Case Report/Series

Quadrigeminal plate arachnoid cyst presenting with eye movement related migraine: a rare case report

Yemima Graciela[1], Robert Shen[2,3], Mardjono Tjahjadi[4]

pISSN: 0853-1773 • eISSN: 2252-8083
https://doi.org/10.13181/mji.cr.236858
Med J Indones. 2023;32:129–36

Received: March 11, 2023
Accepted: September 06, 2023

Authors' affiliations:
[1]Faculty of Medicine, Universitas Tarumanagara, Jakarta, Indonesia, [2]Atma Jaya Neuroscience Research (ANR), Master Study Program in Biomedical Sciences, School of Medicine and Health Sciences, Universitas Katolik Indonesia Atma Jaya, Jakarta, Indonesia, [3]Bunda Pengharapan Hospital, Papua, Indonesia, [4]School of Medicine and Health Sciences, Universitas Katolik Indonesia Atma Jaya, Jakarta, Indonesia

Corresponding author:
Mardjono Tjahjadi
School of Medicine and Health Sciences, Universitas Katolik Indonesia Atma Jaya, Jalan Pluit Raya No. 2, North Jakarta 14440, DKI Jakarta, Indonesia
Tel/Fax: +62-21-6691944/ +62-21-6606122
E-mail: mardjono.tjahjadi@atmajaya.ac.id

This online publication has been corrected. The corrected version first appeared on December 22, 2023.

ABSTRACT

Type II arachnoid cyst of the quadrigeminal cistern is the rarest type of arachnoid cyst (10% prevalence) in adults and is generally asymptomatic. We reported an unusual case of chronic right-sided migraine provoked by right eye adduction, right eye adduction soreness, and dry eye symptoms in a 47-year-old woman with quadrigeminal arachnoid cyst confirmed by radiological findings with the compression of the tectal plate, vermis, and superomedial cerebellum's part. She was treated conservatively without improvement for 1 year before surgical intervention was conducted. Microsurgery for cyst excision and fenestration was done, followed by immediate relief from all her complaints after 3 months of follow-up. These findings should help clinicians consider surgical intervention for patients with chronic symptoms related to nerve function that have no improvement with the initial treatment.

KEYWORDS arachnoid cysts, eye movement, microsurgery, migraine disorder

Arachnoid cysts are non-neoplastic cerebrospinal fluid (CSF)-filled cysts lined with the arachnoid layer of the brain. The etiology of arachnoid cysts is yet to be determined. However, according to one theory, these cysts arise from abnormal formation of the arachnoid layer of the brain during embryogenesis and have been associated with a history of head trauma, surgery, intracranial hemorrhage, or infection.[1]

Arachnoid cysts are more common in men than women, with a lifetime prevalence of 1.4%. They are generally found in the middle cranial fossa, with a prevalence of 34%, or occur as retrocerebellar cysts, accounting for 33% of all arachnoid cysts.[2,3] Arachnoid cysts in the quadrigeminal cistern have a prevalence of 5% in children and 10% in adults and are usually asymptomatic, with only 10% of arachnoid cysts being symptomatic.[1,4,5]

Quadrigeminal arachnoid cysts are classified into the following three types: (1) type I with supratentorial and infratentorial extensions; (2) type II, when the location of the cyst is only infratentorial, mainly supracerebellar or supraretrocerebellar; and (3) type III, when the cyst has a lateral extension toward the temporal lobe.[6] Garg et al[7] reported that only four out of 18 cases of quadrigeminal arachnoid cysts were type II. Similarly, Cinalli et al[8] found only two cases of type II cysts among 14 patients with quadrigeminal cysts over a 13-year period. This suggests that type II

quadrigeminal arachnoid cysts are one of the rarest arachnoid cysts. To date, no multicenter studies have reported the prevalence of the three types of quadrigeminal arachnoid cysts.[1,7–9] We report a case of a 47-year-old woman with quadrigeminal cistern arachnoid cyst type II who presented with right-sided migraine accompanied by soreness and dryness of the right eye.

