolation, anhedonia, impaired speech, and lack of empathy. Moreover, dysfunction in this dopaminergic pathway may be associated with abnormalities in the N-methyl-D-aspartate (NMDA) glutamatergic system (Stahl, 2021).

Mesolimbic Pathway

The mesolimbic pathway (MLP), which originates in the VTA of the midbrain, projects towards the nucleus accumbens, a key component of the limbic system. This pathway regulates emotions, motivation, pleasure, and the sense of reward. Increased dopamine activity within this pathway is associated with the positive symptoms of schizophrenia, such as impulsivity, hallucinations, aggression, and agitation, as well as with the rewarding effects observed in substance abuse (Stahl, 2021).

Nigrostriatal Pathway

The nigrostriatal pathway (NSP) originates in the substantia nigra of the brainstem, extending axons to the dorsal striatum. As part of the extrapyramidal nervous system, this pathway regulates movements through thalamic and cortical connections. The cortico-striato-thalamo-cortical (CSTC) circuits are subdivided into direct and indirect pathways. The direct pathway, composed of excitatory D1 receptors, projects from the striatum to the internal globus pallidus, stimulating movements. In contrast, the indirect pathway, consisting of inhibitory dopamine D2 receptors, projects to the internal globus pallidus via the external globus pallidus and subthalamic nucleus. Therefore, dopamine triggers both the direct (movement) and indirect

(cessation of movement) pathways, playing a crucial role in the smooth execution of movements. This pathway, along with the cerebellum, modulates motor function and voluntary movement. In schizophrenia, this pathway does not exhibit dysfunctions but is associated with one of the side effects of antipsychotic treatment, known as extrapyramidal effects, which occur after the blockade of dopamine D2 receptors in the striatum (Stahl, 2021).

Tuberoinfundibular Pathway

The tuberoinfundibular pathway (TIP) extends from the hypothalamus to the anterior pituitary, where dopaminergic neurons regulate prolactin release. In cases of schizophrenia, this pathway remains functional and is linked to one of the side effects of antipsychotic treatment: hyperprolactinemia. This condition occurs after blocking dopamine D2 receptors, leading to symptoms such as galactorrhea, gynecomastia, sexual dysfunction, and amenorrhea (Stahl, 2021).

