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CASE REPORT / ПРИКАЗ БОЛЕСНИКА

Surgical treatment of a large arachnoid cyst with multiple complications

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SUMMARY
Introduction Arachnoid cysts are common among the general population. Best treatment option is still the subject of much debate. Surgical options include open-craniotomy or endoscopic cyst fenestration, cysto-peritoneal shunt insertion, or marsupialization via craniotomy.
The aim of this article was to present a patient with an extremely large arachnoid cyst which occupied almost the entire left hemisphere.
Case outline The patient with a large symptomatic arachnoid cyst was treated by craniotomy and open fenestration. The patient suffered multiple postoperative complications, such as imidiate intracerebral hemorrhage due to hypertension, obstructive hydrocephalus, and a fresh ulcer in the bulbus duodeni. All the complications were successfully treated.
Conclusion Since the best treatment option is still the subject of much debate, we think that personalized medical approach is the best one, taking into account patient symptoms, localization and size of the cyst, patient's general condition, and surgeon's familiarity with the procedure.
Keywords: arachnoid cysts; postoperative complications; personalized medical approach

INTRODUCTION

Arachnoid cysts are common among the general population and with increased development of neuroradiology, arachnoid cysts are being incidentally diagnosed more often [1]. Morris et al. [2] conducted a meta-analysis with 16 studies of incidental brain magnetic resonance (MR) imaging findings. They found that arachnoid cysts are the single most prevalent incidental finding. Arachnoid cysts that produce symptoms should be treated. Surgical options include open-craniotomy or endoscopic cyst fenestration, cysto-peritoneal shunt insertion or marsupialization via craniotomy. The qualities of each technique continue to be the subject of much debate [1, 3]. Recent advances in neurosurgical techniques and endoscopy techniques continue to favor fenestration over shunt insertion [3]. The complications of these procedures include subdural hematomas, hygromas, hydrocephalus, and more rarely intraparenchymal hemorrhage [4].

We report a case of a patient with a symptomatic large arachnoid cyst treated by open craniotomy fenestration.

CASE REPORT

We present a 54-year-old man admitted to the Neurosurgical Department with dizziness, tinnitus in the left ear, and a history of chronic generalized headache. In the previous two months the patient had two episodes of dizziness accompanied by a sense of general malaise and vomiting. He was examined by a neurologist and a cardiologist. He was treated by an ear-nose-throat (ENT) specialist, with a five-day course of vestibular suppressants with no clinical improvement, after which he was referred to a neurosurgeon. On admission to our department he had a headache without associated features. He was conscious and obeying commands, Glasgow Coma Scale score was 15. Neurological examination revealed a right-beating conjugate and predominantly horizontal nystagmus, provoked by right gaze position. There was no focal neurological deficit, while Romberg's test was positive and the patient had a wide-based gait. Laboratory tests were normal. Computed tomography (CT) scan showed a large left-sided almost holohemispheric cystic formation, and MR imaging revealed a large left fronto-temporo-parietal arachnoid cyst causing serious midline shift (Figure 1). The patient was prepared for surgery. However, since differential diagnosis included epidermoid tumor, pilocytic astrocytoma, and hygroma, we decided to perform large left-sided craniotomy. Upon opening of the dura, a cyst wall was observed. Initial fenestration of the cyst showed the fluid to be under high pressure. The fluid was opaque. After drainage of the cyst we chose a direct surgery method of opening the cyst into the adjacent subarachnoid space via resection and fenestration of interhemispheric cistern. Since lamina terminalis was covered with perforating arteries, we decided to leave it intact. In the early post-operative period, at about 30 minutes post-procedure, the patient was still unconscious with no verbal response and flexing response

