CASE REPORT

Low-grade meningioma showing nearly equal density with spinal fluid on radiographic images

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SUMMARY

A 61-year-old woman had an intracranial tumour that was located on the falx. Meningioma was suspected and the tumour rapidly grew over 1 year. It showed nearly equal density with spinal fluid showing almost no enhancement on radiographic images, like microcystic meningioma. Successful removal of the tumour was achieved. Histopathologically, the tumour was diagnosed as low-grade meningioma. The meningioma had variable sized microcysts and the appearance of solid area was meningothelial meningioma. This is a rare radiographic image for meningothelial meningioma.

BACKGROUND

Generally meningioma shows mild to high intensity on plain computed tomography (CT) and is extremely well-enhanced globally on contrast-enhanced CT. Sometimes we can differentiate the type of meningioma from its radiographic features. For example, microcystic meningioma shows low density on plain CT and sometimes shows little enhancement (figure 1).^{1 2} In this case, we experienced a case of meningothelial meningioma that was suggestive of microcystic meningioma on CT and magnetic resonance imaging (MRI).

CASE PRESENTATION

A 61-year-old woman presented asymptomatic and her meningioma was discovered by periodic health screening. She had no remarkable medical history.

Intracranial tumour perhaps attached on the falx in the right frontal lobe showed low density on plain CT in the same range as spinal fluid, extremely high intensity on T2-weighted image (T2WI), low intensity on T1-weighted image (T1WI). The low signal mass lesion in the T1WI remained almost non-enhanced for the most part with only scanty thin peripheral enhancement after gadolinium injection unlike in the case of usual meningioma. This tumour grew rapidly (from 28×16×27 to 32×22×32 mm) in 1 year, but MRI showed no peritumoral oedema. Angiography showed no stain of the tumour. Successful removal of the tumour was achieved by a bicoronal craniotomy. Attachment of the tumour was unclear. Adhesion against the brain was moderate. The resected tumour was soft and the colour was greyish. Histopathologically, the tumour was diagnosed as low-grade meningioma. In solid area, oval-shaped arachnoid-like cells were proliferating like sheets. The tumour had intranuclear inclusions and psammoma body (figure 2). Few necrosis and mitosis were found. Capillary blood vessel became

dilated and intercellular oedema was elevated. This tumour partly formed an image like microcystic meningioma, but was built mostly of large cysts as if it were macrocystic meningioma. The tumour was epithelial membrane antigen-positive and CD 34-negative in immunostaining just like usual meningioma. But D2-40 was positive like chordoid meningioma.^{3–5} MIB-1 index varied widely, and the average was less than 10%.

She was discharged with no neurological deficits.

DIFFERENTIAL DIAGNOSIS

CT and MRI show extra-axial lesion and perhaps attachment to the falx suggesting meningioma. The type of meningioma that can show low density on CT are lymphoplasmacyte-rich meningioma, microcystic meningioma and chordoid meningioma, but they usually show peritumoral oedema.^{1 4 6 7} The histological diagnosis was meningothelial meningioma as most of the specimen's appearance was meningothelial. There were parts showing similar appearances with microcystic meningioma, but most of the cysts were larger in size as if it were macrocystic meningioma. This might be the reason for showing nearly equal density with spinal fluid and almost no enhancement on radiographic images. This is a rare image for meningothelial meningioma.

Even if microcystic, lymphoplasmacyte-rich or chordoid meningioma is suspected from its internal density, meningothelial meningioma is possible if there is no peritumoral oedema as seen in this case.

OUTCOME AND FOLLOW-UP

The patient was discharged with no neurological deficits. On MRI, total resection was confirmed, and there is no recurrence for 4 months.

DISCUSSION

Meningioma that shows nearly equal density with spinal fluid and without peritumoral oedema on radiographic image is rare.

Meningothelial meningioma is difficult to distinguish from microcystic meningioma from radiographic images in this type of cases. Microcystic meningioma is assumed to occur from pia-arachnoid differentiation. Subsequent reports identified characteristic clinicopathological findings, such as vacuolation, myxomatous change and microcysts in certain meningiomas and designated that subgroup as a microcystic meningioma. Radiographically, microcystic meningioma reported in the past shows a global low-density area on CT image, which is an important differential diagnosis point. It has a webbing or

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Figure 1 (A) Head axial plain CT scan showing low density in the same range as spinal fluid. (B) Head axial plain T2-weighted MR image showing high intensity in the same range as spinal fluid. (C) Head axial enhanced T1-weighted MRI showed almost no effect on the central site and little effect on the peripheral site. (D) Macroscopically, the tumour did not have cozy relations with falx.

