

MULTIPLE MODALITIES OF ARACHNOID CYST TREATMENT AND POSSIBLE COMPLICATIONS

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Arachnoid cysts are benign, congenital lesions of the brain that grow inside the leaves of the arachnoid. They represent 1% of all intracranial *mass* lesions and are most frequently detected during childhood and adolescence. In most cases, they do not cause any symptoms. However, they can grow to a large size and cause life-threatening symptoms, especially if they grow in a confined space such as a posterior cranial fossa.

Our case is a symptomatic arachnoid cyst of the posterior cranial fossa in a 22-year old man. The patient had symptoms and signs of progressive intracranial hypertension. CT of the brain showed the presence of an arachnoid cyst in the posterior cranial fossa that compresses the surrounding structures. The cyst was surgically treated with suboccipital craniectomy, excision of the cyst wall and drainage.

In our study, we examined the simultaneous use of different methods of arachnoid cyst drainage and their complications.

The goal was to show that the simultaneous use of multiple alternative methods of surgical treatment of these cysts have high efficiency in treatment because of the low possibility of recurrence.

Acta Medica Medianae 2020;59(4):43-48.

Key words: *arachnoid cyst, treatment modalities, intracranial hypertension*

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Introduction

Arachnoid cysts are congenital lesions of the brain that arise from the separation of arachnoid layers. They are filled with cerebrospinal fluid (CSF) and do not interact with the ventricular system or subarachnoid space. Arachnoid cysts represent about 1% of all intracranial mass lesions (1) and their incidence, looking at the incidence of all arachnoid brain cysts, is about 20% in the posterior cranial fossa (2). Most of these cysts do not cause any symptoms. Those that are symptomatic generally manifest themselves as early as childhood in the form of convulsions, headaches, hemiparesis,

craniomegaly, developmental disorders and premature puberty. Arachnoid cysts of the posterior cranial fossa can compress the fourth brain ventricle and cause hydrocephalus by pressing aqueduct of Sylvius.

In clinical practice, if they do not cause symptoms or cause a mass effect, these cysts are not treated, regardless of location and size.

The goal of surgical treatment of arachnoid cysts is not only their evacuation but also the prevention of re-accumulation of cerebrospinal fluid and recurrence. For this reason, the most recommended definitive treatment for these cysts is shunting into the peritoneum (3) or the vascular system.

Case report

Our case is a symptomatic arachnoid cyst of the posterior cranial fossa in a 22 year old man. The patient was admitted to the Clinic for Neurosurgery of the Clinical Center Niš due to severe headache, vomiting and blurred vision. The headache has been present for the last month and has been treated medically. A brain CT indicated a cystic formation in the cerebellum, which compresses the surrounding structures (Figure 1). An examination of the ocular fundus indicated pupillary stasis of 2 diopters.