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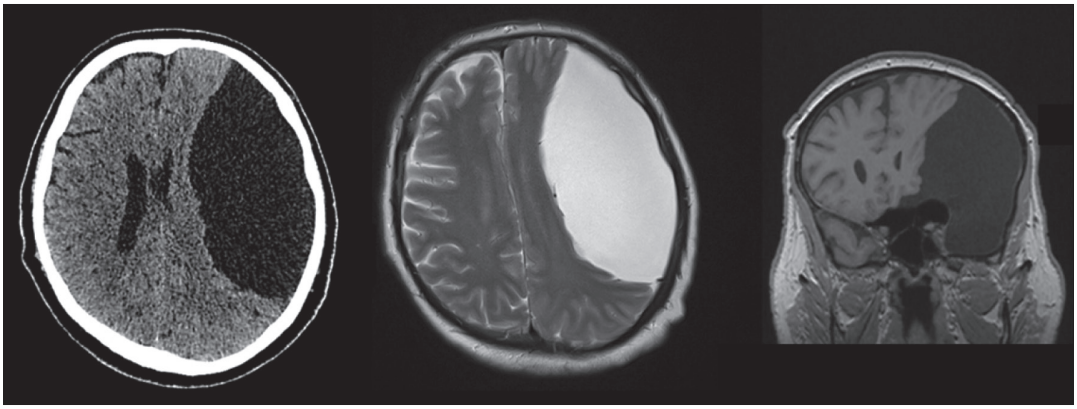

Figure 1. Computed tomography (CT) scan and magnetic resonance (MR) imaging before the first surgery showing a large fronto-temporo-parietal arachnoid cyst, although differential diagnosis includes tumor and hygroma

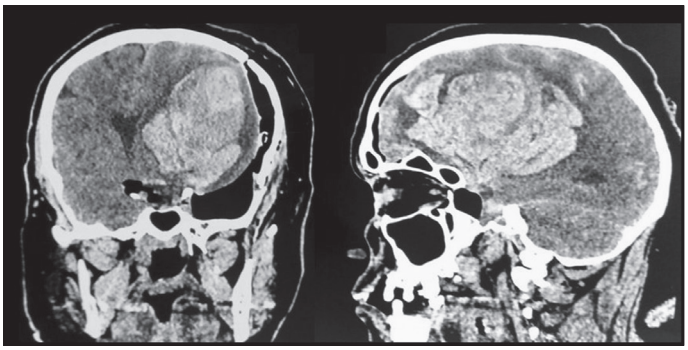

Figure 2. CT scan performed immediately after cyst fenestration showing a large parenchymal hematoma on the left side; the brain parenchyma is expanded, with the rest of the cyst in the basal temporal region

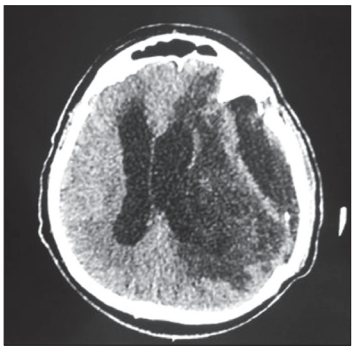

Figure 3. CT scan showing dilatation of the ventricles with periventricular oozing, signs of cyst re-expansion, and crowding of the gyri at the vertex, with small sulci

to pain. Babinski sign was positive on the right. He was still intubated and ventilated. An immediate CT scan showed large parenchymal hemorrhage on the left side, as well as in the cerebellar hemispheres, probably due to hypertension. There was a decrease in the size of the cyst, with the cyst rest in the basal temporal region (Figure 2). The patient was immediately taken into the operating room and intracerebral hematoma was successfully evacuated. On the 20th day after hematoma evacuation, the patient suffered from upper gastrointestinal bleeding, and a fresh ulcer in the bulbus duodeni was found, so the patient was operated on once again, and Jaboulay duodeno-pyloroplasty was made. About seven days after the abdominal operation the patient started to manifest signs of hydrocephalus, and a CT scan showed dilatation of the ventricles with periventricular oozing, signs of cyst re-expansion, and crowding of the gyri at the vertex, (Figure 3), so external ventricular drain was inserted and opaque-dense cerebro-spinal fluid (CSF) came out under high pressure. After one week, external ventricular drain catheter was removed. A control CT showed regression of hydrocephalus signs, as well as the retraction of the cyst and brain parenchyma re-expansion, which was an indirect sign that the communication between the cyst and the subarachnoid space was successfully established. Unfortunately, after a few days, the patient again started to express symptoms of hydrocephalus, and a new CT scan showed similar findings in favor of hydrocephalus. This time we decided to insert a ventriculo-atrial shunt. Since the abdomen was operated on because of the duodenal ulcer, we selected a ventriculo-atrial instead of a ventriculo-peritoneal shunt. Intraoperative finding confirmed high pressure of CSF. After the operation the patient was in a clinical improvement. On the seventh day of the last operation, a CT scan showed satisfactory findings (Figure 4). Chest X-ray confirmed the good position of the atrial catheter part (Figure 5). After a few days, the patient in a solid physical condition, with right-sided hemiparesis and signs of psycho-organic syndrome, was transported to the regional rehabilitation center for further treatment. On a regular control, six months after his discharge, the patient's condition was satisfactory, and he was independent in walking.

