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HYDROCEPHALUS IN CLINICAL PRACTICE

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Summary. The issue of hydrocephalus is typical for a clinical practice. This disease can be found in different age group of people: from infants and older children to adults. The frequency of congenital hydrocephalus varies in different countries. In the UK, the USA, Ukraine and Russia from data of different authors, it differs from 1 to 4 per 1000 live births but in countries of Africa it is higher. In pediatric neurosurgery, hydrocephalus is one of the most common diseases requiring surgical intervention. During pregnancy usual ultrasound investigation can identify enlarged ventricles and subarachnoid spaces. This information allows us to reveal data about condition of liquor circulation as early as it is possible. Due to early diagnostics with usage of modern achievements of computed and magnetic resonance imaging we have opportunity for more timely and rational treatment. Unfortunately conservative treatment cannot be effective in the cases of non-communicating or obstructive hydrocephalus. The method of ventriculo-atrial and other types of shunts can help to make symptoms of hydrocephalus reversible and treatment more successful.

Key words: hydrocephalus, cerebrospinal fluid, ventricles of brain, shunt system.

Introduction

Problem of hydrocephalus always excited many physicians since ancient time.

Hydrocephalus affects a wide diapason of people, from infants and older children to young, middle-aged and older adults.

From data of different authors (UK, USA) about 1–2 in every 1000 babies is born with hydrocephalus [1; 2]. Over 1000000 people in the United States currently live with hydrocephalus [3]. The prevalence of congenital hydrocephalus in Ukraine and Russia from data of different sources is from 1 to 4 per 1000 live births [4; 5]. In developed countries, the incidence of neonatal hydrocephalus ranges from 3 to 5 cases per 1000 live births, with a male predominance, but little is known about the frequency of hydrocephalus in Africa. In Mozambique, there is no primary information associated to this disorder, but the expected incidence of neonatal hydrocephalus would be in the range from 2900 to 4800 cases per year [6].

Hydrocephalus is classified as congenital and acquired. Congenital hydrocephalus is connected with abnormal fetal development or genetic abnormalities that are present at birth. In rare cases, congenital hydrocephalus may not cause symptoms in childhood but only manifest in adulthood and may be associated with aqueduct stenosis [7].

Acquired hydrocephalus as a rule develops after birth and affects individuals of all ages and may be caused by brain injury or other diseases.

Unfortunately, conservative treatment cannot be effective in the cases of non-communicating or obstructive hydrocephalus when the flow of cerebrospinal fluid (CSF) is blocked along one or more of the narrow passage connecting the ventricles and only operation can save the life of such patients. The technique ventriculocisternostomy (a procedure in which a shunt is placed from the lateral ventricle to the cistern magna) created by Norwegian neurosurgeon Arne Torkildsen,

since 1940s and 1950s became internationally recognized as an efficient operation for the treatment of non-communicating or obstructive hydrocephalus [8]. One of such causes is aqueductal stenosis, a narrowing of the Sylvia's aqueduct, a small passage between the third and fourth brain ventricles.

It is known that, in normal conditions, CSF is produced mainly within the lateral and third ventricles by the choroid plexus and flows from the lateral ventricles through narrow passageways named as cerebral aqueduct into the third ventricle [9]. From the third ventricle, it flows down another long passageway known as the Sylvia's aqueduct into the fourth ventricle and then it passes through three small openings called foramina (Luschke and Magendie) into the subarachnoid space surrounding the brain and the spinal cord (**Fig. 1**).

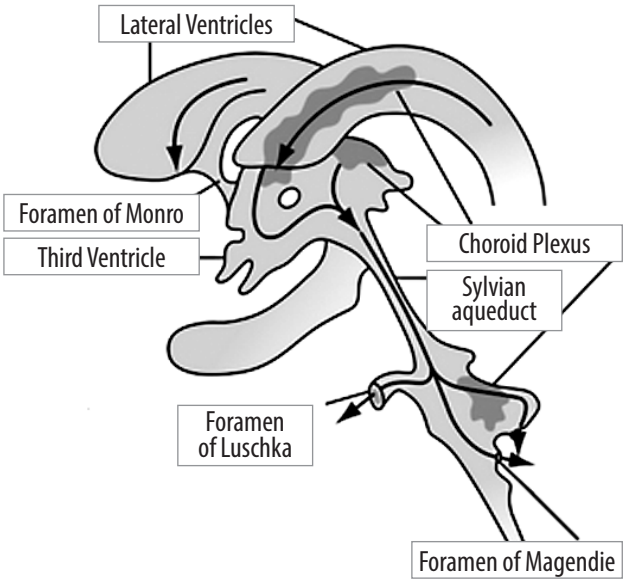

Fig. 1. Normal passage cerebrospinal fluid

The famous Russian scientists D. A. Shamburov (1887–1963), V. K. Khoroshko (1881–1949) [10] studied questions of liquor diagnostic, spinal puncture and developed the method called pneumoencephalography. A. A. Arendt (1948) [11] studied hydrocephalus and its surgical treatment. After the 1980s a significant place in the former USSR began using endoscopic surgery in the treatment of hydrocephalus.

