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Management of Fourth Ventricle Arachnoid Cyst Using Open Suboccipital Craniectomy and Marsupialisation at a Tertiary Hospital – Case Report

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Summary

Background: Fourth ventricular arachnoid cysts are rare, often presenting with symptoms of raised intracranial pressure or brainstem compression. **Case Presentation:** A 41-year-old male with a six-month history of headaches and difficulty walking was diagnosed with a fourth ventricular arachnoid cyst causing obstructive hydrocephalus. He underwent suboccipital craniotomy with marsupialisation, leading to successful decompression and symptom resolution. **Conclusion:** Suboccipital craniotomy with marsupialisation is an effective and safe approach for managing symptomatic fourth ventricular arachnoid cysts, ensuring long-term relief and preventing recurrence.

Key words: fourth ventricle, arachnoid cyst, suboccipital craniectomy

INTRODUCTION

Intraventricular arachnoid cysts are rare, with fourth ventricular involvement being particularly uncommon. The trigone of the lateral ventricles is the most frequent site for intraventricular cysts, while fourth ventricular cysts are extremely rare (1,2).

Arachnoid cysts are primarily congenital, arising from abnormalities in brain and spine development during early gestation. Secondary arachnoid cysts may result from trauma, inflammation, hemorrhage, or complications of brain surgery (3,4). The pathogenesis of fourth ventricular arachnoid cysts may involve herniation of the external arachnoid from the cisterna magna into the fourth ventricle or displacement of ectopic arachnoid tissue during choroid plexus formation (3,4).

This report highlights the surgical management of posterior fossa arachnoid cysts, emphasizing the benefits of definitive surgical treatment over observation or ventriculoperitoneal (VP) shunting (5,6).

CASE REPORT

Clinical summary: A 41-year-old male presented with progressive headaches and difficulty walking over six months. Examination revealed a wide-based gait and a positive Romberg test (both with eyes open and closed).

Investigations: Blood tests, including full hemogram, urea, electrolytes, and liver function tests, were normal. CT and MRI scans revealed a well-defined intra-axial cystic lesion in the posterior fossa, abutting the vermis and following cerebrospinal fluid (CSF) signal characteristics. The lesion caused mass effect without perilesional edema, extending paramedianly to the right cerebellum and spanning from the midbrain to the foramen magnum. Associated obstructive hydrocephalus was evidenced by dilated ventricles and transependymal (Figure 1-4).

Surgical Procedure: A standard suboccipital craniotomy was performed. After a Y-shaped durotomy, the cisterna magna was opened, allowing CSF to egress (Figures 5-6). The cerebellar tonsils and posterior inferior cerebellar artery (PICA) were displaced laterally to expose the thick arachnoid cyst capsule overlying the obex (Figure 7).Marsupialization of the cyst capsule was performed, achieving controlled decompression (Figure 8). Hemostasis was achieved, and ventricular washout was conducted without clots. The dura was repaired primarily without CSF leakage during the Valsalva maneuver. The bone flap was secured, and the wound was closed in layers with sterile dressing applied.

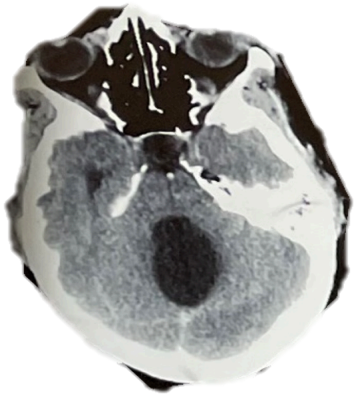

Figure 1: *Axial CT-Scan showing a hypodense lesion in the posterior fossa*

Figure 2: *T1-weighted MRI Scan showing a hypointense lesion in the posterior fossa*

Figure 3: *T2-weighted MRI Scan showing a hyperintense lesion in the posterior fossa*

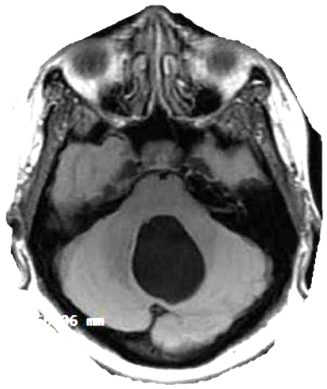

Figure 4: *FLAIR MRI Scan showing a nulling of the lesion signal in keeping with CSF*

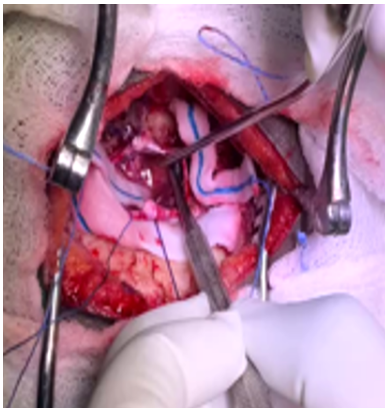

Figure 5: *Intraoperative imaging showing decompression of the cyst*

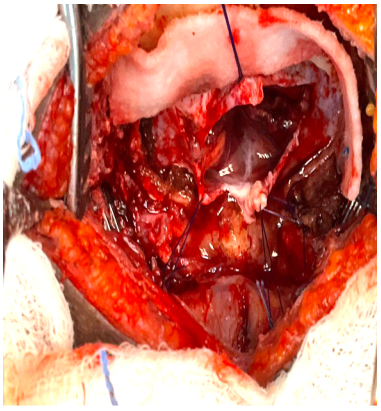

Figure 6: *Intraoperative imaging showing marsupialisation of the cyst*

DISCUSSION

Posterior fossa arachnoid cyst patients present with features of raised intracranial pressure due to chronic hydrocephalus, vertigo, ataxia, and, less frequently, symptoms related to brainstem compression such as difficulty swallowing, requiring surgical intervention (1, 2).

Treatment options include shunting, which has unsatisfactory outcomes, with reports of symptoms remaining unchanged or worsening, often requiring definitive surgery. Additionally, cerebellar or brainstem dysfunction has been reported following VP shunts, suggesting that CSF diversion procedures do not constitute a durable solution (3, 4).

Definitive surgical management has been recommended to avoid shunt dependence (5). Although endoscopic fenestration has been described as having good postoperative results for arachnoid cysts, few attempts have been made to treat cysts located in the fourth ventricle endoscopically. This approach involves marsupialization of the cyst and standard endoscopic third ventriculostomy (6,7).

When anatomically favorable conditions exist, such as obstructive hydrocephalus with dilation of the Sylvian aqueduct, an endoscopic procedure via the third ventricle can be attempted to prevent delayed hydrocephalus in case of cyst recurrence (6, 8).

The objective of microsurgical approaches, including cyst wall resection and fenestration/ marsupialisation, is to decompress the cyst, relieve mass effect and 4th ventricle obstruction, and establish communication between the cyst and subarachnoid space to prevent fluid re-accumulation. To minimize recurrence, a minimum of five walls of the cyst must be excised, as cysts typically have six walls (2, 4, 9). Recurrences may occur due to inadequate fenestration, closure of the fenestration, or incomplete communication between the cyst and subarachnoid space (9, 10).

CONCLUSION

Advances in imaging modalities such as CT and MRI have increased the detection of intracranial arachnoid cysts. A subset of these lesions, including fourth ventricular cysts, become symptomatic and require neurosurgical intervention. Definitive surgical management, including marsupialization or microsurgical cyst excision, offers better outcomes than shunting procedures.

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