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Rigid endoscopic surgery of brainstem cavernous malformation on the cerebral aqueduct. Case report

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Cavernous angiomas (malformations) of the brain occur in 0.5% of the population. Most of them are asymptomatic, but due to their anatomical features, namely escape of blood into surrounding tissues, significant neurological symptoms can occur. The deep location of cavernous angiomas in the area of cerebral aqueduct makes surgical intervention difficult.

Microsurgical approaches are the gold standard in removal of cavernous angiomas, but they are associated with certain surgical risks in the formation of the surgical corridor. Cavernous malformations in the cerebral aqueduct are a rare subtype. Due to anatomical localization and concomitant obstructive hydrocephalus III and lateral ventricles, they can be removed by endoscopic frontal transcortical transventricular approach.

A 59-year-old patient was diagnosed with cavernous angioma of the brainstem (in the area of cerebral aqueduct) with hemorrhage and the formation of obstructive hydrocephalus III and lateral ventricles. The operation was performed: removal of the cavernous angioma in the area of cerebral aqueduct by endoscopic frontal transcortical transventricular approach on the right. Additionally, a triventriculocisternostomy was performed. Osteoplastic trepanation with centering at the Kocher's point in size of 4 × 4 cm and the formation of a free bone flap was performed. The dura mater is cut in an H-shape. Approach to the anterior horn of the right lateral ventricle was performed. An intracerebral retractor was inserted into the anterior horn of the right lateral ventricle. Transforaminal approach to the tuber cinereum was performed - a triventriculocisternostomy was performed. Transforaminal approach to the cerebral aqueduct was performed and the cavernous angioma of the brainstem was removed.

In the postoperative period, the patient had a slight deterioration in short-term memory, which regressed 2 weeks after surgery, an increase in oculomotor disorders, in particular persistent diplopia due to moderate paresis of the left oculomotor nerve. Three months after the operation, magnetic resonance imaging of the brain with intravenous contrast enhancement was performed. There are no signs of cavernous angioma. After the operation of frontal transcortical transventricular removal of cavernous angioma in the area of cerebral aqueduct, the compression of the latter was eliminated. Occlusive hydrocephalus regressed, the size of the ventricles decreased.

Endoscopic frontal transcortical transventricular approach allows reaching the area of cerebral aqueduct in a less traumatic and minimally invasive manner. This technique is effective due to the low risk of surgical approach complications.

Key words: *endoscopic surgery; cavernoma; cavernous angioma; brainstem; cerebral aqueduct; triventriculocisternostomy; hydrocephalus*

Introduction

Cavernous angiomas (malformations) occur in 0.5% of the population [1-3]. Most of them are asymptomatic, but due to their anatomical features, namely escape of blood into surrounding tissues, significant neurological symptoms can occur [2, 4]. Although the risk of bleeding is small, symptomatic lesions should be treated.

Microsurgical resection is a generally accepted technique of treating cavernous angiomas [2, 3, 5].

Cavernous angiomas in the area of cerebral aqueduct are a rare subtype [2]. Their deep location complicates the surgery. [5]. Microsurgical approaches (infratemporal approach, etc.) are the gold standard in the removal of such cavernous angiomas [2, 3, 5], but

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they are associated with certain surgical risks in the formation of the surgical corridor [1-7]. Due to anatomical localization and concomitant occlusive hydrocephalus III and lateral ventricles, cavernous angiomas in the area of cerebral aqueduct can be removed by endoscopic frontal transcortical transventricular approach. In literature there are isolated reports of neuroendoscopic resection of cavernous angiomas (malformations) of the specified area [1, 2, 4].

Clinical case

The 59-year-old patient complained of headache, recurrent diplopia, periodic dizziness, blurred vision. According to the data of magnetic resonance imaging of the brain with intravenous contrast signs of cavernous angioma (malformation) of the brainstem (in the area of cerebral aqueduct) with hemorrhage and the formation of occlusive hydrocephalus III and lateral ventricles were revealed (**Fig. 1**).

Using a rigid endoscope (0 degrees), the patient underwent surgery to remove a cavernous angioma in the area of the cerebral aqueduct by endoscopic frontal transcortical transventricular approach on the

right. Additionally, a triventriculocisternostomy was performed.

Technique description

A linear skin incision in the projection of the Kocher point on the right was made. Osteoplastic trepanation with centering at the Kocher's point in size of 4 × 4 cm and the formation of a free bone flap was performed. The dura mater is cut in an H-shape. Approach to the anterior horn of the right lateral ventricle was performed, cerebrospinal fluid was drained. After corticotomy of the middle frontal gyrus (about 2 cm), an intracerebral retractor was inserted into the anterior horn of the right lateral ventricle. Transforaminal approach to the tuber cinereum was performed using a rigid endoscope (Karl Storz, 18 cm, 0 °) a triventriculocisternostomy was performed. Cavernous angioma of the brainstem was removed through transforaminal approach to the cerebral aqueduct.

The patient was activated on the 1st day after surgery, discharged on the 7th day after surgery.