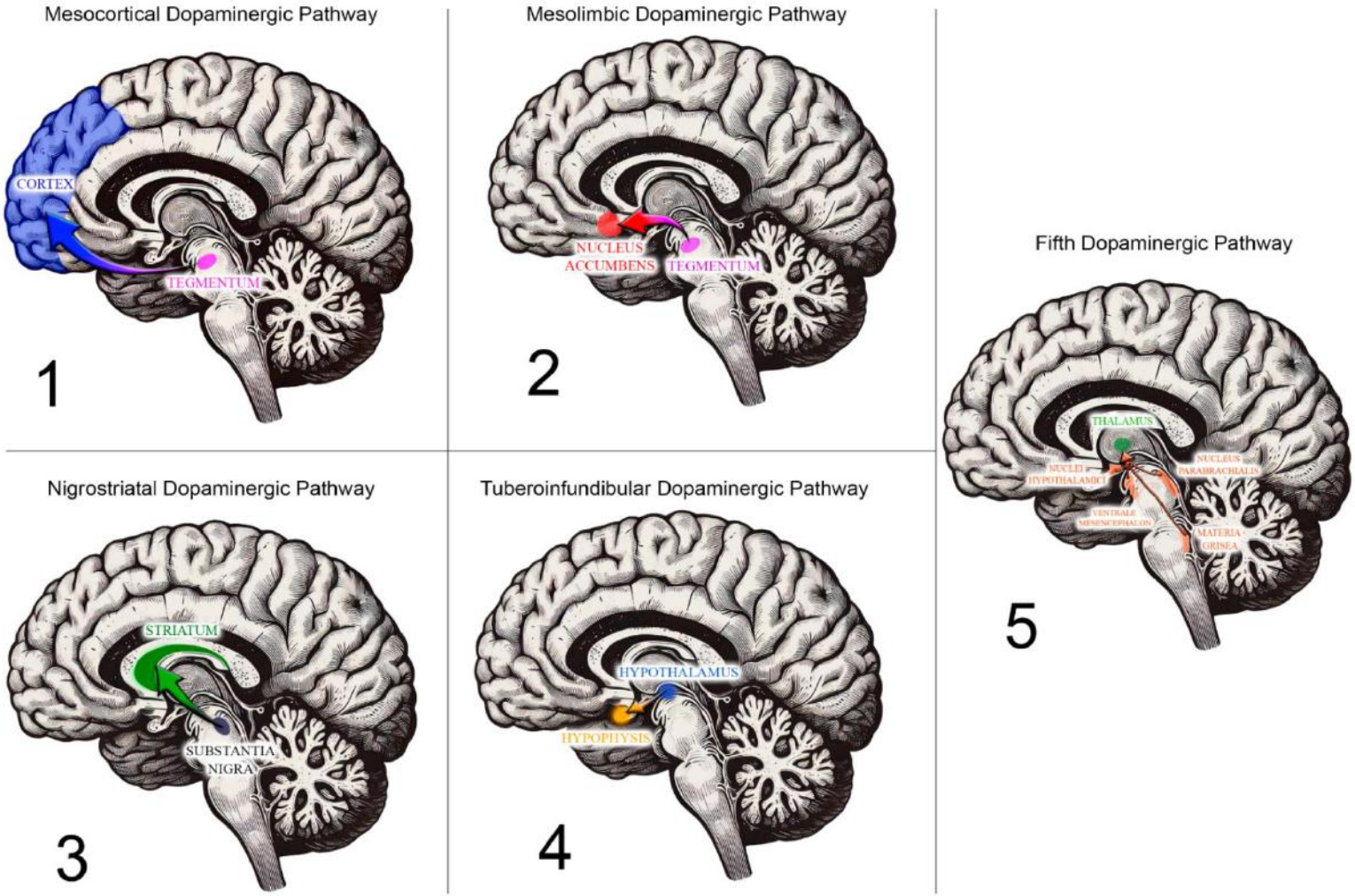
Fifth Pathway

The fifth dopaminergic pathway (FDP) originates from various brain regions, including the periaqueductal gray matter, the ventral mesencephalon, hypothalamic nuclei, and the lateral parabrachial nucleus, extending to the thalamus. The function of this pathway is still under investigation, but it is believed to be involved in mechanisms of sleep and wakefulness. Additionally, it is hypothesized that this pathway serves as a conduit facilitating communication between the thalamus, cortex, and other brain regions. Regarding schizophrenia, there is no current substantial evidence indicating dysfunction in this pathway's functioning (Stahl, 2021).

Understanding dopaminergic pathways is crucial for deciphering the intricate neurobiological mechanisms associated with akathisia. Each of the five classic pathways serves a unique function in regulating cognitive abilities, emotional regulation, motor control, and endocrine activity. The interaction among these pathways is vital for maintaining dopaminergic homeostasis, and any disruption can lead to significant clinical outcomes.

Figure 2 presents a simplified illustration of these dopaminergic pathways, delineating their anatomical origins and target regions. This visual representation enhances comprehension of how dysregulation in dopaminergic signaling can contribute to the pathophysiology of various mental health disorders.

Figure 2 – Dopaminergic Pathways.



Source: Own elaboration (2024).

The figure displays detailed sagittal sections of the brain, brainstem, and cerebellum. 1 - The Mesocortical Pathway, indicated by the arrow, originates in the ventral tegmental area (pink) and extends to the prefrontal cortex (blue). 2 - The Mesolimbic Pathway, indicated by the arrow, originates in the ventral tegmental area (pink) and extends to the nucleus accumbens (red). 3 - The Nigrostriatal Pathway is indicated by the arrow, originating from the substantia nigra (black) and extending to the dorsal striatum (green). 4 - The Tuberoinfundibular pathway indicated by the arrow, originates from the hypothalamus (blue) and extends to the anterior pituitary (yellow). 5 - The Fifth Dopaminergic Pathway is highlighted by the arrow, originating from the periaqueductal gray matter, ventral mesencephalon, hypothalamic nuclei, and lateral parabrachial nucleus (all highlighted in orange), and extending to the thalamus (green).

