SERBIAN ARCHIVES OF MEDICINE Est.1872

Address: 1 Kraljice Natalije Street, 11000 Belgrade, Serbia
☏ +381 11 4092 776, Fax: +381 11 3348 653
E-mail: srparhiv@bvcom.net, Web address: www.srpskiarhiv.rs

Paper Accepted* **ISSN Online 2406-0895**

Case Report / Приказ случаја

Nenad Živković[1,†], Vuk Aleksić[1], Milenko Stanić[1],
Marko Samardžić[1], Radomir Benović[1]

Surgical treatment of a large arachnoid cyst with multiple complications

Хируршко лечење велике арахноидне цисте са мултиплим компликацијама

[1] Department of Neurosurgery, Clinical Hospital Center Zemun, Belgrade, Serbia;
[2] Department of Anesthesiology, Clinical Hospital Center Zemun, Belgrade, Serbia

Received: August 4, 2016
Revised: June 5, 2017
Accepted: June 9, 2017
Online First: June 13, 2017
DOI: https://doi.org/10.2298/SARH160804128Z

† **Correspondence to:**
Nenad ŽIVKOVIĆ
Department of Neurosurgery, Clinical Hospital Center Zemun, 11000 Belgrade, Serbia
E mail: **drnzivkovic@yahoo.com**

Surgical treatment of a large arachnoid cyst with multiple complications

Хируршко лечење велике арахноидне цисте са мултиплим компликацијама

SUMMARY

Introduction Arachnoid cysts are common among the general population. Best treatment option is still subject of much debate. Surgical options include open-craniotomy or endoscopic cyst fenestration, cysto-peritoneal shunt insertion or marsupialization via a craniotomy.

The aim of this article was to present a patient with extremely large arachnoid cyst which occupies almost the entire left hemisphere.

Case outline Patient treated by craniotomy open fenestration. Patient suffered multiple postoperative complications, such as imidiate intracerebral hemorrhage due to hypertension, obstructive hydrocephalus, anda fresh ulcer in the bulbus duodeni. All complications were successfully treated.

Conclusion 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

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 цисто-перитонеалног шанта или марсупијализацију након отворене краниотомије.

Циљ овог рада је био да прикажемо болесника са изузетно великом симптоматском арахноидалном цистом у левој хемисфери.

Приказ случаја 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 комплиакције су успешно санирање.

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: арахноидална циста; Постоперативне компликације; персонализовани приступ

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. conducted a meta – analysis with 16 studies of incidental brain Magnetic resonance imaging (MRI) findings. They found that arachnoid cysts are the single most prevalent incidental finding [2]. Arachnoid cysts that produce symptoms should be treated. Surgical options include open-craniotomy or endoscopic cyst fenestration, cysto-peritoneal shunt insertion or marsupialization via a 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 craniotomy open fenestration.

CASE REPORT

We present a 54-year-old man admitted to our Neurosurgical Department with dizziness, tinnitus on the left ear, and history of chronic generalized headache. In last two months patient had two episodes of dizziness accompanied by a sense of general malaise and vomiting. He was examined by neurologist and cardiologist. He was treated by ear-nose-throath (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 headache without associated features. He was conscious and obeying commands, Glasgow Coma Score was 15. Neurological examination revealed 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 patient had wide-based gait. Laboratory tests were normal. Computer tomographic (CT) scan showed 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). Patient was prepared for operation.