CASE REPORT

A 47-year-old Asian woman complained of a right-sided migraine for the past 1 year that was intermittent, chronically progressive, and almost disabling, affecting her daily routine and working ability. The migraine was often provoked by adduction of the right eye and was accompanied by soreness and dryness of the eye. She was referred to an ophthalmologist, who diagnosed multiple chalazia in the right eye. Surgical excision of all chalazia was performed to relieve her symptoms. However, 1 month after the chalazion excision, there was still no improvement in the migraine, eye soreness, and dryness. She was initially treated with minor tranquilizers and various painkillers, which slightly alleviated her symptoms.

Non-contrast head computed tomography (CT) showed a hypodense lesion of size 3.66 cm × 2.24 cm × 2.1 cm with attenuation of the CSF at the quadrigeminal cistern, which extends into the superior part of the cerebellum and compresses the tectal plate, superior vermis, and superomedial portion of the cerebellar hemisphere. Due to worsening symptoms, she was referred to a neurosurgeon (MT). Physical examination revealed impaired right eye adduction;

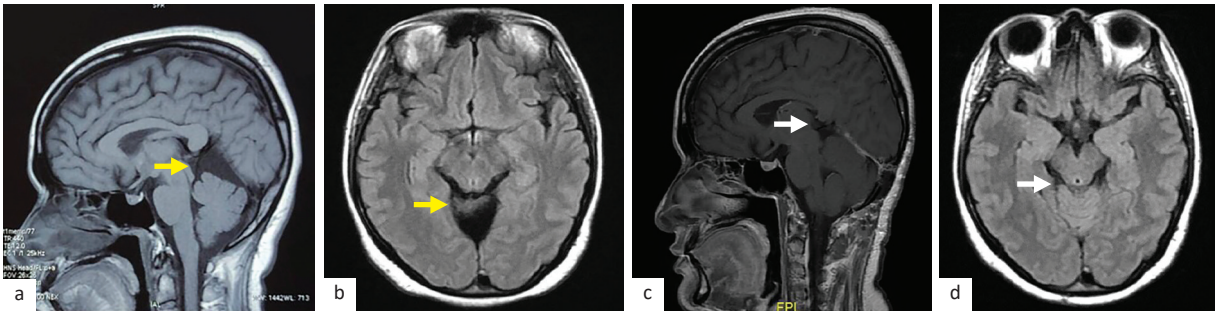

Figure 1. Preoperative non-contrast brain MRI of sagittal (a) and axial (b) views showing a hypointense lesion with a well-defined margin in T1WI that compressed cerebellar roof and tectal plate. An infratentorial extension confirmed the head CT findings of a type II quadrigeminal arachnoid cyst (yellow arrows) compared with the postoperative follow-up of the head MRI without contrast of sagittal (c) and axial (d) views that showed a complete resolution of the arachnoid cyst and a significant cerebellar roof decompression (white arrows). CT=computed tomography; MRI= magnetic resonance imaging; T1W1=T1-weighted images

