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Third ventricle arachnoid cyst presenting with acute hydrocephalus: A case report and review of the literature

Akut hidrosefali ile gelen üçüncü ventrikül araknoid kisti: Olgu sunumu ve literatür taraması

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ABSTRACT

We present a 57-year-old male admitted to emergency department with acute loss of consciousness and diagnosed with third ventricular arachnoid cyst. Transcallosal cyst resection was performed following an emergency ventriculostomy. Postoperative imaging revealed gross-total cyst excision and a moderate decrease in hydrocephalus. However, the patient improved only after a subsequent ventriculoperitoneal shunting. This time, however, a subdural hematoma occurred under the craniotomy incision. In conclusion, surgical approach for the treatment of arachnoid cysts of the third ventricle should be selected carefully. Cyst excision via open craniotomy may require subsequent shunting and can cause serious complications such as subdural hematoma.

Keywords: *Arachnoid cyst, third ventricle, hydrocephalus, craniotomy, shunt, complication*

ÖZ

Acile ani şuur kaybı ile gelen ve üçüncü ventrikül araknoid kisti belirlenen 57 yaşında bir erkek hasta sunuyoruz. Hastaya acil ventrikülostomi sonrası transkallozal kist rezeksiyonu uygulandı. Postoperatif görüntülemede kistin gros-total eksize edildiği ve hidrosefalide orta derecede azalma olduğu görüldü. Hastanın durumunda ancak vetriküloperitoneal şant takıldıktan sonra düzelme görüldü. Ancak bu kez de kraniotominin altında subdural hematom oluştu. Sonuçta, üçüncü ventrikül araknoid kistlerinin cerrahi tedavisinde yeğlenecek yaklaşım dikkatle seçilmelidir. Açık kraniyotomi ile kist eksizyonunda şant gereksinimi olabilir ve bu yaklaşım subdural hematom gibi ciddi komplikasyonlara neden olabilir.

Anahtar kelimeler: *Araknoid kist, üçücü ventrikül, kraniyotomi, şant, komplikasyon*

INTRODUCTION

The prevalence of arachnoid cysts is 1.4% in adults[1]. Ventricular arachnoid cysts are very rare, because there is no arachnoid tissue in the ventricles. Third ventricle arachnoid cysts are even rarer and to our knowledge, only 7 cases have been reported in the literature so far.

Since there are few published cases of third ventricular arachnoid cysts, the optimal surgical strategy remains controversial. Open craniotomy, endoscopic approaches, CSF diversion and their combinations are the techniques used in the literature. Here we report a 57-year-old male admitted to emergency department with acute loss of consciousness and diagnosed with third ventricular arachnoid cyst. Treatment strategy is discussed and the previously published cases are reviewed accordingly.

CASE REPORT

A 57-year-old male was admitted to the emergency department with sudden loss of consciousness. His

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medical history was unremarkable other than an intermittent headache lasting for 5 years. He had a Glasgow coma score (GCS) of 8 with normal pupillary examination. Cranial Computed Tomography (CT) revealed the presence of an acute hydrocephalus [Figure 1a]. Cranial Magnetic Resonance Imaging (MRI) demonstrated that the hydrocephalus was caused by third ventricular arachnoid cyst [Figure 1b-c]. Immediately after the diagnosis, an external ventricular drainage system was inserted. The day after the ventriculostomy, surgical removal of the cyst was aimed via a right frontal craniotomy using transcallosal approach. Postoperative CT of the patient revealed a gross-total removal of the cyst with a moderate decrease in the ventricle sizes [Figure 2]. Histopathological diagnosis confirmed the presence of an arachnoid cyst. Howe-