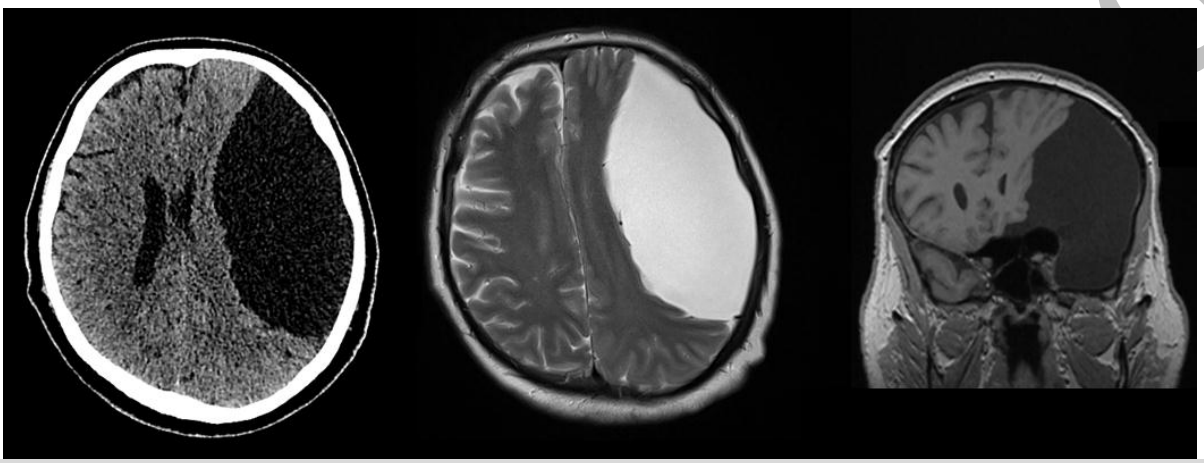

Figure 1. CT and MR before first surgery showing large fronto-temporo-parietal arachnid cyst, although differential diagnosis include tumor and hygroma.

However, since differential diagnosis included epidermoid tumor, pilocytic astrocytoma, and hygroma we decided to perform large left-sided craniotomy. Upon opening of the dura, 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 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, he was still unconscious with no verbal response and flexing response to pain. Babinski sign was positive on the right. He still was intubated and ventilated. 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). Patient was immediately taken into operating room (OR), and intracerebral hematoma was successfully evacuated. On the 20th day after hematoma

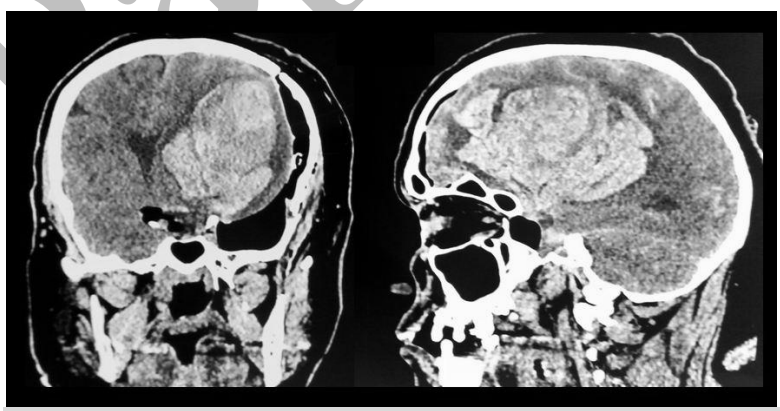

Figure 2. Immediate CT scan after cyst fenestration showing large parenchymal hematoma on the left side. The brain parenchyma is expanded with cyst rest in the basal temporal region.

evacuation patient suffered from upper gastrointestinal bleeding, and a fresh ulcer in the bulbus duodeni was found, so again patient was operated, and Jaboulay duodeno-pyloroplasty was made.

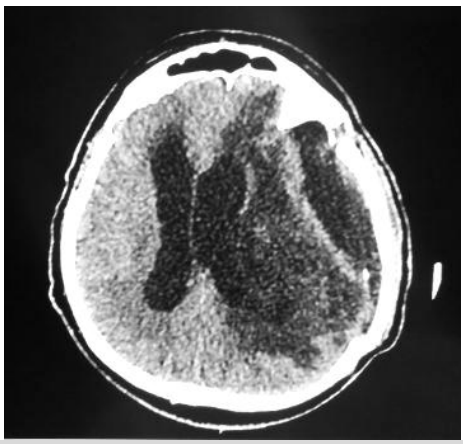

Figure 3. CT scan showing dilatation of the ventricles with periventricular oozing, signs of cyst reexpansion, and crowding of the gyri at the vertex, with small sulci.

About 7 days after abdominal operation patient started to manifestsigns of hydrocephalus, and CT scan showed dilatation of the ventricles with periventricular oozing, signs of cyst reexpansion, 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 has been removed. Control CT showed hydrocephalus signs regression, as well as retraction of the cyst and brain parenchyma reexpansion, which was indirect sign that the communication between cyst and subarachnoid space was successfully established. Unfortunately, after a few days patient again started to express symptoms of hydrocephalus, and again CT scan showed similar finding in favor of hydrocephalus. This time we decided to insert a ventriculo-atrial shunt. Since abdomen was operated because of duodenal ulcer, we selected ventriculo-atrial instead of ventriculo-peritoneal shunt. Intraoperative finding confirmed high pressure of CSF. After operation patient was in a clinical improvement. On the 7th day of last operation CT scan showed satisfactory finding (Figure 4). Chest X-ray confirmed the good position of atrial catheter part (Figure 5). After a few days, patient was transported in regional rehabilitation center for further treatment in a solid physical condition with right sided hemiparesis and signs of psycho-organic

