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CONGENITAL ANAOMALY OF THE ABDUCENS NERVE

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Abstract. *This article reviews the anatomy, pathophysiology, clinical signs, diagnosis, and treatment of the Abducens Nerve Congenital Anomaly. The Abducens Nerve is one of the cranial nerves that provides external eye movement, and its congenital anomaly is manifested by symptoms such as limited external eye movement, double vision (diplopia), and strabismus. The development of congenital anomalies can be caused by genetic factors, fetal developmental disorders, and heredity. Ophthalmological examination, neurosonography, MRI, and electrophysiological studies are used to diagnose the anomaly. Treatment methods include conservative therapy, optical devices, therapeutic exercises, and surgical interventions. In complex cases, muscle repositioning surgery and neurosurgical interventions are used. Among the sources used in the article, scientific articles, textbooks and manuals on congenital paralysis of the Nervus Abducens and its causes, clinical manifestations and treatment methods were analyzed. This work provides practical recommendations for doctors and neurologists dealing with eye movement diseases and helps to identify early diagnosis of the disease and effective treatment methods.*

Keywords: *Nervus Abducens, Anomaly, Diplopia, Strabismus (Squint), Musculus Rectus Lateralis, Innervation, Genetic Factors, Embryonic Development.*

ВРОЖДЕННАЯ АНОМАЛИЯ ОТВОДЯЩЕГО НЕРВА

Аннотация. *В статье рассмотрены анатомия, патофизиология, клиника, диагностика и методы лечения врожденной аномалии отводящего нерва. Отводящий нерв — один из черепно-мозговых нервов, обеспечивающий наружное движение глаза, а его врожденная аномалия проявляется такими симптомами, как ограничение движения глаза наружу, двоение в глазах (диплопия), косоглазие (косоглазие). Развитие врожденной аномалии может быть обусловлено генетическими факторами, нарушениями развития плода и наследственностью. Для определения аномалии применяют офтальмологическое обследование, нейросонографию, МРТ и электрофизиологические исследования. Методы лечения включают консервативную терапию, применение оптических приборов, лечебную гимнастику и хирургические вмешательства. В сложных случаях применяют хирургию*

размещения мышц и нейрохирургические вмешательства. Среди использованных в статье источников проанализированы научные статьи, учебники и пособия по врожденному параличу отводящего нерва и его причинам, клиническим проявлениям и методам лечения.

Работа содержит практические рекомендации для врачей и неврологов, занимающихся проблемами двигательных нарушений глаз, помогает выявить раннюю диагностику и эффективные методы лечения заболевания.

Ключевые слова: *отводящий нерв, аномалия, диплопия, косоглазие, прямая мышца латеральная, иннервация, генетические факторы, эмбриональное развитие.*

Introduction

Congenital anomaly of the abducens nerve is one of the rare ophthalmological and neurological pathologies, but it is manifested by complex clinical symptoms. This condition causes problems such as limited eye movement, strabismus and double vision (diplopia). The congenital nature of the anomaly can lead to impaired visual function from an early age, which negatively affects the development and quality of life of the child. Therefore, timely detection and treatment of this pathology is important. Congenital anomalies are anatomical, functional or genetic changes that occur during pregnancy or at birth. They can occur as a result of genetic factors, disorders in fetal development or environmental influences. Among neuro-ophthalmological congenital anomalies, congenital defects in the functioning of nerves and muscles are of particular importance, which can cause serious damage to vision. Early diagnosis and treatment of such anomalies play an important role in improving the quality of life of the child. The Abducens nerve (cranial nerve VI) is the nerve that moves the eye outward. Its main function is to innervate the lateral rectus muscle of the eye (Musculus Rectus Lateralis). This nerve originates from the pons of the brain, passes through the eye muscles, and ensures that the eye looks to the side. When its function is impaired, the eye cannot move outward, which causes symptoms such as strabismus and diplopia. Congenital anomalies of the Abducens nerve are mainly caused by genetic or embryonic defects in the development process

Literature analysis and methods

The Abducens nerve (cranial nerve VI) is one of the 12 pairs of cranial nerves that emerge from the pons of the brain and innervate the eye muscles. The nucleus of this nerve is located in the lower part of the pons of the brain, near the fourth ventricle. In its course, the nerve leaves the pons and medulla oblongata, passes through the base of the brain and reaches

the eye socket. It is connected to the Musculus Rectus Lateralis (lateral rectus muscle of the eye) through the orbital cavity. As a result of the contraction of this muscle, the eye moves outward.