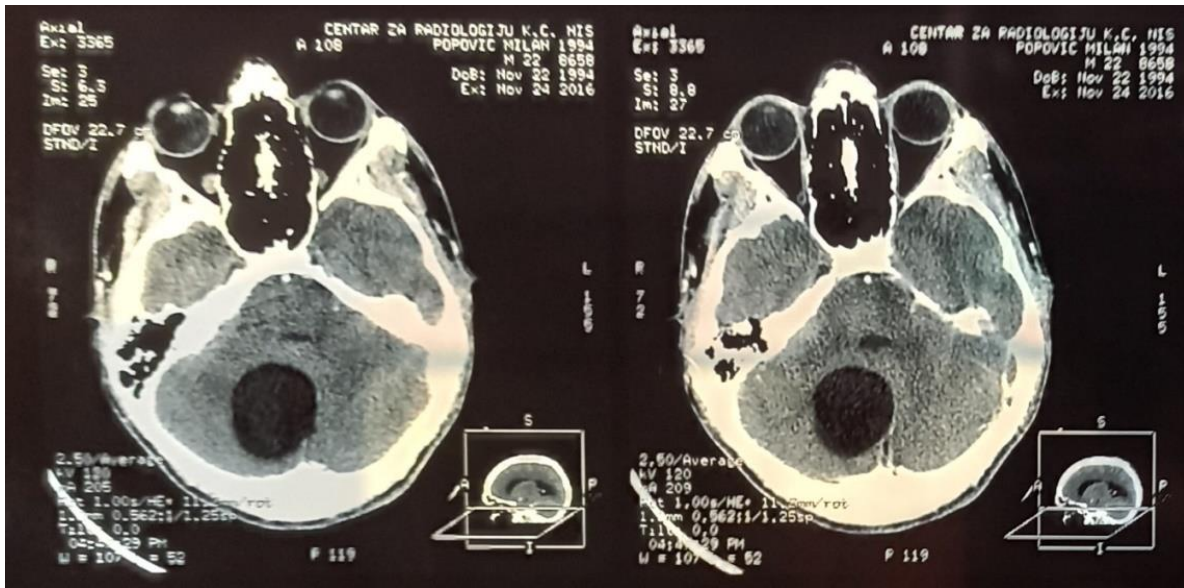


Figure 1. Cystic formation in the cerebellum that compresses the surrounding brain structures

The patient was conscious on admission – Glasgow Coma Score (GCS) was 15, vital parameters stable. The neurological examination showed no pathological findings. As the preparation for the surgery had begun, which included routine laboratory analysis and the coagulation status (INR 1.4, TR 349x10 * 9-I), the patient deteriorated to GCS 12.

Emergency surgery was performed, where external ventricular drainage was inserted after minor occipital craniectomy. The catheter tip was placed in the right occipital horn of the lateral cerebral ventricle. The resulting CSF does not come out under great pressure. Suboccipital craniectomy was then performed paramedially on the right side. Upon opening the dura, a cyst was found. The cyst wall was excised (4) and the liquid resembling CSF spon-

taneously drained under great pressure. The cyst wall was taken for PH analysis and the liquid resembling CSF was taken for cytological analysis. After hemostasis, a Torkildsen shunt was placed, where the cyst lumen was connected by a drain to the cisterna magna (5). Another drain was placed, connecting the cyst lumen with the subgaleatic space (Figure 2), as an alternative drainage, in case of necessity to place a cysto-peritoneal shunt, which is the definitive and according to the literature data the best way to resolve arachnoid cysts (2). The subgaleatic end of the drain was closed with a silver clip and additional ligatures. The dura was then sewn and plasticized with muscle and fibrin glue. The epidural drainage was placed suboccipital on the right and the soft tissues sewn by layers.