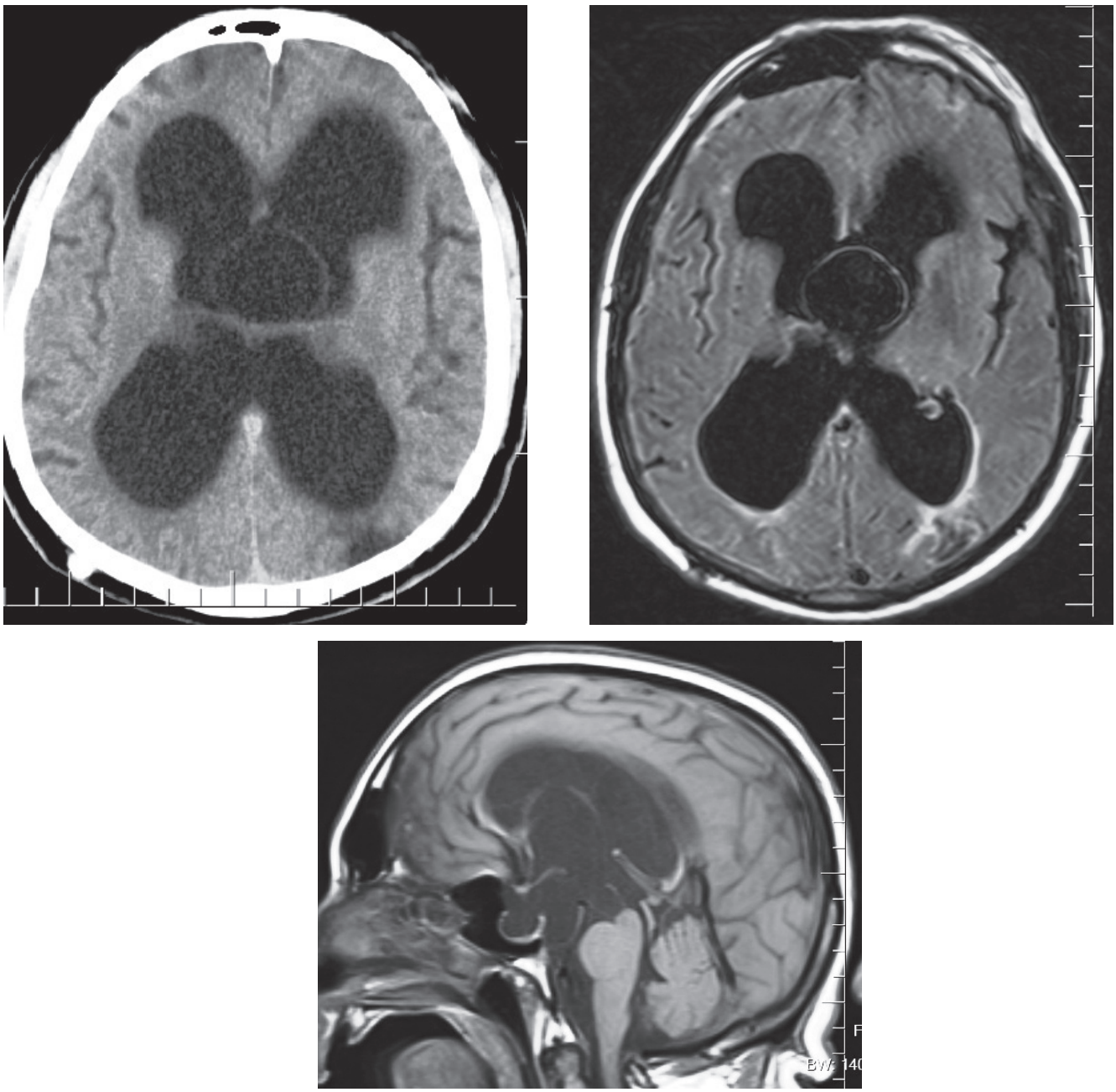

Figure 1. Preoperative cranial axial CT scan (a), preoperative cranial axial (b) and T-1 weighted sagittal (c) MRI scans demonstrating third ventricle arachnoid cyst and hydrocephalus.

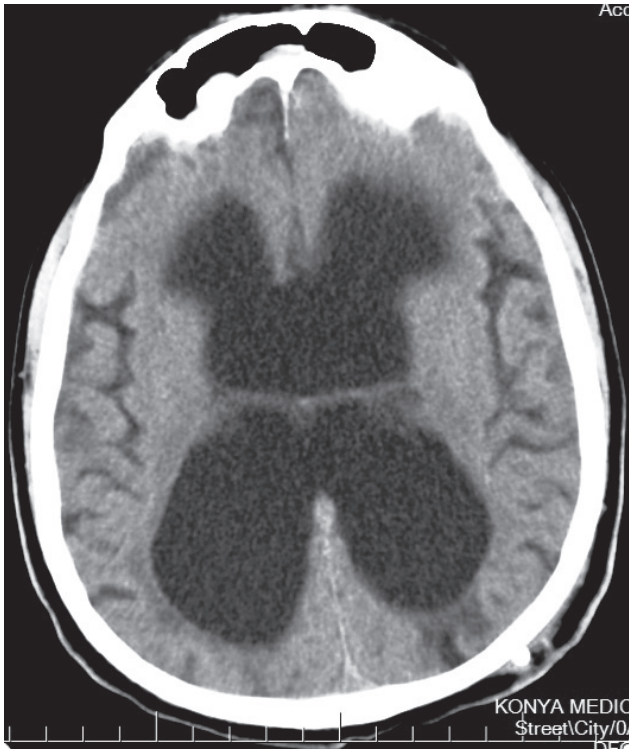

Figure 2. Postoperative cranial axial CT scan revealing a moderate decrease in ventricle sizes and a gross-total excision of arachnoid cyst.

