



Endoscopic Removal of the Migrated Ventricular End of the Shunt and Ventriculocisternostomy for Progressive Hydrocephalus: A Clinical Case

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Abstract

Objective: Surgical treatment of patients with migrated ventricular end of the shunt and simultaneous endoscopic ventriculocisternostomy of the bottom of the third ventricle. Description of a case that was first performed in the Republic of Tajikistan.

Material and Methods: An 11-month-old patient underwent shunt surgery at the age of 4 months for progressive post-inflammatory hydrocephalus. At the age of 10 months, the infected shunt was removed. During removal, the ventricular end migrated. Transferred to the State Institution National Medical Center “Shifobakhsh” in the pediatric neurosurgical department with hypertensive-hydrocephalic syndrome. Computed tomography (CT) revealed a migrated ventricular end in the left lateral ventricle measuring 10 cm and progressive tetraventricular hydrocephalus with symmetrical enlargement of the lateral and third and fourth ventricles. Endoscopic removal of the migrated ventricular end of the shunt and ventriculocisternostomy of the floor of the third ventricle (EVC III) were performed. After surgery, regression of symptoms was observed. According to control CT data, there was a moderate decrease in the size of the lateral and third and fourth ventricles.

Discussion: When the ventricular end of the shunt migrates, its endoscopic removal is the optimal and low-traumatic method of operation and, if possible, ventriculocisternostomy of the third ventricle floor (EVC III) allows to reduce the implantation of CSF shunt system.

Keywords: Migrated Ventricular End of the Shunt; Hydrocephalus; Endoscopic Triventriculocisternostomy

Abbreviations

EVC III: Endoscopic Ventricular Cysternostomy of the Bottom of the Third ventricle

Introduction

Despite the rapid development of pediatric neurosurgery, the appearance of new methods of surgery and the improvement of fluorescent systems in childhood patients, especially infants, the incidence of postoperative complications is still considered high, which is from 3 to 60%, with the rate of fatality ranging from 1.1 to 29.4% [1-3]. The frequency of reoperations in shunt operations is very high, almost 60% it is due to ventricular end shunt dysfunction [3,4]. The migrated ventricular end of the shunt is a very rare complication and occurs as a result of insufficient fixation of the drainage system components or the impact of the trauma on the shunting system [5,6]. The use in the practice of pediatric neurosurgery of endoscopic revision for ventricular end

dysfunction and its elimination significantly improves its suitability and minimizes complications and is the prevention of ventricular shunt dysfunctions. This article describes the data of the single-moment endoscopic removal of the migrated end of the shunt from the opposite ventricle and the conduct of ventriculocysternostomy of the bottom of the third chamber (EVC III).

Description of the case Patient O. was transferred to the children's neurosurgery department of GU NMC of the Republic of Tajikistan “Shifobakhsh” with the words of the mother complaints of the increase in the size of the skull, frequent anxiety, hypertonus of the hands and legs, vomiting, developmental retardation. An anamnesis was established at the age of 4 months and a shunt operation was performed for progressive hydrocephalus. It developed after a severe neuroinfection. After the surgical period passed normally, was discharged with improvement condition. Last month the child was often affected by ARVI and there was a redness

in the area of the pump of the thyroid region on the right. After the emergence of hypertensive syndrome and the appearance of local symptoms of shunt infection dysfunction, the neurosurgeon at the place of residence gave an indication regarding the removal of the infected shunt. At the time of the shunt removal, when trying to remove the ventricular shunt it migrated and the surgeon could not remove it. This was followed by a CT scan of the skull and the brain where the ventricular end of the shunt is visible in the left side ventriculus. After antibiotic therapy and stabilization of the condition, it was decided to transfer the patient of GU NMC of the Republic of Tajikistan “Shiphobash” to the pediatric neurosurgery department. When assessing the neurological status -the patient’s consciousness is clear, responds to external irritations. There are involuntary movements of the eyeballs at the extreme withdrawal of the eyes, and there is also a small-scale vertical nystagmus. Head circumference 54cm. The shape of the skull is hydrocephalous. Greffe’s symptom is positive. The big fountain is not closed, blown and tense. Volume of active and passive movements in the joints of the upper and lower limbs without limitation. Muscle tone increased. The deep tendon reflexes on the upper and lower limbs are alive with some increase. No sensitivity violations. There are no violations of the functions of the pelvic organs. Meningial signs are not observed.

CT of the brain from 3D reconstruction (Figure 1) before the operation.