This case report aims to analyze the management of akathisia in a patient with schizophrenia, highlighting the therapeutic strategies employed and the results obtained. The report intends to explore the interrelationship between akathisia and the involved dopaminergic mechanisms, emphasizing the importance of a personalized approach in the treatment of schizophrenia. By sharing this clinical experience, the authors hope to contribute to the understanding of the nuances in managing akathisia and encourage a more informed and conscious practice in administering antipsychotics, always aiming to improve the quality of life for patients.

2. Methodology

This study aims to ensure the highest level of reproducibility in its findings by adhering to robust methodological principles (Pereira et al., 2018). Here, a qualitative approach is utilized, specifically a case report, chosen for its focus on detailed examination of a single phenomenon (Yin, 2015; Toy, Briscoe & Britton, 2013; Neto, 2023).

2.1 Case Report

To provide a practical representation of the topic under analysis, this study includes a detailed case report. Case reports are invaluable for contextualizing theoretical concepts through concrete examples of real-world clinical situations. They can highlight various clinical scenarios, including rare conditions, previously undocumented diseases, uncommon treatment side effects, and unique therapeutic responses (Sun, 2013).

These reports are essential in medical practice, as they deliver precise data on clinical episodes, thereby facilitating individualized, high-quality healthcare. To ensure the quality and transparency of this report, the authors adhered to the CARE (CAse REports) guidelines outlined by Riley et al. (2017), which enhance the accuracy and utility of reports in medical literature.

Initially, patient identification was made, collecting demographic information and relevant complaints. Subsequently, patient's complete medical history was recorded, encompassing previous illnesses, medical conditions, medications in use, and allergies. Patient's current disease presentation was detailed, highlighting the duration of symptoms and any previous medical interventions.

All findings from physical examinations and diagnostic assessments were documented alongside their interpretations. Therapeutic interventions were meticulously recorded, including prescribed medications. Patient progress was closely monitored, with documentation of responses to interventions and any modifications to the treatment plan. The case discussion emphasized the report's relevance in relation to existing literature, highlighting its specific contributions to medical knowledge.

This report focuses on a unique case of a patient who developed akathisia in response to antipsychotic pharmacological treatment, detailing symptoms, diagnostic processes, underlying pathophysiology, and therapeutic strategies aimed at alleviating motor symptoms. This case report significantly enriches the understanding of akathisia and its management.

2.2 Ethical Aspects

The study follows the guidelines and standards for research involving human subjects, as established in Resolution 466/12 of the Brazilian National Health Council (Conselho Nacional de Saúde - CNS). An Informed Consent Form was completed by the patient, allowing for the publication of this study. The study was submitted to the Research Ethics Committee and received approval under protocol number 82273024.4.0000.5101.

3. Case Description

The patient, a 59-year-old woman, has a history of psychotic episodes since 1987, with symptoms including object burning, fear of fictional animals, and auditory hallucinations. In 2007, after six hospitalizations in psychiatric hospitals, she sought treatment and was diagnosed with hebephrenic schizophrenia.

Her initial treatment included Trifluoperazine 7.5mg/day, Haloperidol 3 mg/day, and Lorazepam 4 mg/day. The following year, Haloperidol was replaced by Clomipramine 30mg/day.

The patient remained stable until 2011 when her psychotic symptoms, including hallucinations and aggressiveness, began to worsen. At this point, Clomipramine was replaced by Imipramine 50mg/day, and the dosage of Trifluoperazine was increased to 10mg/day and later to 15mg/day. In 2012, Risperidone was introduced at a dosage of 4 mg/day, later increased to 6mg/day. This resulted in episodes of akathisia, characterized by intense psychomotor agitation and overwhelming emotional discomfort.

Although the patient initially responded favorably to Risperidone, subsequent consultations revealed a decline in mood and an increase in agitation. This led to the reintroduction of Haloperidol at a dosage of 3mg/day. However, agitation increased after the use of this first-generation antipsychotic, resulting in its discontinuation, along with Imipramine. The dosage of Risperidone was then increased to 8mg/day, but this only exacerbated extrapyramidal symptoms, and the patient experienced recurrent episodes of delirium and hallucinations.

In late 2013, Chlorpromazine 100mg/day and Propranolol 40mg/day were added to the treatment regimen for sedation and agitation control. The patient's spouse had discontinued the patient’s use of Risperidone, associating it with agitation symptoms, but it was reintroduced by the medical team.