Neurosurgical methodic which include more accurate placement of ventricular catheters and a third ventriculostomy for an aqueduct stenosis were improved in the 1980s and 1990s. This technique was widely spread as a first choice method in adult patients with acquired or late-onset occlusive hydrocephalus.

Purpose and objectives of the study

The aim of our work is to study using of neurosurgical methodic of treatment of congenital hydrocephalus caused by the Sylvia's aqueduct stenosis in clinical practice.

Material and methods

We describe the clinical case of treatment of patient with congenital hydrocephalus using operative methodic of ventricular-atria shunt and this changes neurological, ophthalmological status and ventricle system in connection with hydrocephalus.

For analysis of this case we used such methods as the clinical-neurological method, the method of computed tomography and the method of ophthalmological investigation.

Results of research and discussion

Patient V., was born in 1980 and was treated in the Central Clinical Hospital UZ, Kharkiv. Since 1995 every 6 months he is undergoing treatment in the clinic. Last time it was in winter of 2017.

Complaints. Diffuse headaches, a feeling of pressure on the eyes, ears, decreased vision, dizziness, nausea from time to time, anxiety, irritability, memory loss, confusion attention, bad dream. With an increase in the headache, vomiting occurs and sometimes it brings relief.

Medical history. From the early childhood he has headaches, enlargement of head size, especially in the frontal part. His treatment was as an outpatient. At the age of fifteen his condition became worse, headaches increased, vision worsened, dizziness appeared, nausea, vomiting during headache increased. He was examined by neurosurgeon in our clinic and the CT revealed big ventricles as a sign of congenital hydrocephalus, also optic atrophy was founded. In 1995 he was operated with ventricular-atria shunt because the stenosis of Sylvain's aqueduct was revealed.

General condition of patient is good. BP=120/70 mm Hg., heart rate is 72 in 1 min. Blood and urine analysis are normal.

Neurological status. Strabismus is divergent of the left eyeball. Pupils D=S, dilated. Defeat of convergence OS is found. Horizontal nystagmus is found. Muscle

tonus of extremities and muscle strength are normal. Tendon reflexes with arms D=S, knee and achilles S>D, reviving. Double-sided reflexes Rossolimo on the feet. Pain sensitivity intact is present. In the Romberg test is stable. Performing finger-nose and knee-heel test was satisfactory. Distal hyperhidrosis is present. Asthenic syndrome is found.

CT brain (2017) when compared with CT data from 15.02.11 N 46026 present no dynamics. Dramatically expanded ventricles, asymmetric with a predominance of the left side (at the level of the septum pellucid shift right up to 6 mm), width III – 26 mm ventricle, the anterior horns of the lateral: left and right 48 mm and 68 mm). The free end of the drain tube is in the temporal horn of the right lateral ventricle. Convexity subarachnoid space is slightly expanded to 4 mm, cisterns of brain are not expanded. Pneumatization of the sinuses is not compromised. Bone-destructive changes are not determined.

Ophthalmologist (2017) – VOD = 0,8–0,75 D = 1,0; VOS = 0,07. Tendency is to divergent concomitant strabismus by the left eye. Field of vision: not limited, visual reactions are normal. Ocular fundus: optic nerves discs are pale, S>D, moderate venous plethora of retina angiopathy of both eyes. Partial atrophy of the optic discs in both eyes, S>D is found.

Diagnosis. Congenital hydrocephalus. Optic atrophy, liquorno-hypertensive syndrome. Vegetative-vascular dystonia syndrome. Condition after operations ventricular-atria shunt (1995).

Treatment. L-lysine aescinatis – 5 ml i.v.1 time a day for 10 days, magnesium sulfate 25 % – 5 ml i.v. 1 time a day for 5 days, tiocetam – 5 ml i.v. 1 time a day for 10 days, drotaverine (No-spanum) – 2 ml i.m. 1 time a day for 5 days, acethazolamid (diakarb) – 1 tab. twice a day (TD) for 10 days, asparkam – 1 tab. TD for 10 days, gliatilin – 1 tab. TD for 15 days, valeriana – 2 tab. three times a day for 15 days, nimesulide – 1 powder a day for 1 day, dexamethasone – 4 mg i.m. for 3 day, amitriptyline – 2 ml i.m. for 10 days.