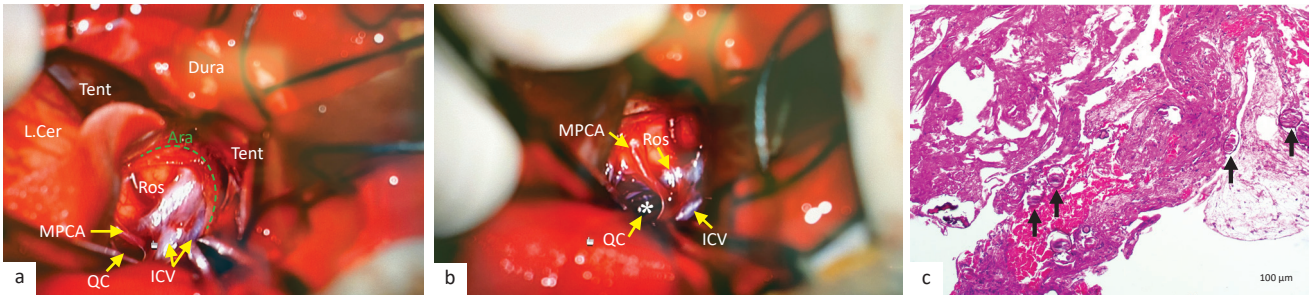

Figure 2. Arachnoid cyst. (a) Intraoperative findings at supracerebellar space showing the quadrigeminal supracerebellar area after some cyst walls removal with a microscope tilting inferolateral toward the brainstem and ambient cistern. The flap of the dura mater was mobilized superiorly to widen the surgical corridor. The remaining thick arachnoid cyst (green dashed line) was still visible at the level of incisura tentorium. In addition, the left side basal vein of Rosenthal and bilateral internal cerebral veins were visible and became the deepest border of the surgical dissection; (b) a more inferolateral tilting microscope aiming to fenestrate to the ambient cistern. The remaining arachnoid cyst wall shown in Figure 2a had already been removed; (c) histopathological examination results of the H&E stained cyst wall (200× magnification) showing a degenerative cyst wall without epithelial lining cells, several foci of calcification were present (black arrows). Ara=arachnoid cyst; Dura=dura mater of the posterior fossa; H&E=hematoxylin and eosin; ICV=internal cerebral veins; L.Cer=left cerebellum; MPCA=medial posterior choroidal artery; QC=quadrigeminal cistern toward quadrigeminal plate; Ros=basal vein of Rosenthal; Tent=tentorium. *Fenestration to the ambient cistern

eye movement was stalled and painful. The right-sided eye soreness was exacerbated when she performed eye adduction; otherwise, the other examinations were within normal limits. Brain magnetic resonance imaging (MRI) revealed a hypointense lesion in the supracerebellar area, confirming the findings of the head CT scan (Figure 1, a and b).

Cyst excision and fenestration to the surrounding basal cistern were performed by MT. The patient underwent microsurgery using the supracerebellar infratentorial (SCIT) technique while in the prone position. Meticulous arachnoid dissection was performed to access the superior cerebellar area and the cyst located in the quadrangular cistern under high magnification using a surgical microscope. All cerebellar bridging veins were preserved. Once the cyst wall was found, micro scissors were used to open and remove the cyst, followed by fenestration of the surrounding ambient cistern to ensure normal CSF flow. A hemostatic agent was used to manage minor post-dissection bleeding (Figure 2).

The surgery was successful and without any complications, and the patient experienced immediate relief from her chief complaints of migraine, right eye adduction soreness, and dry eye. She was hospitalized for 4 days and discharged with a modified Rankin Scale (mRS) score of 1 due to slight dizziness. Histological examination revealed a degenerative cyst wall with calcified foci (Figure 2).

Her condition had improved during the outpatient follow-up visit 2 weeks after surgery, with an mRS score of 0. Compared with the preoperative brain MRI, brain MRI performed after 3 months with gadolinium-diethylenetriamine pentaacetic acid contrast showed complete resolution of the quadrigeminal cistern arachnoid cyst and no further compression of the superior vermis and superomedial cerebellar hemisphere (Figure 1, c and d).

Written informed consent for the medical procedures and publication of this case report and accompanying images had been obtained from the patient. All ethical principles for medical research established by the hospital were followed.

DISCUSSION

During the last 30 years, only 38 cases of symptomatic quadrigeminal cistern arachnoid cysts have been reported (Table 1).[7,10–27] Of these, only 15 had visual disturbances as one of the main complaints. These complaints included decreased visual acuity, diplopia, nystagmus, worsening of eye vision, Parinaud's syndrome in the form of supraduction eye movement paralysis, and spasms of the orbicularis oculi muscle.[8,11–13] To the best of our knowledge, type II quadrigeminal cyst presenting with migraine related to eye adduction, eye adduction soreness, and dry eye has not been reported previously.