Year 2014 brought relative stability, with reduced delusions, improved sleep, and decreased compulsions resulting in the discontinuation of Lorazepam. However, episodes of agitation spikes indicated the continued need for dose adjustments in treatment.

In 2016, Clonazepam (2mg/day) and Phenytoin (100mg/day) were prescribed due to increased agitation. In 2017, the patient reported worsening sleep, weight gain, and exaggerated libido, and dose adjustments were again made during this period.

In 2021, the patient was using Risperidone (4mg/day), Phenytoin (300mg/day), Chlorpromazine (30mg/day), Clonazepam (2mg/day), and Propranolol (80mg/day). In early 2022, the patient experienced severe psychomotor agitation and worsening akathisia, being unable to even sit during consultations, in addition to excessive crying, anxiety, and returning obsessive-compulsive disorder symptoms related to hygiene and cleaning. The team then decided to try the progressive introduction of Clozapine and gradual reduction of Risperidone aiming for a reduction in akathisia symptoms. In addition, Fluoxetine 20mg/day was initiated for the anxiety, and Promethazine 25mg/day for sleep improvement. This period marked a significant improvement in the patient's clinical condition, highlighting the effectiveness of the adopted therapeutic strategy.

Currently, the patient remains on treatment with Propranolol 80mg/day, Clozapine 200mg/day, Risperidone 1mg/day, Fluoxetine 20mg/day, Phenytoin 100mg/day, Promethazine 25mg/day, and Chlorpromazine 15mg/day.

4. Case Discussion

The patient presented without a history of substance use or abuse and lacked pre-existing conditions that could predispose her to movement disorders. A comprehensive clinical examination was conducted, revealing no abnormalities, thereby aiding in the exclusion of other potential diagnoses. This finding is consistent with the observations of Campos et al. (2021) and Zareifopoulos et al. (2021), who underscore the critical role of meticulous clinical evaluations in differentiating akathisia from other movement disorders.

Based on the gathered information and in alignment with the criteria established by the International Classification of Diseases (ICD-10) for extrapyramidal movement disorders, a diagnosis of akathisia was rendered. The patient experienced akathisia as a multifaceted phenomenon comprising both physical and emotional sensations. During episodes, she exhibited profound restlessness, characterized by an internal distress that compelled her to engage in constant movements. She described experiencing internal tingling and an almost unbearable compulsion to move, mirroring the experiences reported by Demyttenaere et al. (2019), who note that akathisia frequently manifests as a significant psychological discomfort intertwined with a motor compulsion.

The onset of these symptoms coincided with the initiation of risperidone, a second-generation antipsychotic known for its propensity to induce extrapyramidal side effects (Thippaiah et al., 2021; Zareifopoulos et al., 2021). This temporal relationship suggests a direct association between the medication and the onset of akathisia symptoms. The confluence of these sensations rendered the episodes of akathisia exceptionally challenging for the patient, considerably impacting her quality of life and daily functioning. An in-depth understanding of these sensory experiences was paramount in refining the therapeutic approach, as it sought effective alleviation of symptoms and improvement in treatment outcomes. This aligns with the advocacy by Lopes et al. (2024) for the implementation of patient-centered strategies in addressing akathisia-related side effects.

In an effort to mitigate the antipsychotic-induced side effects and prevent the exacerbation of akathisia, propranolol, clonazepam, and phenytoin were integrated into the treatment regimen. This adjustment yielded a modest improvement in her condition, corroborating the findings of Poyurovsky and Weizman (2020), who suggest that beta-blockers, anticholinergics, and benzodiazepines can effectively alleviate akathisia symptoms.

Subsequently, there was a gradual reduction in the dose of risperidone, along with the introduction of clozapine into the therapeutic regimen. The improvement in akathisia symptoms occurred progressively throughout the treatment. The therapeutic evolution of this patient highlights the complexity of managing adverse reactions in cases of schizophrenia. This case report underscores the need for a personalized approach, considering not only the efficacy of antipsychotics but also their side effects, particularly akathisia, which can significantly impact the patient's quality of life. The negative consequences of akathisia are elucidated in the study by Nagaoka et al. (2023), reinforcing the importance of addressing these challenges in the clinical management of schizophrenia.