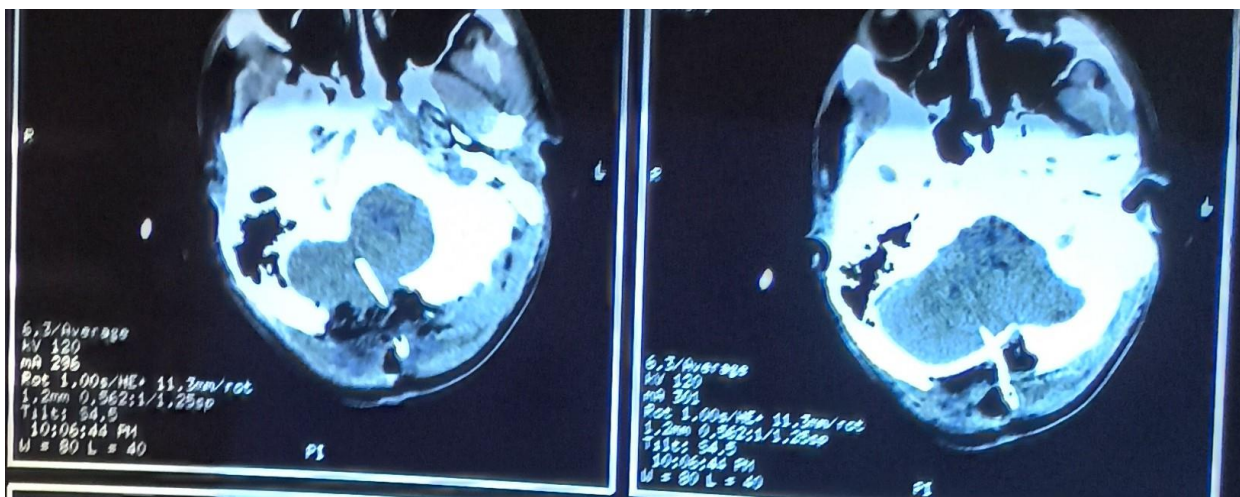


Figure 2. Drainage catheter connecting the cyst lumen to the subgaleatic space

Postoperatively, the patient was confused with evidence of left-sided hemiparesis in neurological status. A brain CT scan indicated the right sided acute parietal epidural hematoma (Figure 3). An emergency reoperation was performed in the form of parietal craniotomy with the evacuation of the

epidural hematoma, placement of dural suspensions and epidural drainage. After this operation, the patient was conscious and without any neurological deficit. Control brain CT was without rests of epidural hematoma (Figure 4).