In early life, quadrigeminal cysts often cause hydrocephalus by compressing the aqueduct of Sylvius. Compared to cysts in other locations, cysts in the quadrigeminal cistern tend to cause symptoms because of obstructive hydrocephalus.[2] However, quadrigeminal cyst is commonly an incidental finding because it is usually asymptomatic. If symptomatic, the symptoms are usually nonspecific, such as headache, lethargy, nausea, vomiting, gait ataxia, papilledema, and visual disturbance.[1,5,25,28] Rarely, typical clinical signs may develop, such as impaired posture, nystagmus, diplopia, Parinaud's syndrome, hearing loss, hemiparesis, body spasticity, and weakness of the lateral rectus muscle of the eye.[5,25]

As many as 50% of patients with quadrigeminal arachnoid cysts are under 18 years of age and show signs of hydrocephalus in the form of developmental delays. In the present case, the clinical signs of eye adduction soreness were probably due to pressure on the superior vermis and tectal plate. The underlying mechanism may involve: (1) compression of the cerebellar vermis cortex, especially lobes VI and VII (declive, folium, and tuber), also referred to as the oculomotor vermis, which is responsible for initiating saccadic movement, projecting inhibitory signals to stop the gaze accurately at the target during saccadic movement, and calibrating saccadic amplitude, direction, and horizontal alignment of the eye;[29–31] (2) compression of the tectal plate, the deepest layer of the superior colliculus, which plays an essential role in the eye's motor function. The superior colliculus projects saccadic motion stimuli to the tegmentum and controls the oculocephalic reflex and gaze shift.[32] Hence, compression of these two anatomical structures may cause limited eye movement, eventually generating soreness and headaches.

Another interesting clinical presentation in our patient was chronic dry eye, which was relieved after cyst resection. The mechanism was unclear, but we believed that removing the cyst eventually released

Table 1. Adult symptomatic quadrigeminal cistern arachnoid cysts case report in the last 30 years

First author, year	Age/ sex	Clinical presentations	Radiologic findings	1st surgical procedure	2nd surgical procedure	Postoperative complications	Follow-up (months)	Outcomes
Garg,[7] 2015	34/F	Headache, gait ataxia, and vision diminution	Supratentorial extension of the cyst	ETV	Shunt followed by shunt revision	Pseudomeningocele	24	~
	22/F	Headache and vomiting	Supratentorial and infratentorial extension of the cyst	ETV	NA	NA	44	↑
	24/M	Parinaud's syndrome and ataxia	Supratentorial and infratentorial extension of the cyst and compression of the dorsal midbrain	Endoscopic ventriculostomy	Shunt	Intraoperative bleeding during endoscopic ventriculostomy	16	~
	22/F	Headache and vision diminution	Supratentorial and infratentorial extension of the cyst	Endoscopic ventriculostomy and ETV	NA	NA	27	↑
	50/F	Headache, gait ataxia, vision diminution, and Parinaud's syndrome	Supratentorial and infratentorial extension of the cyst and compression of the dorsal midbrain	Endoscopic ventriculostomy and ETV	NA	NA	12	↑
	28/M	Vision diminution, gait ataxia, and headache	Supratentorial and infratentorial extension of the cyst	Endoscopic ventriculostomy and ETV	NA	NA	6	↑
	19/M	Headache and vision diminution	Supratentorial and infratentorial extension of the cyst	Endoscopic ventriculostomy and cysto-cisternostomy	Shunt	NA	36	~
Silva,[10] 2022	33/F	Headache	Hydrocephalus	ETV	NA	Superficial skin infection	24	↑
	19/M	Headache and gait disturbance	Hydrocephalus	Endoscopic fenestration	NA	NA	60	↑
Takaki,[11] 2021	68/F	Intermittent spasms in the left orbicularis oculi and orbicularis oris muscles spasm as well as left upper and lower extremities cerebellar ataxia	Obstructed cerebral aqueduct and narrowing of the prepontine cistern with moderate ventriculomegaly and elongated left vertebral artery	Endoscopic ventriculostomy	NA	NA	NA	↑
Hayashi,[12] 1999	71/M	Gait instability, memory impairment, and disorientation	Supracollicular cyst, 3rd and lateral ventricle's anterior horn enlargement, and cerebellar vermis compression	ETV and ventricle-cystostomy	NA	NA	5	↑
Inamasu,[13] 2003	35/F	Headache	Hydrocephalus and infratentorial extension of the cyst	ETV and ventricle-cystostomy	NA	NA	6	↑
Gangemi,[14] 2005	45/F	Intracranial hypertension symptoms	NA	ETV and ventricle-cystostomy	NA	NA	NA	↑