In the postoperative period, the patient had a slight deterioration in short-term memory, which regressed 2 weeks after surgery, an increase in oculomotor

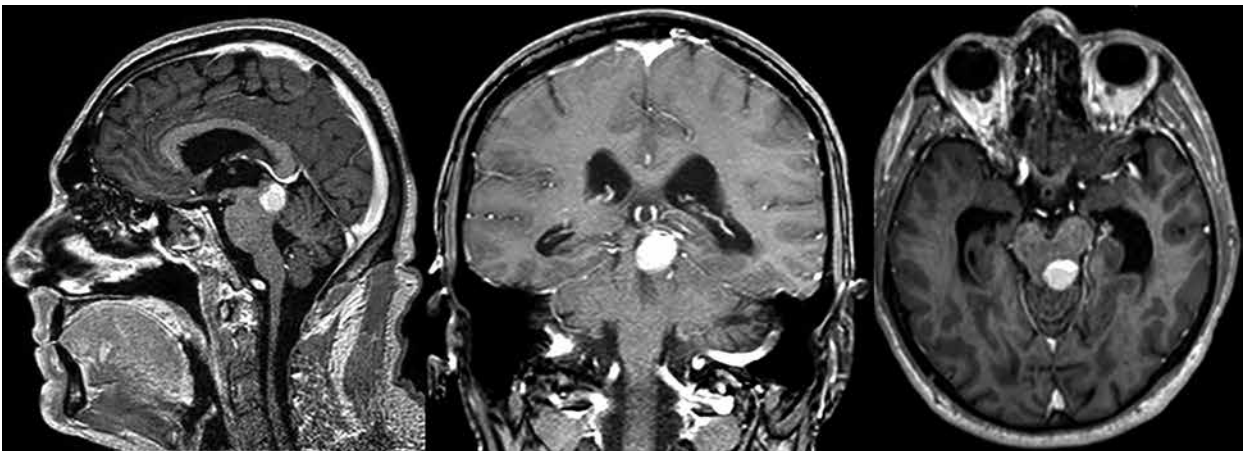


Fig. 1. Magnetic resonance imaging of the brain with intravenous contrast before surgery: cavernous angioma of the brainstem in the area of the cerebral aqueduct

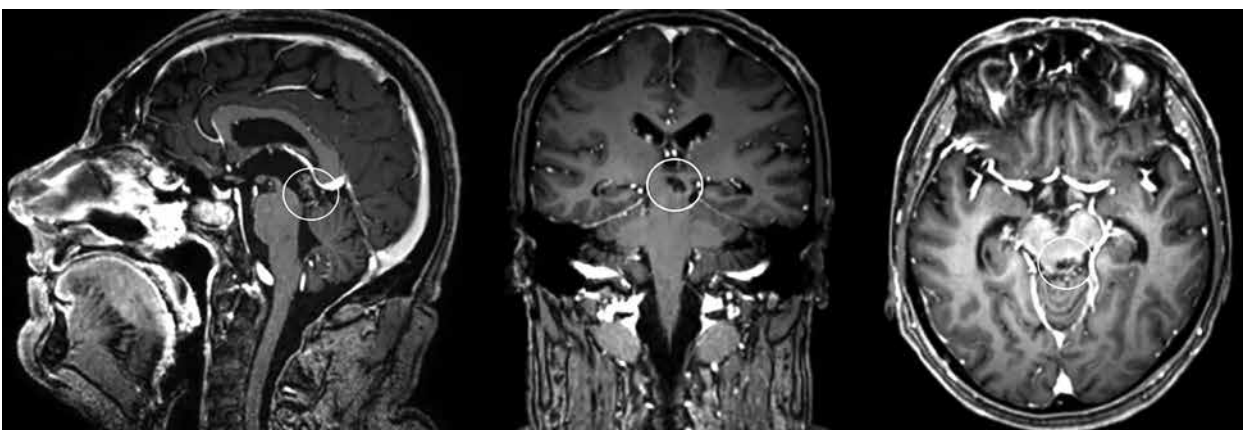


Fig. 2. Magnetic resonance imaging of the brain with intravenous contrast 3 months after surgery: post surgery status of frontal transcortical transventricular removal of cavernous angioma in the cerebral aqueduct

disorders, in particular persistent diplopia due to moderate paresis of the oculomotor nerve on the left.

Magnetic resonance imaging of the brain with intravenous contrast was performed 3 months after the operation. There are no signs of cavernous angioma. After the operation of frontal transcortical transventricular removal of cavernous angioma in the area of cerebral aqueduct, the compression of the latter was eliminated. Occlusive hydrocephalus regressed, ventricular size decreased (**Fig. 2**).

Conclusions

1. Endoscopic frontal transcortical transventricular approach allows reaching the area of cerebral aqueduct in a minimally traumatic and minimally invasively way.

2. This technique is effective due to the low risk of complications of surgical approach.

Disclosure

Conflict of interest

The authors declare no conflict of interest.

Informed consent

Informed consent was obtained from the patient

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