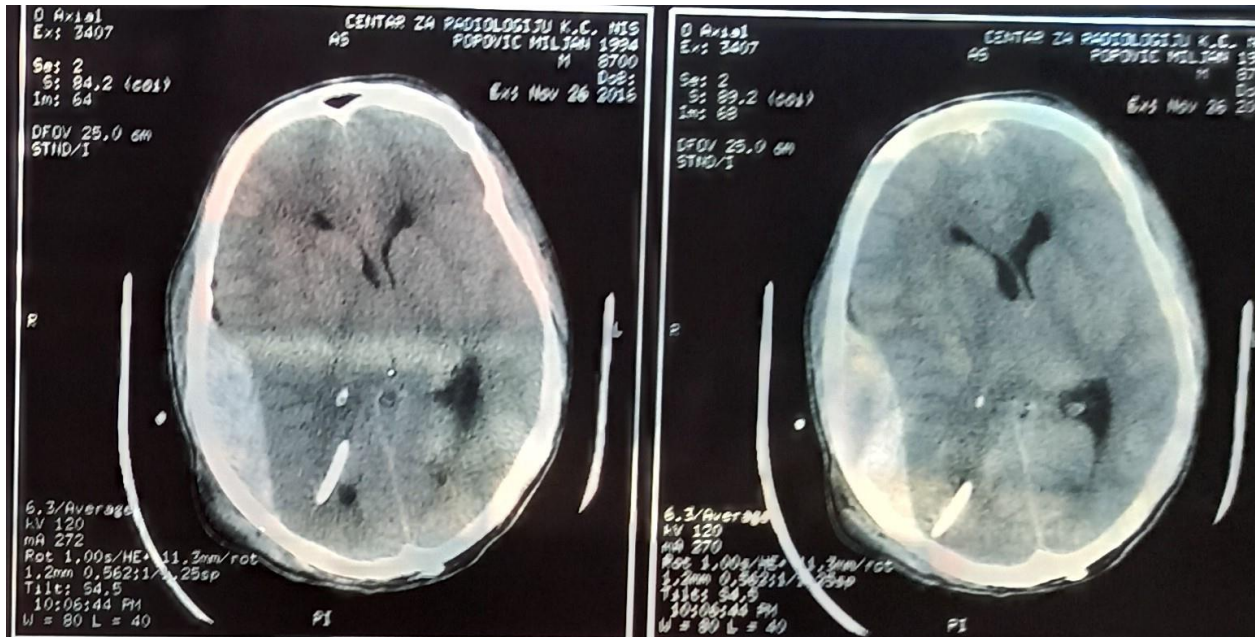


Figure 3. The right sided acute parietal epidural hematoma

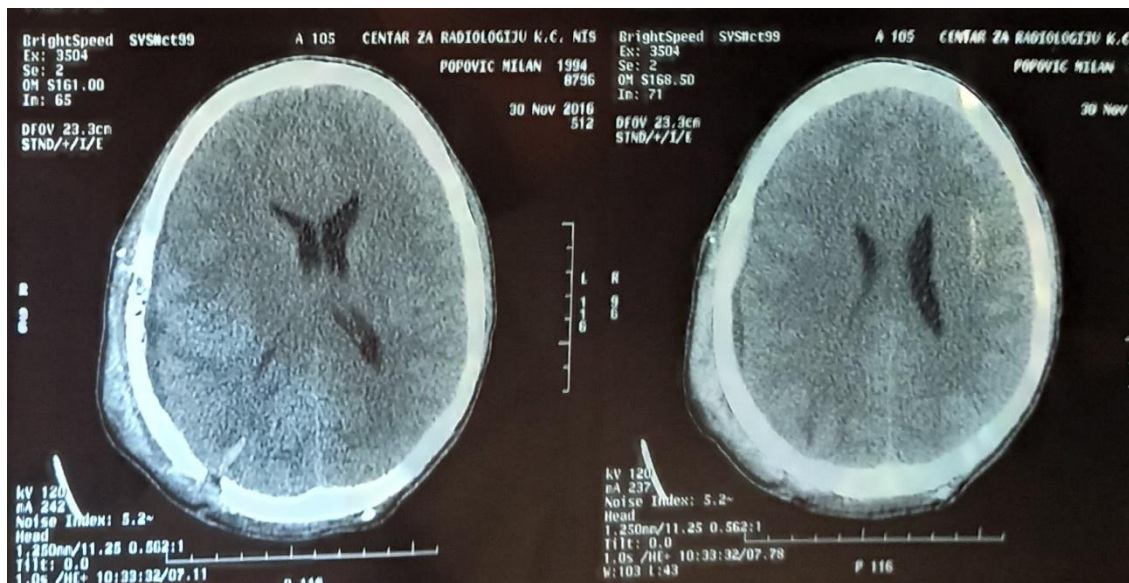


Figure 4. Control CT of the brain after evacuation of epidural hematoma

Postoperatively, the patient's condition was complicated with the development of subcutaneous cerebrospinal fluid collection in the suboccipital region and with febrile periods. The subcutaneous ce-

rebrospinal fluid collection was resolved by compressive occipital circular bandages (6), and with the needle assisted aspiration of the subcutaneous collection. CSF sampled three times did not indicate

bacterial infection. Laboratory findings indicated neutrophil predominance in leukocytosis. Conventional empirical antibiotic therapy led to a normalization of body temperature and laboratory parameters.

The patient was discharged after 3 weeks with fully healed wounds, Glasgow Coma Score was 15, vital parameters stable, without any neurological deficit.

Discussion

Arachnoid cysts are congenital lesions that become subject to treatment only when they cause disturbances in patients in the form of convulsions, psychomotor disturbances or symptoms and signs of intracranial hypertension (7), which was the clinical course in our patient. The most common types of surgical treatment for these cysts are excision and evacuation of the cyst after craniotomy, needle aspiration, endoscopic cyst fenestration, and shunting of the cyst into the peritoneum or vascular bed (2). One of the most common complication of operations is a CSF leak of 5-17% (8). According to the literature (2), the CSF leak can be minimized or completely eliminated by the prophylactic use of external ventricular drainage. Therefore, prior to cyst evacuation surgery, we placed external ventricular drainage. It is a well-known fact (7) that arachnoid cysts have a recurrence rate of 10%, so after we evacuated the cyst, we placed the Tokildsen system of cysto-cisternal drainage and an additional cysto-subgaleatic shunt as an alternative precaution in case of inefficiency of the Tokildsen system. We closed the cysto-subgaleatic shunt with a silver clip and ligatures in the subcutaneous tissue, thus allowing us to open the shunt rapidly and convert it into a cysto-peritoneal shunt, if necessary.