Table continued on next page

Table 1. (continued)

First author, year	Age/ sex	Clinical presentations	Radiologic findings	1st surgical procedure	2nd surgical procedure	Postoperative complications	Follow-up (months)	Outcomes
Ohnishi,[15] 2007	62/F	Pain in 2nd division of right N V and papilledema	Infratentorial extension of the cyst and hydrocephalus	Ventriculo-cysto-cisternostomy	NA	NA	12	↑
Roka,[16] 2010	26/M	Migraine	Supratentorial and prepontine cistern extension of the cyst	Conservative treatment (carbamazepine)	NA	NA	12	Symptoms ↑, cyst size ~
Zanini,[17] 2013	66/F	Unsteady gait, headache, and cognitive impairment	Infratentorial extension of the cyst	Endoscopic fenestration	NA	Parinaud's syndrome	6	↑
Arakawa,[18] 2013	28/F	Headache and papilledema	Hydrocephalus and infratentorial extension of the cyst	ETV	NA	NA	12	↑
	26/F	Headache and nausea	NA	LVC and ETV	NA	NA	81	↑
	38/F	Headache and nausea	NA	LVC, third ventricle-cystostomy, and ETV	NA	NA	55	↑
Gui,[19] 2016	42/M	Headache, diplopia, and visual impairment	NA	LVC, third ventricle-cystostomy, and ETV	NA	NA	52	↑
	36/F	Headache and nausea	NA	LVC, third ventricle-cystostomy, and ETV	NA	NA	37	↑
	23/M	Nystagmus	NA	LVC and ETV	NA	NA	19	↑
	30/M	Headache, drowsiness, and ataxic gait	Infratentorial extension of the cyst	Third ventricle-cystostomy	NA	NA	70	↑
Yu,[20] 2016	19/M	Generalized convulsion and headache	Supratentorial and infratentorial extension of the cyst	Third ventricle-cystostomy	NA	NA	51	↑
	50/F	Headache and lassitude	Supratentorial and infratentorial extension of the cyst	ETV	NA	NA	64	↑
	35/M	Ataxic gait and visual complaints	Infratentorial extension of the cyst	Cysto-cisternostomy	NA	NA	50	↑
Yu,[20] 2016	26/F	Unsteady gait and visual complaints	Supratentorial and infratentorial extension of the cyst	ETV and third ventricle-cystostomy	NA	NA	65	↑
	20/F	Increased intracranial pressure	Supratentorial and infratentorial extension of the cyst	ETV and LVC	NA	NA	11	↑
Isaka,[21] 1995	37/M	Headache and visual impairment	Hydrocephalus	Ventriculoperitoneal shunt	NA	NA	NA	NA

Table continued on next page

Table 1. (continued)