Usually after treatment the condition of patient became better, but through the course of 2-3 months old complaints appeared. Unfortunately, he was operated late at the age of fifteen when hydrocephalus

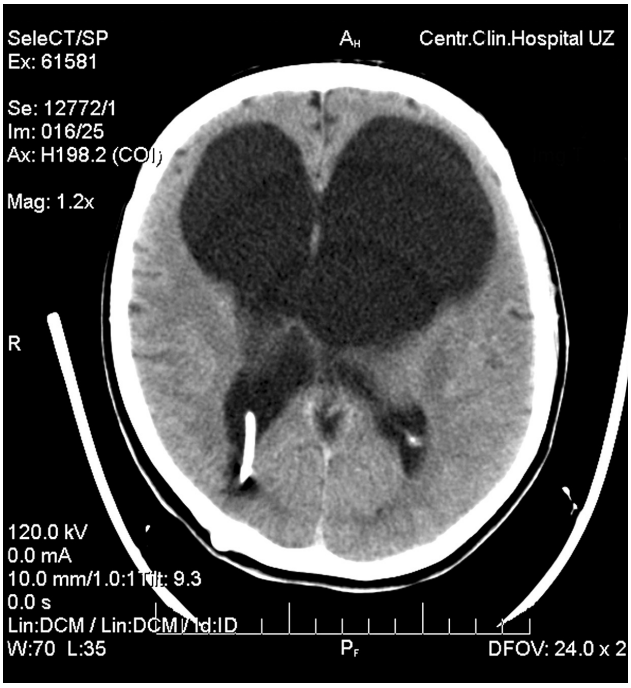

Fig. 2. CT patient V. (own observation). Congenital hydrocephalus. Condition after operations with ventricular-atria shunt (VAS), 1995. Enlargement ventricles especially left lateral. White color tube is VAS

was formed, on CT revealed asymmetric ventricles, more pronounced left side, and external hydrocephalus (**Fig. 2**).

Conclusions

Our medical history shows that the patient's brain ventricles seriously change with congenital hydrocephalus. This case demonstrates severe clinical symptoms of the disease and features of congenital hydrocephalus, which does not give the patient possibility to completely recover because operation was made in the late age. We will expect a better prognosis if such patients were operated in early age because children have no persistent irreversible symptoms of hydrocephalus.

On the literature data, prognosis of treatment of hydrocephalus varies depending on the cause. In the case of untreated hydrocephalus, the survival rate is 40–50 %, with the survivors having varying degrees of intellectual, physical, and neurological disabilities. About 50 % of all children who receive appropriate treatment and follow up will develop IQs in the near-normal or normal range [2]. That is why the problem of hydrocephalus is significant for neurologists, neurosurgeons and general practitioners.

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ГІДРОЦЕФАЛІЯ В КЛІНІЧНІЙ ПРАКТИЦІ

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Анотація. Проблема гідроцефалії є актуальною для клінічної практики. Це захворювання зустрічається у різному віці: від немовлят і дітей старшого віку – до дорослих. Частота вродженої гідроцефалії відрізняється у різних країнах. У Великобританії, США, Україні та Росії, за даними різних авторів, вона коливається у межах 1–4 випадків на 1000 живонароджених, але у країнах Африки цей показник значно вищий. Гідроцефалія є одним із найбільш поширених у дитячій нейрохірургії захворювань, що потребують оперативного втручання. Під час вагітності звичайне ультразвукове дослідження може виявити розширені шлуночки і субарахноїдальні простори. Ця інформація дозволяє нам якомога раніше отримати дані про стан ліквороциркуляції. Завдяки ранній діагностиці з використанням сучасних досягнень комп'ютерної та магнітно-резонансної томографії ми маємо можливість своєчасного та раціонального лікування. На жаль, консервативне лікування не може бути ефективним у випадках неінфекційної або обструктивної гідроцефалії. Метод шлуночково-передсердного та інших шунтів може допомогти зробити симптоми гідроцефалії оборотними, а лікування більш успішним.

Ключові слова: гідроцефалія, спинномозкова рідина, шлуночки мозку, шунтуюча система.

ГИДРОЦЕФАЛИЯ В КЛИНИЧЕСКОЙ ПРАКТИКЕ

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Аннотация. Проблема гидроцефалии является актуальной для клинической практики. Это заболевание встречается в различном возрасте: от младенцев и детей старшего возраста – к взрослым. Частота врожденной гидроцефалии отличается в разных странах. В Великобритании, США, Украине и России, по данным разных авторов, она колеблется в пределах 1–4 случаев на 1000 живорожденных, но в странах Африки этот показатель гораздо выше. Гидроцефалия является одним из наиболее распространенных в детской нейрохирургии заболеваний, требующих оперативного вмешательства. Во время беременности обычное ультразвуковое исследование может выявить расширенные желудочки и субарахноидальные пространства. Эта информация позволяет нам как можно раньше получить данные о состоянии ликвороциркуляции. Благодаря более ранней диагностике с использованием современных достижений компьютерной и магнитно-резонансной томографии мы имеем возможность своевременного и рационального лечения. К сожалению, консервативное лечение не может быть эффективным при неинфекционной или обструктивной гидроцефалии. Метод желудочково-предсердного и других шунтов может помочь сделать симптомы гидроцефалии обратимыми, а лечение более успешным.

Ключевые слова: гидроцефалия, спинномозговая жидкость, желудочки мозга, шунтирующая система.

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