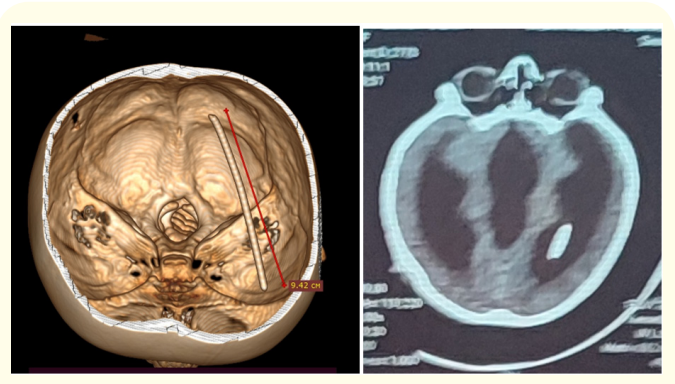


Figure 1: On a series of CT of the brain from 17.10.2023g- The cut end of the ventricular end of shunt to be on the left side chamber with a size of 10cm. Symptoms of progressive tetraventricular hydrocephalus with symmetrical enlargement of the lateral ventricles, III ventricles, IV-ventricle.

Ophthalmologist examination data from 18.10.2023: bilateral partial atrophy of the optic nerve.

During the period of hospitalization from 17.10.2023 to 21.08.2022 the patient was examined and prescribed antidiuretics, antibiotics for sensitivity.

General analysis of the liquid from 18.10.2023g- Cytosis-12, protein 0.66g/l, neutrophils-4, lymphocytes -12, but the dynamics noted the preservation of pronounced hypertensive-hydrocephal syndrome. 20.10.2023 The patient was performed a surgical intervention – instantaneous endoscopic removal of the migrated end of the ventricular shunt Figure 2 and ventriculocisternostomy of the bottom of the third chamber (EVC III) – in Figure 3. The duration of the operation was 35 minutes. The wound healing is primary. Control CT images taken on 3 days after the operation, there is a positive dynamic. The symptoms completely regressed, was discharged 7 days after the operation. No complications were observed. The seams are removed on the 10th day.

The ventricular shunt was removed from the normal Koher point of the right side of the chamber. After the shunt was found, it was removed with the help of spikes. The main steps of removal are shown in Figure 2.

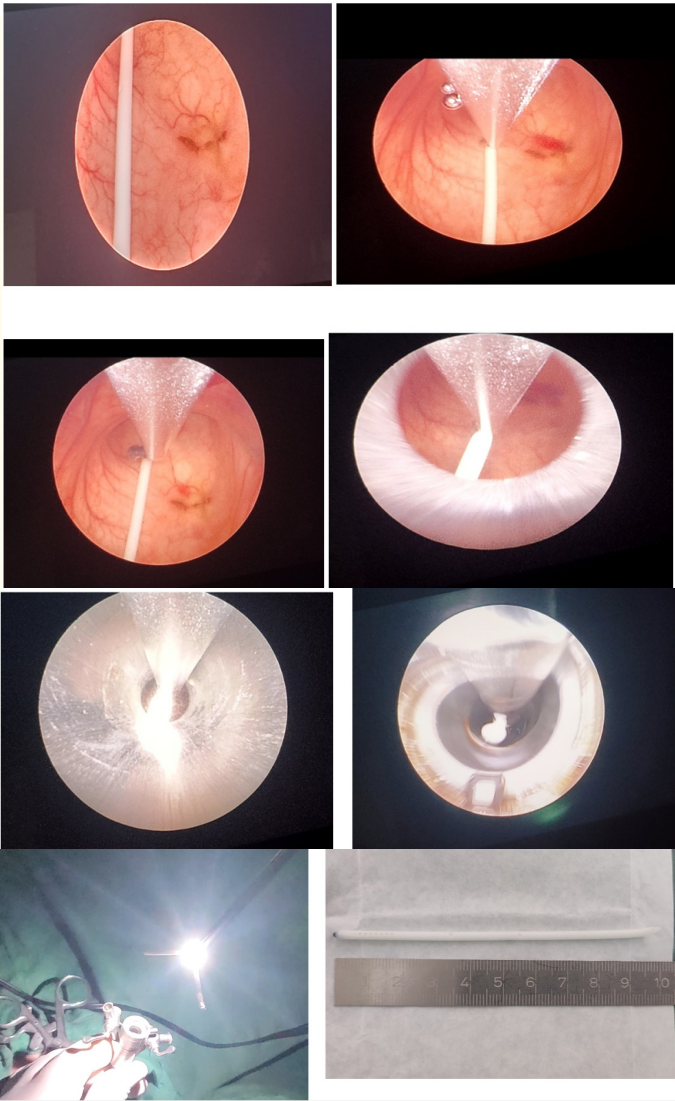


Figure 2: The main stages are removed from the migrated end of the ventricular shunt.

Bearing in mind that the patient remained hypertensive syndrome and after the removal of the shunt, it was decided to perform the patient ventriculocysternostomy of the bottom of the third ventricle (EVC III). The stomach is placed on the bottom of the third ventricle with a monocoagulator and enlarged with a Fogarty balloon (Figure 3).