First author, year	Age/ sex	Clinical presentations	Radiologic findings	1st surgical procedure	2nd surgical procedure	Postoperative complications	Follow-up (months)	Outcomes
Laviv,[22] 2017	31/F	Migraine, gait ataxia, cognitive impairment, and bilateral horizontal nystagmus	Supratentorial and infratentorial extension of the cyst and bilateral tonsil herniation	EVD and cystoperitoneal shunt	NA	NA	18	↑
Ohtsuka,[23] 1998	54/M	Trochlear nerve palsy (torsional diplopia) and mild truncal ataxia	3rd, 4th, and lateral ventricle enlargement, compression of the dorsal part of the brainstem, vermis cerebellar anterior, cisterna interpenduncularis, prepontine, and ambient	NA	NA	NA	NA	NA
Hayashi,[24] 2005	71/M	Ataxia	NA	NA	NA	NA	NA	NA
	54/F	Headache	NA	NA	NA	NA	NA	NA
Garg,[7] 2015	42/M	Headache and gait ataxia	Infratentorial extension of the cyst	Microsurgery cyst removal, ventricle-cystostomy, and cysto-cisternostomy	ETV	Air embolism hyponatremia	24	↑
	45/F	Headache and vision diminution	Infratentorial extension of the cyst	Midline suboccipital craniotomy with ventricle-cystostomy and cysto-cisternostomy	NA	NA	36	↑
Topsakal,[25] 2002	67/F	Lower cranial nerve paresis, pyramidal sign, respiratory disturbances, disorientation, and memory disturbances	Hydrocephalus, lateral extension, brainstem, tectal plate, cerebellum, and aqueduct compression, and lateral and 3rd ventricle dilation	Microsurgery cyst removal	NA	NA	18 days	↑
Wong,[26] 1996	42 /F	Right hemiparesis, dysarthria, dizziness, and hypesthesia	Supratentorial and infratentorial extension of the cyst	Microsurgery cyst removal and cysto-cisternostomy	NA	NA	18	↑
Sharifi,[27] 2013	52/F	Headache increased intracranial pressure signs.	Hydrocephalus and infratentorial extension of the cyst	Ventriculoperitoneal shunt, microsurgery cyst removal, and fenestration	Third ventriculostomy and third ventricle-cystostomy	Recurrence	28 days	↑

ETV=endoscopic third ventriculostomy; EVD=external ventricular drainage; F=female; LVC=lateral ventricle cystostomy; M=male; NA=not available; N V=trigeminal nerve. ~: unchanged; ↑: improved

the stretching and angulation of the ophthalmic branch (V1) of the trigeminal nerve (cranial nerve [CN] V). Previously, Hayashi et al[33] have also reported a relationship between quadrigeminal arachnoid cysts and CN V involvement. They suggested that trigeminal neuralgia was caused by stretching, angulation, and demyelination at the root entry zone by a quadrigeminal arachnoid cyst.

Microsurgical fenestration and excision of the quadrigeminal cyst using the SCIT technique were preferred, considering the clear evidence of cerebellar compression, cyst size, predominant infratentorial extension, and progressive worsening of the symptoms without hydrocephalus findings.[7,10,34] Microsurgery is preferred in type II quadrigeminal cysts without hydrocephalus, as sudden cyst decompression may invoke bleeding in the surrounding fragile neurovascular structures.[6,7,34] Bleeding can be more efficiently controlled with microsurgery than an endoscopic approach. The reported success rate of microsurgery (85%) is comparable to that of endoscopic fenestration (88.5%).[10,34]

In the present case, open surgery was preferred because of the degree of cyst wall removal required. A wide fenestration, with a minimum size of 10 to 15 mm, was made to reduce the possibility of cyst recurrence in the future.[1,34] Post-intervention cerebellar complications were minimized by preserving all the cerebellar bridging veins while avoiding coagulation to handle minor bleeding and using a hemostatic agent instead. The larger bridging veins, mainly located at the midline, must be preserved; however, some smaller bridging veins can be removed if they cover a limited surgical corridor.[34]

Intraoperative findings in the supracerebellar space showed the quadrigeminal supracerebellar area after removing some cyst walls with a microscope tilted inferolaterally toward the brainstem and ambient cistern. The remaining thick arachnoid cyst (green dashed line) was still visible at the level of the tentorium of the incisura. In addition, the left-side basal vein of Rosenthal and bilateral internal cerebral veins were visible and became the deepest border of the surgical dissection. Figure 2b shows an inferolateral tilting microscope aimed at fenestrating an ambient cistern. The remaining arachnoid cyst wall, shown in Figure 2a, had already been removed.

In conclusion, this was the first report of type II quadrigeminal arachnoid cyst presenting with migraine associated with eye adduction, eye adduction-induced eye soreness, and dry eye symptoms, which were immediately relieved after microsurgical cyst resection and fenestration. These findings may help clinicians consider surgical intervention in patients with chronic symptoms related to nerve function that do not improve with initial medical treatment.