Postoperatively, an acute epidural hematoma appeared in the region where the primary surgery was not performed. The patient had no coagulation disorders (INR 1.4, TR 349x10⁻³ * 9-l). External ventricular drainage was placed occipital on the right side, the burr hole was in the immediate vicinity of the site where the epidural hematoma was developed. The incidence of postoperative epidural hematomas is 1% (9). The Mayfield head holder was

used, because the primary surgery was performed in a sitting position, whose pins (10) could cause a skull fracture if too much pressed into the skull, and thus potentially cause an epidural hematoma outside the operating region. However, postoperative brain CT did not verify non-operative skull trauma. Preoperatively, the patient was given medical therapy against brain swelling, and during the operation three methods were performed that could reduce the intracranial volume - external ventricular drainage, cysto-cisternal shunt and cysto-subgaleatic shunt. Cyst evacuation surgery itself also reduces intracranial volume. All of these methods, collectively or individually, can cause abrupt intracranial decompression and provoke the formation of an epidural hematoma due to dural separation off of the skull. External ventricular drainage can induce spontaneous epidural hematoma due to sudden excessive drainage of the CSF (11). A cysto-cisternal shunt can cause excessive drainage, especially if there is communication of the cyst with the ventricular system of the brain. The subgaleatic shunt was closed in our case, but the reliability of this was questionable because of the fact that the patient had a persistent subcutaneous collection of CSF at the point where the subgaleatic part of this drain was placed.

Conclusion

Using multiple alternative methods for surgical treating of arachnoid cysts in the same act, have the advantage in bigger chance for preventing of the cyst recurrence. Standard procedure in treatment of posterior fossa lesions usually is intra or preoperative ventricular drainage. In our case, the complication was a delayed epidural hematoma (12), caused by a minor craniectomy that was used for external ventricular drainage and not by alternative drainage methods of arachnoid cyst. For this reason, it is necessary to do adequate neurological monitoring of the patient after surgery and perform early CT diagnostics in case of the patient's deterioration. In our case, those measures led to early detection of the epidural hematoma as a complication.

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Prikaz bolesnika

UDC: 616.831-003.4-08
doi:10.5633/amm.2020.0406**MULTIPLI MODALITETI LEČENJA ARAHNOIDALNE CISTE I MOGUĆE KOMPLIKACIJE**

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Arahnoidalne ciste su benigne, kongenitalne lezije mozga, koje rastu unutar listova arahnoidne. Predstavljaju 1% svih intrakranijalnih *mass* lezija i najčešće se otkrivaju u detinjstvu i adolescenciji. U većini slučajeva, one ne izazivaju nikakve simptome. Međutim, mogu narasti do velikih dimenzija i prouzrokovati po život opasne simptome, posebno ako rastu u skućenom prostoru, kao što je zadnja lobanjska jama.

U ovom radu predstavljamo simptomatsku arahnoidalnu cistu zadnje lobanjske jame kod dvadesetdvogodišnjeg muškarca. Bolesnik je imao simptome i znakove progresivne intrakranijalne hipertenzije. CT mozga pokazala je prisustvo arahnoidalne ciste u zadnjoj lobanjskoj jami, koja pritiska okolne strukture. Cista je hirurški tretirana subokcipitalnom kraniektomijom, ekscizijom zida ciste i drenažom.

U našem istraživanju, ispitali smo istovremeno korišćenje različitih metoda drenaže arahnoidalne ciste i njihove komplikacije.

Cilj je bio pokazati da istovremena primena više alternativnih metoda hirurškog lečenja ovih cisti ima prednost u odnosu na korišćenje jedne metode lečenja, zbog manje mogućnosti recidiva.

Acta Medica Medianae 2020;59(4):43-48.

Ključne reči: arahnoidna cista, modaliteti lečenja, intrakranijalna hipertenzija