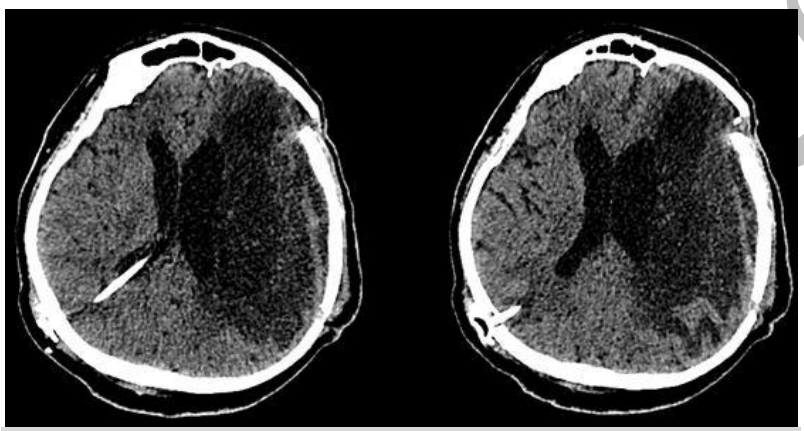

Figure 4. Control CT scan with regression of hydrocephalus signs.

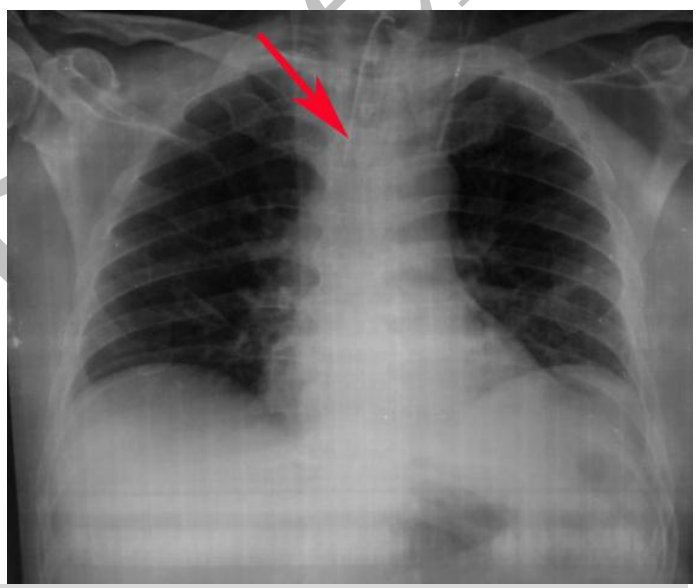

Figure 5. Chest X-ray showing a good position of atrial catheter part.

syndrome. On a regular control, six months after discharge the patient's condition was satisfied, and patient 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 an 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 classification of intracranial arachnoid cysts based on CT scan finding into three basic types: type I (small, spindle-shaped; limited to the anterior portion of the middle cranial fossa, below the spenoid ridge; free communication of subarachnoid space); type II (superior extent along Sylvian fissure; displacement of the temporal lobe; slow communication with subarachnoid space); 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 extremely large arachnoid cyst which occupies almost the entire left hemisphere. Our patient had typical Galassi type III arachnoid cyst with displacement of frontal, parietal and temporal lobe. Most arachnoid cysts are asymptomatic and may not produce any symptoms during life, and are incidentally diagnosed [7]. Symptoms are present when cysts are large or are accompanied by other pathological substrate, 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 at first sight unrelated to the cyst location, such as tinnitus, unsteadiness, hypoacusia, or even sleep apnea [9]. In such cases adequate diagnosis and management are delayed. We report a patient with combination of symptoms. Since tinnitus, dizziness and vomiting were present patient was referred to neurologist and ENT specialist, because vestibular disorder was presumed. However, ENT specialist ruled out inner ear disease. Tunes et al. suggest that vertigo and dizziness are due to pressure effect of cyst on the temporal-vestibular cortex [9, 10]. Also, Proimos et al. believe that a pressure effect following a spontaneous enlargement of 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 [9]. Since our patient was asymptomatic until two months before admission to our neurosurgical department, we believe that symptoms occurring in our patients are result of fast cyst enlargement and consecutive pressure to brain parenchyma, leading toa combination of symptoms. CT and MR finding are in accordance to this hypothesis, since serious midline shift was presents with significant creasing of brain sulci (see