Conflict of Interest

The authors affirm no conflict of interest in this study.

Acknowledgment

None.

Funding Sources

None.

REFERENCES

1. Mustansir F, Bashir S, Darbar A. Management of arachnoid cysts: a comprehensive review. Cureus. 2018;10(4):e2458.
2. Al-Holou WN, Terman S, Kilburg C, Garton HJ, Muraszko KM, Maher CO. Prevalence and natural history of arachnoid cysts in adults. J Neurosurg. 2013;118(2):222–31.
3. Samii M, Carvalho GA, Schuhmann MU, Matthies C. Arachnoid cysts of the posterior fossa. Surg Neurol. 1999;51(4):376–82.
4. Deopujari CE, Shaikh ST, Karmarkar VS, Sudke AY, Mohanty CB, Biyani NK. Experience with management of intracranial arachnoid cysts. J Neurol Surg A Cent Eur Neurosurg. 2021;82(1):43–52.
5. Choi SK, Starshak RJ, Meyer GA, Kovnar EH, Sty JR. Arachnoid cyst of the quadrigeminal plate cistern: report of two cases. AJNR Am J Neuroradiol. 1986;7(4):725–8.
6. Akutagawa K, Tamura G, Tsurubuchi T, Ishikawa E, Matsumura A, Inagaki T. Quadrigeminal arachnoid cyst with perinatal encephalocele. Childs Nerv Syst. 2020;36(7):1393–7.
7. Garg K, Tandon V, Sharma S, Suri A, Chandra PS, Kumar R, et al. Quadrigeminal cistern arachnoid cyst: a series of 18 patients and a review of literature. Br J Neurosurg. 2015;29(1):70–6.
8. Cinalli G, Spennato P, Columbano L, Ruggiero C, Aliberti F, Trischitta V, et al. Neuroendoscopic treatment of arachnoid cysts of the quadrigeminal cistern: a series of 14 cases. J Neurosurg Pediatr. 2010;6(5):489–97.
9. Spennato P, Ruggiero C, Aliberti F, Buonocore MC, Trischitta V, Cinalli G. Interhemispheric and quadrigeminal cysts. World Neurosurg. 2013;79(2 Suppl):S20.e1–7.
10. Silva MA, Chang H, Weng J, Hernandez NE, Shah AH, Wang S, et al. Surgical management of quadrigeminal cistern arachnoid cysts: case series and literature review. J Neurosurg Pediatr. 2022;29(4):427–34.
11. Takaki Y, Tsutsumi S, Teramoto S, Nonaka S, Okura H, Suzuki T, et al. Quadrigeminal cistern arachnoid cyst as a probable cause of hemifacial spasm. Radiol Case Rep. 2021;16(6):1300–4.
12. Hayashi N, Endo S, Tsukamoto E, Hohnoki S, Masuoka T, Takaku A. Endoscopic ventriculocystocisternostomy of a quadrigeminal cistern arachnoid cyst. Case report. J Neurosurg. 1999;90(6):1125–8.
13. Inamasu J, Ohira T, Nakamura Y, Saito R, Kuroshima Y, Mayanagi K, et al. Endoscopic ventriculo-cystomy for non-communicating hydrocephalus secondary to quadrigeminal cistern arachnoid cyst. Acta Neurol Scand. 2003;107(1):67–71.
14. Gangemi M, Maiuri F, Colella G, Magro F. Endoscopic treatment of quadrigeminal cistern arachnoid cysts. Minim Invasive Neurosurg. 2005;48(5):289–92.
15. Ohnishi YI, Fujimoto Y, Taniguchi M, Tsuzuki T, Taki T. Neuroendoscopically assisted cyst-cisternal shunting for

