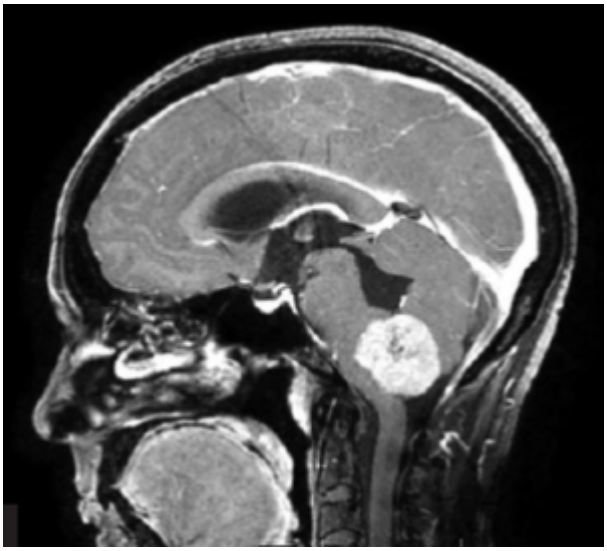
Fourth ventricular meningioma



Epidemiology

Of the intraventricular meningiomas, only 6% are primarily in the fourth ventricle. [1].

The most common age of onset was from the third decade to sixth decade of life. The female/male ratio was about 1.16:1. The most frequent subtype of meningioma was fibrous meningioma [2].

Diagnosis

The FVMs had specific imaging features, such as calcification (20%), peritumoral edema (30.3%), heterogeneous enhancement (22.5%), cystic formation (4.3%) and hydrocephalus (52.8%) [3].

The computed tomography (CT; n=5), magnetic resonance imaging (MRI; n=9) features and clinical presentations of 10 patients with pathologically documented fourth-ventricular meningiomas were retrospectively analysed.

All tumours appeared as well-demarcated masses in the fourth ventricle at CT and MRI. The tumour shape was round in eight cases (80%) and irregular in two cases (20%). The CT images of five cases showed predominantly isoattenuation in three cases and high attenuation in two cases, with a mean attenuation value of 52 HU. In addition, calcifications were seen in three cases. At MRI, nine masses were isointense (n=6) or hypointense (n=3) to grey matter on T1-weighted images and mildly hyperintense (n=4), isointense (n=3), hypointense (n=1), and of mixed signal intensity (n=1) on T2-weighted and fluid-attenuated inversion recovery (FLAIR) images. Signal voids were visible in two cases. Enhancement after injection of contrast material was marked homogeneous (n=5) or heterogeneous (n=5) on CT or T1-weighted images. Three tumours had mild peritumoural oedema. Three tumours were associated with obstructive hydrocephalus. The pathological subtype of the 10 meningiomas was fibromatous (n=5), atypical (n=2), and one each of transitional, psammomatous,

and clear-cell type.

The relatively typical radiological appearance, combined the age and sex of patients, can suggest the diagnosis of fourth-ventricular meningioma [4].

Treatment

The recommended treatment is surgical treatment via the telovelar approach with suboccipital craniotomy/craniectomy. Adjuvant therapy is needed in some of the high grade meningiomas and in cases underwent partial resection [5].

Outcome

The prognosis is relatively good, with less postoperative complications and higher rate of total resection [6].

In the series of Luo et al., the proportion of total tumor resection was about 94.9%, with 15.3% of postoperative complications. During follow-up, the recurrent rate of FVMs was about 6.8%. There was no significant difference in the analysis of correlation between hydrocephalus and the maximum diameter of tumors, correlation between hydrocephalus and the volume of tumor, correlation between peritumoral edema and the volume of tumor, as well as correlation between heterogeneous enhancement and the grade of meningiomas [7].

Case series

Luo et al., published a series of eleven Fourth ventricular meningioma at one single institution. A comprehensive literature analysis was conducted.

The information of eleven cases were extracted from the patient data. And English cases were obtained from the literature. Including the 11 cases, 71 cases were analyzed in this study. [8].

Sadashiva et al., published two cases harboring a primary fourth ventricular meningioma Grade II, which was surgically excised successfully. Total excision was achieved in both cases and as the tumor was firm to soft and vermian splitting was not required. Understanding the clinical features and a careful preoperative radiological examination is required to differentiate this tumor from more commonly occurring lesions at this location [9].

Zhang et al., presented the neuroradiological and clinical findings of fourth-ventricular meningiomas to increase awareness of this entity.