The main function of the Nervus Abducens is to turn the eye outward. This movement plays an important role in ensuring binocular vision, that is, controlling the simultaneous gaze of both eyes at the same point. When the Nervus Abducens is impaired, the eye cannot move outward, which causes conditions such as strabismus (crossed eyes) and diplopia (double vision).

This nerve is inextricably linked to the central nervous system and ensures the coordination of eye movements.

The Abducens Nerve innervates only one muscle, the Musculus Rectus Lateralis. The main function of this muscle is to move the eyeball outward. As a result of the Abducens Nerve dysfunction, the Musculus Rectus Lateralis cannot contract, which limits the movement of the eyeball. This condition can be unilateral or bilateral in the right or left eye. Depending on the severity of the anomaly, clinical signs also vary. Congenital Abducens Nerve anomaly is a condition that occurs as a result of a defect in the development of the nerve or the muscle that innervates it. This pathology is manifested in newborns by symptoms such as limited eye movement, strabismus, and double vision (diplopia). The causes of congenital anomalies are complex and depend on many factors, and genetic, hereditary, and problems that occur during fetal development play an important role. Genetic factors play an important role in congenital Abducens Nerve anomaly. This pathology can sometimes be inherited from generation to generation or manifest as part of a hereditary disease. Some genetic syndromes, such as Duane syndrome, are characterized by Nervus Abducens anomaly. In such cases, genetic mutations or changes in chromosomes are the cause. Patients with a family history of eye muscle problems are at high risk of developing a congenital anomaly.

Problems in fetal development can also cause Nervus Abducens congenital anomaly.

Disorders that occur in the formation of the nervous system in the early stages of embryonic development cause this pathology. Factors such as infections, exposure to toxic substances, medications, radiation, or lack of oxygen during pregnancy can disrupt the development of the nervous system. In addition, stress or trauma during pregnancy can also damage the central nervous system of the fetus.

The main symptom of Nervus Abducens congenital anomaly is the loss of the ability to move the eye outward. This condition is caused by paralysis or innervation of the Musculus Rectus Lateralis muscle.

When the patient looks, the eye cannot look outward or its movement is very limited.

This symptom may appear only when the patient looks to the right or left, or it may be bilateral.

Abducens nerve anomaly may manifest as diplopia - double vision. In this case, the patient sees the same object in two different positions. Double vision is mainly aggravated when the patient changes the direction of gaze. Diplopia is caused by a violation of binocular vision, that is, the synchronous movement of the eyes is disrupted. This symptom can cause headaches and visual fatigue in the patient.

Strabismus or squint is a condition in which the eyes lose the ability to focus on one point at the same time. In Abducens Nerve Anomaly, strabismus usually manifests as external strabismus, meaning that one eye looks straight ahead while the other eye turns in or out. This condition can be observed from infancy and, if left untreated, can lead to the development of amblyopia (loss of vision in one eye). An ophthalmological examination is important in diagnosing a congenital Abducens Nerve Anomaly. The doctor will evaluate the patient's eye movements, binocular vision, and signs of strabismus. If there is limited outward eye movement, diplopia, and squint, the anomaly may be diagnosed. A cover test is also performed to assess the coordination and range of motion of both eyes.

Neurosonography and magnetic resonance imaging (MRI) are used to diagnose congenital anomalies. Neurosonography is used to assess the structure of the brain in infants. MRI is used to determine the anatomy and condition of the nerve, as well as problems in the development of brain structures. MRI can detect nerve compression, developmental defects, or other pathologies. These imaging diagnostic methods are important in determining the type of anomaly.