a quadrigeminal arachnoid cyst causing typical trigeminal neuralgia. Minim Invasive Neurosurg. 2007;50(2):124–7.
16. Roka YB, Nepal A. Unusual cause for unilateral headache: a quadrigeminal cistern arachnoid cyst. Ann Acad Med Singap. 2010;39(6):495–6.
17. Zanini MA, Rondinelli G, Fernandes AY. Endoscopic supracerebellar infratentorial parapineal approach for third ventricular colloid cyst in a patient with quadrigeminal cistern arachnoid cyst: case report. Clin Neurol Neurosurg. 2013;115(6):751–5.
18. Arakawa Y, Kita D, Ezuka I, Hayashi Y, Hamada J, Hayashi Y. Regression of cerebellar tonsillar descent and hydrocephalus after endoscopic third ventriculostomy in a patient with a quadrigeminal arachnoid cyst. Surg Neurol Int. 2013;4:142.
19. Gui S, Bai J, Wang X, Zong X, Li C, Cao L, et al. Assessment of endoscopic treatment for quadrigeminal cistern arachnoid cysts: a 7-year experience with 28 cases. Childs Nerv Syst. 2016;32(4):647–54.
20. Yu L, Qi S, Peng Y, Fan J. Endoscopic approach for quadrigeminal cistern arachnoid cyst. Br J Neurosurg. 2016;30(4):429–37.
21. Isaka T, Akai F, Kuroda R, Nakatani S, Taneda S. [The quadrigeminal giant cyst communicating with lateral ventricle as a cause of obstructive hydrocephalus: a case report]. CI Kenkyu. 1995;17:413–7. Japanese.
22. Laviv Y, Neto S, Kasper EM. Management of quadrigeminal arachnoid cyst associated with obstructive hydrocephalus: report on stereotactic ventricular - cystic stenting. Br J Neurosurg. 2019;33(4):418–21.
23. Ohtsuka K, Hashimoto M, Nakamura Y. Bilateral trochlear nerve palsy with arachnoid cyst of the quadrigeminal cistern. Am J Ophthalmol. 1998;125(2):268–70.
24. Hayashi N, Hamada H, Umemura K, Kurosaki K, Kurimoto M, Endo S. [Selection of surgical approach for quadrigeminal cistern arachnoid cyst]. No Shinkei Geka. 2005;33(5):457–65. Japanese.
25. Topsakal C, Kaplan M, Erol F, Cetin H, Ozercan I. Unusual arachnoid cyst of the quadrigeminal cistern in an adult presenting with apneic spells and normal pressure hydrocephalus--case report. Neurol Med Chir (Tokyo). 2002;42(1):44–50.
26. Wong CW, Lee ST, Lui TN, Wu T, WU LL. Fluctuating hemiparesis caused by a quadrigeminal arachnoid cyst: case report. Surg Neurol. 1996;45(2):193–5.
27. Sharifi G, Jahanbakhshi A. Quadrigeminal cistern arachnoid cyst treated by endoscopic ventriculocystostomy through the trigonal region. J Neurol Surg A Cent Eur Neurosurg. 2013;74 Suppl 1:e145–8.
28. White ML, M Das J. Arachnoid cysts. [updated 2022 Oct 3]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK563272/.
29. Park IS, Lee NJ, Rhyu IJ. Roles of the declive, folium, and tuber cerebellar vermian lobules in sportspeople. J Clin Neurol. 2018;14(1):1–7.
30. Choi JH, Choi KD. Cerebellar control of saccades. Ann Clin Neurophysiol. 2013;15(2):37–41.
31. Kheradmand A, Zee DS. Cerebellum and ocular motor control. Front Neurol. 2011;2:53.
32. Ruchalski K, Hathout GM. A medley of midbrain maladies: a brief review of midbrain anatomy and syndromology for radiologists. Radiol Res Pract. 2012;2012:258524.
33. Hayashi Y, Takata S, Iizuka H. Endoscopic treatment for arachnoid cyst at the cerebellopontine angle presenting with bilateral trigeminal neuralgia: case report and literature review. Interdiscip Neurosurg. 2020;22:100815.
34. Campagnaro L, Bonaudo C, Capelli F, Della Puppa A. Microscope neuronavigation-guided microsurgical fenestration of quadrigeminal cistern arachnoid cysts: how I do it. Acta Neurochir (Wien). 2023;165(9):2561–5.