honey comb style pattern in which most of the patients show vivid enhancement, but some show little enhancement. On MRI, T1WI shows low and T2WI shows extremely high intensity. The tumour

has many microcysts and this is thought to be the reason for this radiographic image.^{1 2} The most distinguishable point from usual microcystic meningioma in this case was that many types of cysts

Figure 2 (A) Oval-shaped arachnoid-like cells grew proliferously like sheets. The tumour had cytosolic inclusions and psammoma body. Few necrosis and mitosis were found. (B) The lesion of the specimen which shows a histological image of meningothelial meningioma. Vacuole in the nucleus is apparent. (C) The diameter of the large microcysts was 200 μ m. The inner layers of the microcysts were not covered by endothelial cells. Tumour cells were found on the inside of the microcysts. (D) The lesion with small microcysts had a appearance like microcystic meningioma.

were mixed, both large and small. This is thought as the reason for the radiographic image suggesting microcystic meningioma. The number of tumour cells with positive nuclear Ki67 immunostaining was variable from area to area, but the estimated index in the specimen was less than 10%. The tumour showed a rapid growth on radiographic image, but MIB-1 index was low and was considered as low-grade histopathologically.

This radiographic finding has a significant impact in deciding the patient's treatment strategy. Usually, peritumoral oedema is one of the recurrence factors besides the rate of resection.⁸ Most people would expect meningioma with this type of density, although no peritumoral oedema is atypical, as microcystic, lymphoplasmacyte-rich or chordoid meningioma. With these types of meningioma, complete resection is a must even in locations where complete resection is difficult in order to prevent recurrence. However, in this case, pathological findings revealed a different type of meningioma rather than microcystic, lymphoplasmacyte-rich and chordoid meningioma. This can be differentiated from the fact that no peritumoral oedema was shown, and in these types of cases, there is no need to perform a complete resection risking severe surgical complications as we can expect on postoperation radiation therapy.

Histopathological findings also have a significant impact in deciding the patient's treatment strategy. If the resected tumour is microcystic, lymphoplasmacyte-rich or chordoid meningioma, we must consider about postoperation radiation therapy. However, in meningioma as seen in this case is found, postoperation would be not necessary if complete resection was performed. In short, radiographic and histopathological findings are critical in deciding the patient's treatment strategy.

Learning points

- ▶ There is meningotheial meningioma representing variable sized microcystic change. This type of meningotheial meningioma looks like microcystic meningioma on CT and MRI showing nearly equal density with spinal fluid.
- ▶ Meningioma that grows rapidly but without peripheral oedema is benign.
- ▶ Therefore, even if microcystic, lymphoplasmacyte-rich or chordoid meningioma is suspected from radiographic images, but no peritumoral oedema is found, and is located in sites in which complete resection is difficult, there is no need to perform a complete resection risking severe surgical complications as we can expect on postoperation radiation therapy against meningotheial meningioma.

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REFERENCES

- 1 Paek SH, Kim SH, Chang KH, *et al.* Microcystic meningiomas: radiological characteristics of 16 cases. *Acta Neurochir (Wien)* 2005;147:965–72.
- 2 Kubota Y, Ueda T, Kagawa Y, *et al.* Microcystic meningioma without enhancement on neuroimaging. *Neurol Med Chir (Tokyo)* 1997;37:407–10.
- 3 Tena-Suck ML, Collado-Ortiz MA, Salinas-Lara C, *et al.* Chordoid meningioma: a report of ten cases. *J Neurooncol* 2010;99:41–8.
- 4 Donato G, Ferraro G, Signorelli F, *et al.* Chordoid meningioma: case report and literature review. *Ultrastruct Pathol* 2006;30:309–14.
- 5 Kozler P, Benes V, Netuka D, *et al.* Chordoid meningioma: presentation of two case reports, review of the literature, and plea for data standardisation. *J Neurooncol* 2008;88:115–20.
- 6 Bruno MC, Ginguene C, Santangelo M, *et al.* Lymphoplasmacyte rich meningioma: a case report and review of the literature. *J Neurosurg Sci* 2004;48:117–24.
- 7 Katayama S, Fukuhara T, Wani T, *et al.* Cystic lymphoplasmacyte-rich meningioma-case report. *Neurol Med Chir (Tokyo)* 1997;37:275–8.
- 8 Mantle RE, Lach B, Delgado MR, *et al.* Predicting the probability of meningioma recurrence based on the quantity of peritumoral brain edema on computerized tomography scanning. *J Neurosurg* 1999;91:375–83.

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