again 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 subject matter of much debate [1, 3]. Since cyst was very large, with rapid onset of different symptoms and possibility that other substrate can be behind clinical and radiological picture (tumor, hygroma) we decided to perform large craniotomy and decompression via cyst fenestration. After drainage the connection between cyst and 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 probably clogged drainage system. Cyst fenestration and resection may be complicated with subdural or intraparenchymal hemorrhage, meningitis, and by inability to treat hydrocephalus. Also, recurrence of cyst is often seen [11, 12]. The rapid decompression with the 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 site of operation. The suction drain may also contribute to this incident [1,13]. This could be explanation for intraparenchymal hemorrhage in our patient. On the other hand, immediately after surgery patient had high values of blood pressure, so hemorrhage due to hypertension cannot be excluded. In later onset our patient developed another complication of arachnoid cyst treatment: hydrocephalus. Interestingly, we were back at the beginning, since 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].

Since best treatment option is still 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'sfamiliaritywith the procedure.

REFERENCES

1. Bahl A, Connolly DJ, Sinha S, Zaki H, McMullan J. Rapid brain shift, remote site hemorrhage, and a spinal hematoma after craniotomy for a large arachnoid cyst. J Pediatr Neurosci. 2012; 7(2): 106–8.
2. Morris Z, Whiteley WN, Longstreth WT Jr, Weber F, Lee YC, Tsushima Y, et al. Incidental findings on brain magnetic resonance imaging: systematic review and meta-analysis. BMJ. 2009; 339(7720): 547–50.
3. Pradilla G, Jallo G. Arachnoid cysts: case series and review of the literature. Neurosurg Focus. 2007; 22(2): E7.
4. Auschwitz T, DeCuypere M, Khan N, Einhaus S. Hemorrhagic infarction following open fenestration of a large intracranial arachnoid cyst in a pediatric patient. J Neurosurg Pediatr. 2015; 15(2): 203–6.
5. Rabiei K, Tisell M, Wikkelso C, Johansson BR. Diversearachnoidcyst morphology indicatesdifferentpathophysiologicalorigins. Fluids Barriers CNS. 2014; 11(1): 5.

6. Galassi E, Tognetti F, Gaist G, Fagioli L, Frank F, Frank G. CT scan and metrizamide CT cisternography in arachnoid cysts of the middle cranial fossa: classification and pathophysiological aspects. Surg Neurol. 1982; 17(5): 363–9.
7. Goswami P, Medhi N, Sarma PK, Sarmah BJ. Case report: Middle cranial fossa arachnoid cyst in association with subdural hygroma. Indian J Radiol Imaging. 2008; 18(3): 222–3.
8. Karnazes AC, Kei J, Le MV. Image diagnosis: Arachnoid cyst. Perm J. 2015; 19(2): e110–1.
9. Proimos E, Chimona Ts, Memtsas Z, Papadakis C. Middlefossaarachnoidcysts and innerearsymptoms: Are they related? Hippokratia. 2014; 18(2): 168–71.
10. Tunes C, Flones I, Helland C, Wilhelmsen K Golpen F, Wester KG. Pre- and post-operativedizziness and posturalinstability in temporalarachnoidcystpatients. Acta Neurol Scand. 2014; 129(5): 335–42.
11. Kim MH. The role of endoscopicfenestrationprocedures for cerebralarachnoidcysts. J Korean Med Sci. 1999; 14(4): 443–7.
12. Spring C, Mauersberger W. Value of computed tomography for the diagnosis of arachnoid cysts and assessment of surgical treatment. Acta Neurochir Suppl (Wien). 1979; 28(2): 619–26.
13. Esmaeeli B, Eftekhar B. Intraparenchymalhemorrhageaftersurgical decompression of a Sylvian fissure arachnoid cyst. Neurol India. 2006; 54(3): 320–1.
14. Helland CA, Wester K. A population-based study of intracranial arachnoid cysts: clinical and neuroimaging outcomes following surgical cyst decompression in children. J Neurosurg. 2006; 105(5 Suppl): 385–90.