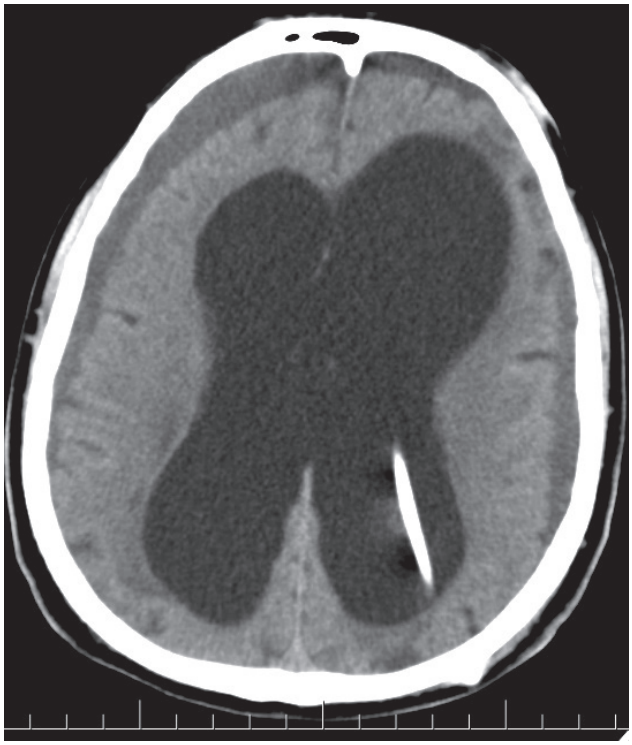

Figure 3. Postoperative cranial axial CT scan taken after ventriculoperitoneal shunting reveals bilateral frontoparietal subdural hematoma -the larger one being under the craniotomy on the right side- and the shunt catheter inserted from the left Frazier point.

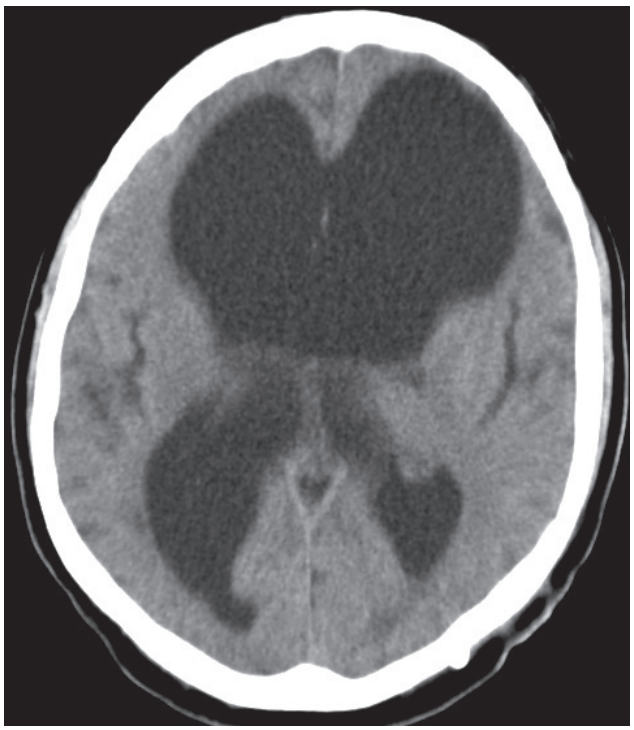

Figure 4. Cranial CT showing spontaneous resolution of subdural hematoma and over dilated frontal horns.

ver, hydrocephalus still existed, and the patient's GCS did not improve alongside these radiological findings. A medium pressure ventriculoperitoneal shunt was inserted from left Frazier point and the GCS of the patient improved immediately after the placement of ventriculoperitoneal shunt. This time, however, bilateral frontoparietal subdural hematoma -the larger one being under the craniotomy on the right side- was observed under the craniotomy incision [Figure 3]. After a week of close observation, hematoma resolved spontaneously [Figure 4] and the patient was discharged from hospital with a GCS of 14.

DISCUSSION

Many arachnoid cysts remain asymptomatic but third ventricular arachnoid cysts can cause obstructive hydrocephalus as a result of either compression to the cerebral aqueduct or occlusion of foramen of Monro. There is some controversy over the ideal operative treatment of arachnoid cysts[2,3]. Since there

are few published cases of third ventricular arachnoid cysts and different techniques have been used, the optimal surgical strategy for third ventricular arachnoid cysts remains controversial.

Hoffman et al.[4] recommended a transcallosal approach based on the fact that this approach allows creation of a a communication between the cyst and the ventricles. While transcallosal approach via craniotomy can achieve cyst fenestration and/or resection, an open approach might also result in damage to the crucial structures including vascular injury, disconnection syndromes, forniceal injury and damage to the subcortical nuclei[5]. On the other hand, Ciricillo et al.[2] reported that 67% of the patients with intracranial arachnoid cysts operated via craniotomy required subsequent cyst shunting, while Raffel et al.[3] reported that 76% of the patients treated by craniotomy and fenestration did not require further shunting.