DISCUSSION

Arachnoid cysts are frequently encountered CSF collections in the central nervous system, with preponderance in the middle cranial fossa [3, 5]. Recent advances in neuroradiology have translated into increased discovery of these cysts, that is – diagnoses are made more frequently, and at earlier stages. Arachnoid cysts are the single most prevalent incidental finding in patients without symptoms [2]. Galassi et al. [6] proposed a classification of intracranial arachnoid cysts into three basic types based on CT scan finding: type I (small, spindle-shaped; limited to the anterior portion of the middle cranial fossa, below the sphenoid

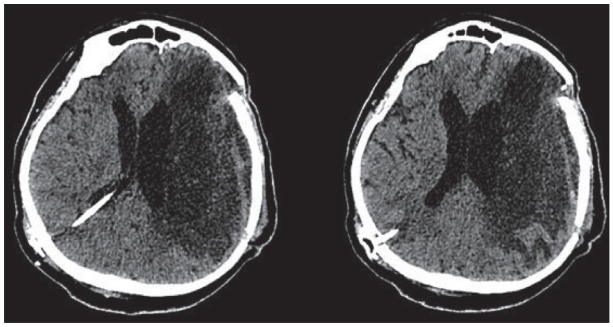

Figure 4. Control CT scan with regression of the hydrocephalus signs

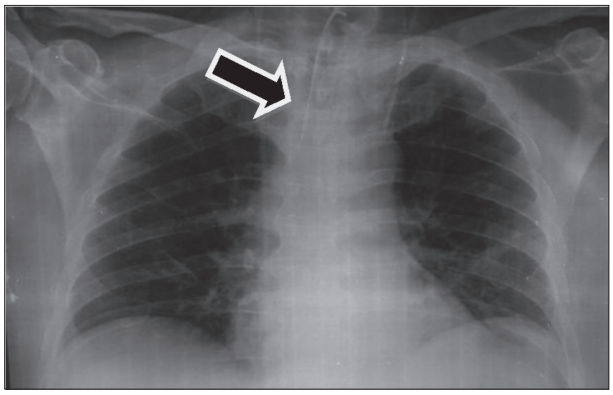

Figure 5. Chest X-ray showing a good position of the atrial catheter part

ridge; free communication of subarachnoid space); type II (superior extent along the Sylvian fissure; displacement of the temporal lobe; slow communication with subarachnoid space); and type III (large, fills the whole middle cranial fossa; displacement of not only the temporal lobe but also the frontal and parietal lobes; often results in midline shift, little communication with subarachnoid space).