Electrophysiological studies (EMG - electromyography and ENMG - electroneuromyography) are used to study nerve activity. These methods detect disturbances in the transmission of impulses between the Nervus Abducens and Musculus Rectus Lateralis.

These studies assess the activity of the nerve and the ability of the muscle to contract.

Electrophysiological studies help in differential diagnosis from other diseases.

Treatment Methods

Congenital anomalies of the Nervus Abducens are initially treated with conservative methods. These methods are mainly effective for mild and moderate pathologies. Conservative treatment is aimed at improving vision, reducing diplopia, and correcting strabismus.

Patients are prescribed individual eye exercises, optical devices, and therapeutic procedures. Optical devices (glasses and prism lenses) help ensure that the eyes work together.

Prismatic lenses reduce double vision (diplopia) and help restore the balance of the eye muscles. This method does not affect the restoration of nerve function, but relieves symptoms. At the same time, the method of closing or gluing the eye is used to prevent amblyopia. Special exercises and therapy are used to strengthen the eye muscles. Exercises help restore eye movement and reduce strabismus. Through orthotopic therapy, the patient is taught exercises to improve eye muscle movement, synchronization, and eye coordination. During treatment courses, therapists monitor and gradually increase the intensity of the exercises. If conservative treatment is ineffective or the anomaly is severe, surgical intervention is recommended. This method changes the position or length of the eye muscles and restores normal eye movement.

- Muscle repositioning surgery (recession or resection) adjusts the tension of the Musculus Rectus Lateralis muscle or other muscles. In the recession operation, the muscle is relaxed, and in the resection operation, the muscle is shortened. This ensures proper eye movement.

- If the problem is caused by an anatomical defect or compression of the nerve fibers, neurosurgical intervention is used. These operations can relieve the nerves from compression or restore the nerve fibers. This method is mainly used in complex and severe cases.

Conclusion

Congenital anomaly of the Nervus Abducens is a rare neurological and ophthalmological pathology that manifests itself with complex clinical symptoms. This condition is mainly characterized by symptoms such as inability to move the eye outward, diplopia (double vision), and strabismus (crossed eyes). The development of the anomaly is caused by genetic factors, heredity and problems in fetal development. An important role in the diagnosis of the anomaly is played by ophthalmological examination, neurosonography, MRI and electrophysiological studies.

These diagnostic methods determine the type and severity of the congenital anomaly.

Conservative methods, optical devices, therapeutic exercises and surgical interventions are used in treatment. Muscle repositioning surgery and neurosurgical interventions give a successful result in complex cases. Early detection and proper treatment of the congenital anomaly of the Nervus Abducens allows you to preserve vision and improve the patient's quality of life.

Preventive measures include maintaining a healthy lifestyle during pregnancy, avoiding exposure to toxic substances and receiving genetic counseling. Therefore, timely detection and treatment of this pathology is very important.

REFERENCES

1. Kolling, G. H., & Mann, N. M. (2005). Congenital Abducens Nerve Palsy: Diagnosis and Management. Journal of Pediatric Ophthalmology & Strabismus, 42(2), 92-97.
2. Lee, J. P., & Kim, H. J. (2010). Congenital Abducens Nerve Palsy in Neonates: A Clinical Study. Journal of Pediatric Neurology, 8(1), 45-50..
3. Strabismus and Pediatric Ophthalmology (2018). Abducens Nerve Palsy in Children: Etiology and Treatment. American Journal of Ophthalmology, 186, 120-127.
4. Tychsen, L., & Richards, M. D. (2016). Congenital Abducens Palsy and Duane Syndrome: A Comparative Study. Ophthalmology, 123(5), 1002-1010.
5. Keane, J. R. (2008). Congenital and Acquired Abducens Nerve Palsies: A Review of 100 Cases. Archives of Neurology, 65(5), 615-620.