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Although fourth-ventricular meningioma is quite rare, it should be considered in differential diagnosis of neoplasms within the fourth ventricle. The relatively typical radiological appearance, combined the age and sex of patients, can suggest the diagnosis of fourth-ventricular meningioma [10].

A adult patient with a rare chordoid meningioma located within the fourth ventricle. This lesion was treated with gross total resection. Chordoid meningioma must be considered within the differential diagnosis of intraventricular tumors. This histological subtype of meningioma warrants close follow-up. The patient must also be evaluated for systemic manifestations of Castleman's disease [11].

Case reports

A 14-year-old man with seizure and headache. The magnetic resonance imaging reported bilateral acoustic neuroma and fourth ventricle meningioma. The patient was scheduled for total tumor resection and the histopathology revealed psammomatous type of meningioma. The patient discharged with good general status [12].

A 60-year-old man was admitted with slowly progressive dizziness. Cranial nerve evaluation found no abnormalities. Magnetic resonance imaging revealed a well-circumscribed mass with homogeneous enhancement located in the fourth ventricle. The patient underwent surgery for the removal of the tumor via the bilateral suboccipital approach. Subtotal removal of the tumor was achieved in a piecemeal fashion. Histological diagnosis was meningothelial meningioma [13].

A 25-year-old man with fourth ventricular meningioma. Qin et al., refer to the usefulness of diffusion-weighted imaging and apparent diffusion coefficient measurements for the differential diagnosis of fourth ventricular tumors [14].

A fourth ventricular clear cell meningioma without dural attachment in a 14-year-old boy with an unusual presentation of failure to thrive [15].

Lyngdoh et al., published in 2007 two cases [16].

Liu et al., published one case in a series of intraventricular meningiomas [17].

A 76 year old male patient presenting with a 2-week history of headache and cognitive disorders with agitation and restlessness particularly exacerbated at night or when lying down. CT scan and MR imaging showed a contrast-enhancing lesion located purely within the whole fourth ventricle, with slight ventricular enlargement. At surgery, we totally removed a well-vascularised, greyish encapsulated mass attached to the choroid plexus. Pathological examination revealed a WHO grade I fibroblastic meningioma [18].

A 72-year-old female presented with an intra-fourth ventricular meningioma manifesting as truncal ataxia. Computed tomography (CT) showed a slightly high-density, well-demarcated, and homogeneously enhanced mass located in the fourth ventricle and extending to the right lateral recess. T2-weighted magnetic resonance (MR) imaging revealed a peritumoral high-intensity band without dural tail sign. Bilateral vertebral angiography revealed faint tumor staining supplied from the choroidal branches of the posterior inferior cerebellar arteries. The mass was totally resected via a suboccipital approach. CT, T2-weighted MR imaging, and vertebral angiography are informative for the preoperative diagnosis of fourth ventricular meningioma [19].

A 72-year-old man operated upon for such a tumor. The pre-operative magnetic resonance images revealed a well circumscribed mass in the fourth ventricle that exhibited a low signal on T1-weighted magnetic resonance images and homogenously enhanced with gadolinium. By light microscopy the tumor was composed of tightly packed spindle cells separated by collagen. Immunohistochemistry showed the tumor cells to be positive for vimentin and epithelial membrane antigen, and negative for glial fibrillary acidic protein. Electron microscopy revealed typical findings of meningioma, including interdigitating cell processes, desmosomes, and intermediate filaments. Although rare, fibroblastic meningioma must be included in the differential diagnosis of a fourth ventricular spindle cell tumor in elderly patients [20].

In 1992 a rare case of fourth ventricle meningioma with a combined intraventricular-intracerebellar localization, successfully removed by surgical treatment, is reported [21].

Perry et al., reported two cases, one with typical CT, angiographic, and magnetic resonance (MR) appearances and one with atypical features of central cyst formation on CT and MR. The utility of MR in demonstrating intraventricular location in three imaging planes is illustrated. Given the rarity of these tumors, atypical features may preclude accurate preoperative diagnosis, even with MR [22)].

Rodriguez-Carbajal and Palacios published in 1974 2 cases [23)].

References

1)
Alver I, Abuzayed B, Kafadar AM, Muhammedrezai S, Sanus GZ, Akar Z. Primary fourth ventricular meningioma: Case report and review of the literature. Turk Neurosurg. 2011;21:249–53.

2) 3) 5) 6) 7) 8)
Luo W, Xu Y, Yang J, Liu Z, Liu H. Fourth ventricular meningiomas. World Neurosurg. 2019 Apr 17. pii: S1878-8750(19)31089-7. doi: 10.1016/j.wneu.2019.04.097. [Epub ahead of print] PubMed PMID: 31004862.

