EYE OF THE TIGER SIGN (PKAN DISEASE)

Mrs. Premalatha Jaya Chandra*

** Pediatric Neuro-Science, NNI, King Fahad Medical City, Riyadh, Saudi Arabia.*

DOI: http://doi.org/10.47211/tg.2022.v09i03.006

ABSTRACT

Having the "eye of the tiger" means being laser-focused on achieving a singular goal. Being "in the eye of the tiger" refers to being in a "kill or be killed" situation. Pantothenate kinase-associated neuro degeneration (formerly called Hallervorden-Spatz syndrome) is a disorder of the nervous system as "Eye of the Tiger." Researchers' sought to assess sleep characteristics, including muscle activity during REM sleep, in patients with PANK2 gene mutation-and confirmed diagnosis of PKAN. Approximately 30-35% of the NBIA population has PKAN. It is caused by mutations in the PANK2 gene on chromosome 20. This gene provides the instruction for making an enzyme called pantothenate kinase. Researchers are investigating how this missing enzyme damages nerve cells in the brain and causes iron to build up.

Key words: *PKAN, PANK2, NBIA, Hallervorden-Spatz, Eye of the tiger.*

ABOUT AUTHOR:

Author, Dr. Premalatha Jaya Chandra MSN. MSc (Psychology) MPhil (Psychology) PHD (Nursing) presently working as a shift Manager in Pediatric Neuroscience, National Neuro Science Institute(NNI) King Fahad Medical City, Riyadh, Saudi Arabia. She has Presented Papers in various conferences and seminars. She has many research publications in national and internationalJournals.

INTRODUCTION

"Eye take in light from the world around us and send visual information to our brain".

"Eye of the Tiger" means an accumulation of iron, is typically seen on Magnetic Resonance Imaging (MRI) scans of the brain in people with this disorder. Experts defined in the Journal as a mutation of pantothenate kinase (PANK2) gene localized on chromosome 20p13 has been described in familiar forms, as well as in sporadic patients.

Hallervorden-Spatz syndrome was first described in 1922 by Drs. Julius Hallervorden and Hugo Spatz with their study of a family of 12 in which five sisters exhibited progressively increasing dementia and poor articulation and slurred speech (dysarthria). The name Hallervorden-Spatz syndrome became discouraged and was replaced with neuro degeneration with brain iron accumulation because of concerns regarding Dr. Hallervorden' s and Dr. Spatz's affiliation with the Nazi regime and their unethical activities surrounding how they obtained many autopsy specimens.

This condition is characterized by progressive difficulty with movement, typically beginning in childhood. Movement abnormalities include involuntary muscle spasms, rigidity, and trouble with walking that worsens over time. Many people with this condition also develop problems with speech (dysarthria), and some develop vision loss. Researchers have described classic and atypical forms of pantothenate kinase-associated neuro degeneration. The classic form usually appears in early childhood, causing severe problems with movement that worsen rapidly. A typicalform appears later in childhood or adolescence and progress more slowly. Signs and symptoms vary, but the atypical form is more likely than the classic form to involve speech defects and psychiatric problems.

DEFINITION

It is an autosomal recessive disorder characterized by dystonia, Parkinsonism, and iron accumulation in the brain in the Globus pallidus –a pale body (control conscious and proprioceptive movements) with central high signal (due to gliosis and spongiosis).

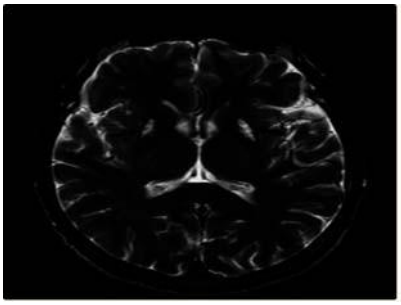
INCIDENCE:

- Unknown.
- It is estimated to affect 1 to 3 per million people worldwide

CLINICAL MANIFESTATIONS

1. Loss of Intellectual Function (Dementia) depression
2. Psychiatric Symptoms Such as Behavioral Problems, Personality Changes, Dystonia,(Sustained Muscle Contractions Causing Repetitive Movements),
3. Muscular Rigidity and Poor Balance, Dysarthria Difficulty in Controlling Movement
4. Spasticity (Sudden Involuntary Muscle Spasms) Clumsiness, Gait (Walking) Problems
5. Speech Problems(Palilalia), Rapid Speech (Tachylalia)
6. Degeneration of The Retina: Resulting in Progressive Night Blindness and Loss ofPeripheral (Side) Vision, difficulty Swallowing (Dysphagia)
7. Blepharospasm (Excessive Blinking and Involuntary Closing of the Eyelids)
8. Torticollis (Involuntary Contractions of Neck Muscles Resulting in Abnormal Movementsand Positions of the Head and Neck)

DIAGNOSIS



MRI (**Eye of the Tiger sign**) and Molecular genetic testing

ETIOLOGY

Mutations in pank 2 gene

(It provides instructions for making an enzyme called pantothenate kinase 2, it plays a critical role in the formation of a molecule called coenzyme A. Found in all living cells, coenzyme A is essential for the body's production of energy from carbohydrates, fats, and some protein building blocks (amino acids). This buildup leads to swelling and tissue damage, and allows iron to accumulate abnormally in certain parts of the brain)

RISK FACTORS

- Recessive genetic disorders occur when an individual inherits a non-working gene from each parent. If an individual receives one working gene and one non-working gene for thedisease, the person will be a carrier for the disease
- The risk for two carrier parents to both pass the non-working gene and, therefore, have an affected child is 25% with each pregnancy.
- The risk to have a child who is a carrier, like the parents, is 50% with each pregnancy.
- The risk is the same for males and females.
- All individuals carry 4-5 abnormal genes and Consanguinity is thought to be present in approximately 23% of families with PKAN.

MANAGEMENT

- Treatment of manifestations: Intramuscular botulinum toxin, ablative pallidotomy orthalmotomy, intrathecal or oral baclofen and oral trihexyphenidyl
- Physical therapy and occupational therapy to maintain joint mobility
- Referral for adaptive aids (walker, wheelchair) for gait abnormalities
- Speech therapy and/or assistive communication devices
- Treatment for retinopathy by ophthalmology

NURSING CARE

- Full-mouth dental extraction when severe Oro-bucco lingual dystonia results in recurrenttongue biting; gastrostomy tube feeding as needed.
- Evaluation for treatable causes of pain during episodes of extreme distress,
- Monitoring of height and weight and speech abilities
- Routine ophthalmologic assessment; Feeding and nutrition assessment
- Oral assessment for trauma, assessment of ambulation

PREVENTION

Genetic Counseling: PKAN is inherited in an autosomal recessive manner. At conception, eachsib of an affected individual has a 25% chance of being affected, a 50% chance of being an asymptomatic carrier, and a 25% chance of being unaffected and not a carrier. Carrier testing for at-risk relatives and prenatal testing for pregnancies at risk are possible if both pathogenic variants have been identified in an affected family member.

PROGNOSIS

With regard to prognosis, there is no current curative treatment for PKAN, thus the management is primarily symptomatic and supportive. Death normally occurs in the third decade –although atypical PKAN seems to be less aggressive than classic forms- due to respiratory infections, cardiorespiratory complications or malnutrition

RECENT FINDINGS

Disease caused by mutations in the gene encoding pantothenate kinase 2 (*PANK2*) is characterized by dystonia and pigmentary retinopathy in children or speech and neuropsychiatric defects in adults, in concert with a specific pattern on MRI of the brain. This virtually pathognomonic radiographic abnormality comprises hyper intensities within a hypo intense medial Globus pallidus on T2-weighted images. This disorder is accounts for most patients diagnosed with NBIA. Pantothenate kinase is essential to coenzyme

SUMMARY

Pantothenate kinase-associated neurodegeneration (PKAN) is a rare disease characterized by a progressive degeneration of the nervous system and buildup of iron in the brain. PKAN is inheritedin an autosomal recessive manner and is caused by genetic changes in the PANK2 gene.

CONCLUSION

This “Eye of the Tiger sign” described as low signal intensity in both globi pallidi (due to iron accumulation) that surrounds a central region of high signal intensity (caused by gliosis, edema,and neuronal loss with subsequent secondary vacuolization and cavitation

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