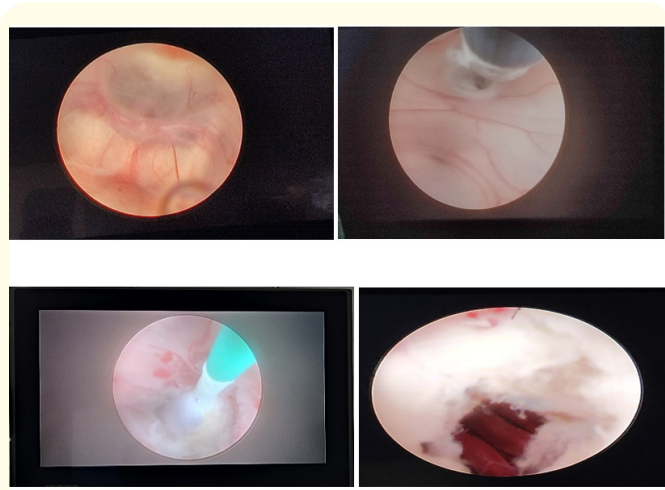


Figure 3: Intraoperative endoscopic photograph. A- the appearance of the bottom of the thoracic ventricle before the application of stoma B- the imposition of the stoma by mono-coagulator C- the expansion of the stomach by the use of the balloons of the Fogarty catheter. D- Stoma after enlargement After surgical treatment, a positive picture was observed – a noticeable decrease in anxiety, a reduction in the tension of the large spring. When assessing the neurological status, regression of neurological disorders is observed.

At the control CT of the brain from 02.11.2023 Figure 3 shows a moderate decrease in the size of the lateral ventricles and III of the third. There are spotted pneumocephalies in basal tanks. Postoperative infiltrative change of the bed of the operating site.

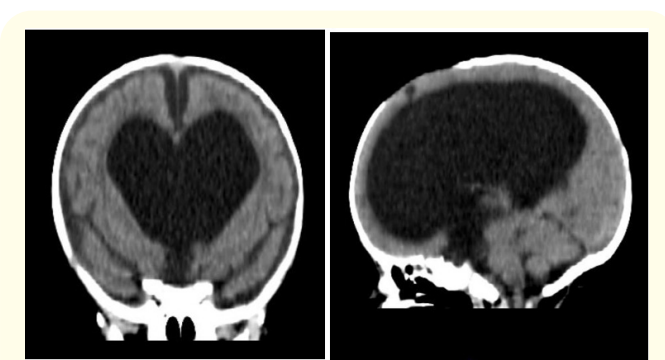


Figure 4: The control CT cas from brain in a weeks after operation.

Discussion

Migration of the ventricular end of the shunt is a very rare case in patients with shunt dysfunction, risk factors for the development of secondary displacement are usually insufficient fixation of the drainage system components, the impact of the trauma on the shunting system. In the clinical case described, it migrated due to insufficient fixation in the pump area. Furthermore, the difficulty was that it migrated in the opposite direction which made it inaccessible or required traumatic surgical intervention. In foreign literature very little information is about the migration of the ventricular end, its surgical treatment. The use of an endoscope made it possible to remove it with a single milling hole. In our case, from the right side ventricle the shunt was removed quite optimally as the size of the side chambers was increased in size. Since the patient had already undergone a shunt operation and was removed after infection, a simultaneous endoscopic ventricular cystostomy (EVC III) was performed as access was the same. In the opinion of many authors, after a shunting operation, conducting IVC III is an inefficient method of operation. However, given the recent shunt infection and the progression of hydrocephalus, conducting IVC III is considered an acceptable method of surgical intervention in this case. Immediately performing these interventions gives more chances for patients.

Conclusion

The use of neuroendoscopy in removing the migrated end of the shunt is the optimal choice method of surgical treatment. It is a low-traumatic intervention with such complications and makes sense to carry out. One-stop conduct with endoscopic ventricular cystostomy (EVC III) reduces the use of shunt implantation.

The contribution of D.D. Kositov contributed substantially to the conception of the article, prepared the text, and agreed to assume responsibility for all aspects of clinical observation. H.J. Rahmonov, R.N. Berdiyev, Sh.B. Choriev participated in the development of the concept of the stable and the preparation of the text. D.I.Kodirov and U.H.Rakhmonov took an active part in the treatment of the patient, the preparation of materials and the description of clinical observation. All authors approved the final version of the publication.

Authors Contributions

Dilovar D. Kositov developed the main concept of the article, wrote the text, approved the final version, and agreed to take responsibility for all aspects of the Article. Khurshed J. Rahmonov, Rustam N. Berdiev, Shurat B. Choriev participated in the development of the concept of the article and the prepaation of the text.

Doston I. Kodirov, Umed Kh. Rahmonov and Iskandar M Habibov took an active part in the treatment of the patient, preparation of materials and description of clinical case. All authors approved the final version of the publication.

Compliance with ethnic norms Declaration of consent. The parents of the patient gave consent to the publication of the above article "Endoscopic removal of the migrated ventricular end of the shunt and ventriculocisternostomy in progressive hydrocephaly: a clinical case" in the journal.

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