4) 10)
Zhang BY, Yin B, Li YX, Wu JS, Chen H, Wang XQ, Geng DY. Neuroradiological findings and clinical features of fourth-ventricular meningioma: a study of 10 cases. Clin Radiol. 2012 May;67(5):455-60. doi: 10.1016/j.crad.2011.10.017. Epub 2011 Dec 6. PubMed PMID: 22153230.

9)
Sadashiva N, Rao S, Srinivas D, Shukla D. Primary intra-fourth ventricular meningioma: Report two cases. J Neurosci Rural Pract. 2016 Apr-Jun;7(2):276-8. doi: 10.4103/0976-3147.178665. PubMed PMID: 27114661; PubMed Central PMCID: PMC4821938.

11)
Wind JJ, Jones RV, Roberti F. Fourth ventricular chordoid meningioma. J Clin Neurosci. 2010 Oct;17(10):1301-3. doi: 10.1016/j.jocn.2010.03.013. Epub 2010 Jul 31. PubMed PMID: 20673720.

12)
Salehpour F, Aghazadeh J, Bazzazi AM, Mirzaei F, Eftekhar Saadat AT, Alavi SAN. Meningioma in Fourth Ventricle of Brain: A Case Report and Literature Review. Asian J Neurosurg. 2018 Apr-Jun;13(2):428-430. doi: 10.4103/1793-5482.228551. PubMed PMID: 29682051; PubMed Central PMCID: PMC5898122.

13)
Takeuchi S, Sugawara T, Masaoka H, Takasato Y. Fourth ventricular meningioma: a case report and literature review. Acta Neurol Belg. 2012 Mar;112(1):97-100. doi: 10.1007/s13760-012-0040-2. Epub 2012 Feb 3. Review. PubMed PMID: 22427300.

14)
Qin Y, Kanasaki Y, Takasugi M, Shinohara Y, Kaminou T, Kurosaki M, Ogawa T. Primary fourth ventricular meningioma: a case report of an adult male. Clin Imaging. 2012 Jul-Aug;36(4):379-82. doi: 10.1016/j.clinimag.2011.11.034. Epub 2012 Jun 8. PubMed PMID: 22726979.

15)
Burgan OT, Bahl A, Critcher V, Zaki HS, McMullan PJ, Sinha S. Clear cell meningioma of the fourth ventricle in a child: a case report and literature review. Pediatr Neurosurg. 2010;46(6):462-5. doi: 10.1159/000325072. Epub 2011 May 3. Review. PubMed PMID: 21540624.

16)
Lyngdoh BT, Giri PJ, Behari S, Banerji D, Chhabra DK, Jain VK. Intraventricular meningiomas: a surgical challenge. J Clin Neurosci. 2007 May;14(5):442-8. Epub 2007 Mar 12. PubMed PMID: 17350844.

17)
Liu M, Wei Y, Liu Y, Zhu S, Li X. Intraventricular meninigiomas: a report of 25 cases. Neurosurg Rev. 2006 Jan;29(1):36-40. Epub 2005 Oct 12. PubMed PMID: 16220350.
18)
Chaskis C, Buisseret T, Michotte A, D'Haens J. Meningioma of the fourth ventricle presenting with intermittent behaviour disorders: a case report and review of the literature. J Clin Neurosci. 2001 May;8 Suppl 1:59-62. Review. PubMed PMID: 11386828.
19)
Akimoto J, Sato Y, Tsutsumi M, Haraoka J. Fourth ventricular meningioma in an adult–case report. Neurol Med Chir (Tokyo). 2001 Aug;41(8):402-5. PubMed PMID: 11561352.
20)
Cummings TJ, Bentley RC, Gray L, Check WE, Lanier TE, McLendon RE. Meningioma of the fourth ventricle. Clin Neuropathol. 1999 Sep-Oct;18(5):265-9. PubMed PMID: 10505436.
21)
Delfini R, Capone R, Ciappetta P, Domenicucci M. Meningioma of the fourth ventricle: a case report. Neurosurg Rev. 1992;15(2):147-9. PubMed PMID: 1635630.
22)
Perry RD, Parker GD, Hallinan JM. CT and MR imaging of fourth ventricular meningiomas. J Comput Assist Tomogr. 1990 Mar-Apr;14(2):276-80. PubMed PMID: 2312858.
23)
Rodriguez-Carbajal J, Palacios E. Intraventricular meningiomas of the fourth ventricle. Am J Roentgenol Radium Ther Nucl Med. 1974 Jan;120(1):27-31. PubMed PMID: 4543954.