Careful adjustments to medication dosages, smooth transitions between treatment options, and comprehensive psychosocial support are essential components of the clinical care for this patient. Establishing a strong therapeutic alliance with the mental health team was fundamental to her treatment, creating an atmosphere of trust and collaboration. This relationship not only facilitated effective communication but also allowed for timely changes to the treatment plan, improving adherence to the prescribed regimen. Employing a person-centered approach was crucial, highlighting the importance of understanding the patient's unique perspective and specific needs. Techniques identified by Moira Stewart, such as active listening, exploring the patient’s ideas, concerns, and expectations, and promoting shared decision-making, were key in building rapport and strengthening the therapeutic alliance (Stewart et al., 1995). By prioritizing these elements, the treatment became more responsive to the patient’s experiences, ultimately leading to better health outcomes.

Additionally, support from the spouse was a critical factor in the patient's progress. His consistent presence and emotional support provided a crucial foundation, helping to alleviate the psychological burden of akathisia and enhancing the patient's resilience. This aspect of family support is essential for effectively managing the condition, as highlighted by Stewart et al. (1995), who emphasize the importance of social support systems in improving treatment outcomes. The spouse's involvement not only fostered a sense of security but also encouraged open communication about the patient's experiences and challenges, facilitating a more holistic approach to her care. Overall, the integration of family support into the treatment plan underscores the necessity of addressing both medical and psychosocial factors in achieving optimal health outcomes for patients with complex conditions like akathisia.

The progression of this complex case emphasizes the need for flexibility in treatment when facing clinical challenges, resulting in significant improvements in the patient's quality of life. This progress serves as strong evidence for the effectiveness of a personalized treatment approach that considers the individuality of each patient and the complexities of their experiences. It reminds us that even in the most challenging clinical situations, positive outcomes can be achieved through appropriate strategies and sufficient support.

5. Conclusion

This case report provides valuable insights into the management of akathisia in patients with schizophrenia, emphasizing the significance of personalized treatment strategies. Understanding the role of dopamine and dopaminergic pathways is crucial, as these neurotransmitter systems are intricately linked to the development of extrapyramidal symptoms, including akathisia. The findings underscore the necessity of comprehensive monitoring and timely adjustments to pharmacological regimens to address the emergence of adverse effects associated with antipsychotic medications.

The successful reduction of akathisia symptoms through a tailored therapeutic approach highlights the potential for improved patient outcomes when considering both efficacy and side effects. Additionally, the integral role of a supportive environment, facilitated by strong communication between the patient, healthcare providers, and family members, cannot be overstated. Such collaboration enhances treatment adherence and fosters resilience in patients facing complex mental health challenges.

Overall, this case exemplifies the importance of adopting a multifaceted strategy in psychiatric care, advocating for a balance between pharmacological interventions and psychosocial support to optimize the quality of life for individuals affected by schizophrenia. Furthermore, ongoing research into dopaminergic pathways will be essential to refine management protocols and deepen our understanding of akathisia, ensuring that patient-centered care remains at the forefront of psychiatric practice.

For future research and articles, it is essential to explore several key areas to enhance the management and understanding of akathisia in patients with schizophrenia. Firstly, clinical trials comparing different pharmacological agents and combinations are necessary to identify the most effective treatments with minimal side effects. Systematic reviews and meta-analyses of existing data could further consolidate knowledge on the efficacy and safety of emerging therapies. Research into genetic and neurobiological factors involved in akathisia susceptibility would also be valuable, as these insights could lead to more personalized treatment approaches based on individual risk profiles. Additionally, longitudinal studies investigating the long-term impact of akathisia on patient quality of life and adherence to antipsychotic therapy could inform comprehensive care strategies. Lastly, the role of non-pharmacological interventions, such as cognitive-behavioral therapy and family-based support systems, warrants further investigation to complement pharmacological treatments. Together, these research directions will advance evidence-based practices and support patient-centered care in managing akathisia in patients with schizophrenia and its associated challenges.

Conflict of Interest

The authors declare no conflicts of interest related to this research. Additionally, no relevant affiliations or financial involvement with any organization or entity that has a financial interest in or conflict with the subject matter or materials discussed in the study.

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