Ventriculoperitoneal shunting is effective for the treatment of hydrocephalus associated with arachnoid cysts; however, these shunts often require further revisions[2,3]. However it should be noted that, shunting the cyst itself-which is technically difficult, is different than shunting for the hydrocephalus associated with cyst. Despite all these known risks, ventriculoperitoneal shunts are useful and sometimes inevitable when hydrocephalus and its clinical findings persist following cyst resection or fenestration. The indications for revisions depend on the patient's clinical condition rather than the postoperative radiological imaging. Kirollos et al.[6] reported that none of their patients had total collapse of the cyst following surgery. They claimed that satisfactory clinical improvement can be achieved even with moderate or slight reduction of cyst volume.

In our case, patient's GCS did not improve after the surgery despite reduction of the cyst size and moderate decrease in hydrocephalus. Therefore, a ventriculoperitoneal shunt was placed which provided an improvement of GCS immediately after the procedure. However, shunting resulted in subdural hematoma possibly because of rapid decompression. Although hematoma resolved spontaneously in a week, the patient was discharged with a GCS of 14.

Cyst fenestration or resection via craniotomy has potential risks of complications such as neurological deficits, meningitis, subdural collections, and epileptic convulsions[3]. As a result, endoscopic approaches have become popular recently in many areas as well as for the treatment of arachnoid cysts, since thay are less invasiveness and help avoid complications related to shunting[6,7]. Kirollos et al.[6] claimed that endoscopic approach helps avoid the complications related to shifts of the intracranial structures resulting from rapid decompression. Endoscope allows the surgeon to perform an additional third ventriculostomy and also gives the chance of fenestrating the cyst to the ventricles and the basal cisterns.

Faris et al.[8], Ericson et al.[9], and Tamburus et al.[10] used stereotactic puncture, craniotomy and craniotomy with additional shunting respectively, between the years 1971 and 1987 when endoscopic techniques were not popular. In 2010, -after introduction of endoscope, Shiba et al.[11] reported that they established a communication between the third ventricle, arachnoid cyst and aqueduct of Sylvius via endoscopic approach and then performed endoscopic third ventriculostomy in the same session. They reported a good outcome at one-year follow-up. In 2014, Jeltema et al.[12] reported that they performed endoscopic fenestration, partial cyst removal using endoscopic instruments and ventriculocisternostomy with a successful result. In 2015, Ho et al.[7] described simultaneous endoscopic cyst fenestration and endoscopic third ventriculostomy via double burr-hole using separate trajectories to avoid forniceal injury. They recommended this technique particularly in multilocular cysts so as to avoid further revision fenestrations and permanent shunting. Reviewing the published cases of third ventricle arachnoid cyst in a chronological order (Table 1), a recent trend toward using endoscopic approaches is worth noting.

CONCLUSION

Surgical strategy for the treatment of arachnoid cysts of the third ventricle should be selected carefully.

Table 1. Cases of third ventricular arachnoid cyst.

Author/ Year	Age/Sex	Signs and Symptoms	Radiological findings	Operative technique
Faris et al. (10) 1971	16/M	Headache, precocious puberty	Triventricular hydrocephalus	Frontal craniotomy and fenestration
Ericson et al. (11) 1986	5/M	Headache, nausea, somnolence	Slightly enlarged third ventricle	Stereotactic puncture
Tamburus et al. (12) 1987	20/M	Neausea, vomiting, horizontal nystagmus	Triventricular hydrocephalus	Ommaya reservoir, parietal craniotomy, cyst excision
Tamburus et al. (12) 1987	46/M	Intracranial hypertension, optic atrophy	Aqueductal stenosis	Ventricular drainage, VA shunt, frontoparietal craniotomy and fenestration
Shiba et al. (8) 2010	35/M	Epilepsy, mental retardation	Triventricular hydrocephalus	Endoscopic fenestration and ETV
Jeltema et al. (9) 2014	2.5/-	Altered consciousness	Triventricular hydrocephalus	Endoscopic fenestration, partial cyst removal ventriculocisternostomy endoscopic fenestration, ETV
Ho et al. (7) 2015	33/F	Headache, blurred vision, galactorrhea	Hydrocephalus with slightly enlarged third ventricle	Frontal craniotomy, gross-total cyst excision
Present case	57/M	loss of consciousness	Triventricular hydrocephalus	VP shunt

Cyst excision via craniotomy might not be desirable, due to the possibility of requiring additional shunting and associated complications such as subdural hematoma. Endoscopic approaches might be considered owing to their being less invasive and giving a further chance of endoscopic third ventriculostomy.

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