We presented a patient with an extremely large arachnoid cyst occupying almost the entire left hemisphere. Our patient had a typical Galassi type III arachnoid cyst with the displacement of the frontal, the parietal, and the temporal lobe. Most arachnoid cysts are asymptomatic during a person's life and are incidentally diagnosed [7]. Symptoms are present when cysts are large or are accompanied by other pathological substrates, such as subdural hematoma or intracystic hemorrhage. A wide range of symptoms have been reported in literature, such as headache, nausea, malaise and vomiting, epileptic seizures, vision disturbances, vertigo, balance disorder, and difficulties with walking. Symptoms might be caused by a space-occupying effect with pressure on surrounding brain tissue, a change in CSF dynamics, or dysgenesis of the brain [8]. On the other hand, patients may present with unusual signs apparently unrelated to the cyst location, such as tinnitus, unsteadiness, hypoacusia, or even sleep apnea [9]. In such cases, adequate diagnosis and management are delayed. The patient we reported on exhibited a combination of symptoms. Since tinnitus, dizziness and vomiting were present, the patient was referred to a neurologist and an ENT specialist, since vestibular disorder was presumed. However, the ENT specialist ruled out an inner ear disease. Tunes et al. [10] suggest that vertigo and dizziness are due to pressure effect of cyst on the temporal-vestibular cortex [9]. Also, Proimos et al. [9] believe that a pressure effect following a spontaneous enlargement of an arachnoid cyst might be a reason for tinnitus, as tinnitus is an active physical process occurring in multiple neural substrates in response to different peripheral or central stimulus. Since our patient was asymptomatic until two months before admission to our neurosurgical department, we believe that symptoms occurring in our patients are the result of fast cyst enlargement and consecutive pressure to brain parenchyma, leading to a combination of symptoms. CT and MR findings are in accordance to this hypothesis, since serious midline shift was presents, with significant creasing of brain sulci (Figure 1). Symptomatic cysts require surgical treatment. Decompression and cyst removal can be done with a single burr hole, mini-craniotomy, craniotomy, shunt placement, and endoscopic fenestration depending on the location and cyst size [8]. The qualities of each technique are still a matter of much debate [1, 3]. Since cyst was very large, with rapid onset of different symptoms and the possibility that other substrates can be behind the clinical and radiological picture (tumor, hygroma), we decided to perform large craniotomy and decompression via cyst fenestration. After drainage, the connection between the cyst and the subarachnoid space was made by interhemispheric cyst fenestration, thereby performing a direct surgery method of cyst drainage, without shunt placement (indirect method). We decided to avoid shunt placement since CSF was opaque, cluttered, and dense, and would have probably clogged the drainage system. Cyst fenestration and resection may be complicated by subdural or intraparenchymal hemorrhage, meningitis, and by inability to treat hydrocephalus. Also, cyst recurrence is often seen [11, 12]. Rapid decompression with craniotomy can produce a rapid rise in cerebral perfusion, causing damage to the capillary bed and resulting in parenchymal hemorrhage. Changes in the intracranial dynamics due to "shift of the brain" can cause venous hyperemia, thus potentially causing the sites of hemorrhage distant from the site of operation. The suction drain may also contribute to this incident [1, 13]. This could be the explanation for intraparenchymal hemorrhage in our patient. On the other hand, immediately after surgery, the patient had high blood pressure values, so hemorrhage due to hypertension cannot be excluded. In the later onset, our patient developed another complication of the arachnoid cyst treatment – hydrocephalus. Interestingly, we were back at the beginning, since the final solution for this patient was shunt operation, e.g. ventriculo-atrial shunt.

While a craniotomy may provide the best long-term outcome for treating arachnoid cysts, gradual decompression with programmable shunts may be a safer approach. If this approach is insufficient, endoscopic or craniotomy fenestration of the cyst may be performed [14].

CONCLUSION

Since the best treatment option is still the subject of much debate, we think that personalized medical approach is the best one, taking into account patient symptoms, localization and size of the cyst, patient's general condition, and surgeon's familiarity with the procedure.

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Хируршко лечење велике арахноидне цисте са мултиплим компликацијама

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САЖЕТАК

Увод Арахноидне цисте су честе у општој популацији, али избор најбољег начина лечења је још увек предмет расправе. Хируршке методе лечења укључују дренажу и фенстрацију зидова цисте путем отворене краниотомије или ендоскопски, пласирање цистоперитонеалног шанта или марсупијализацију након отворене краниотомије.
Циљ овог рада је био да прикажемо болесника са изузетно великом симптоматском арахноидном цистом у левој хемисфери.

Приказ болесника Болесник је лечен фенестрацијом отвореном краниотомијом. У постоперативном периоду долази до бројних компликација у виду масивне интрацеребралне хеморагије услед наглог скока крвног притиска, опструктивног хидроцефалуса и улкуса желуца. Све компликације су успешно саниране.

Закључак Индивидуални приступ болеснику је најбољи, узимајући у обзир симптоме, локализацију и величину цисте, опште стање, као и методу лечења која се може применити.

Кључне речи: арахноидна циста; постоперативне компликације; персонализовани приступ