Intracranial ipoma : CT and MRI Findings

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Intracranial lipomas are rare lesions, which are believed to be congenital malformations. They are usually asymptomatic incidental findings and localized in the midline. However, they may occasionally produce neurological symptoms such as seizure, headache, mental changes, paresis. Currently, diagnosis of intracranial lipomas is made on based of imaging modalities, particularly Magnetic resonance imaging(MRI). Because Lipomas are strongly adherent to the surroundings and typically enclose both vessels and nerves, Surgical approach is rarely indicated.

Key words : intracranial lipoma, lipoma of corpus callosum, brain, computed tomography, magnetic resonace imaging

Introduction

Intracranial lipomas are believed to be congenital malformations that result from persistence and maldifferentiation of the meninx primitiva, an embryologic structures that normally differentiates into the leptomeniges[1)]. Intracranial lipomas are firstly described by Rokitansy following his discovery at autopsy in 1856, and are estimated less than 0.1% of all intracranial tumors[2,3)]. Most of intracranial lipomas are located in midline, especially near the corpus callosum. These are known as interhemispheric lipomas and are often associated with brain deformities[1,3-5)]. Intracranial Lipomas can also be detected within the quadrigeminal plate, the ambient, interpeduncular, chiasmatic and sylvian cistern, along with the cerebellopontine angle and the tuber cinereum[1,6-7)]. Intracranial lipomas are usually asymptomatic and do not require surgical treatment[1)]. Surgical approach may be considered for the very few patients who have neurological deficits[8)]. We describe a rare case of intracranial lipoma in a 77-year-old woman, demonstrate characteristic MR signal together with the anatomical location of the lesion and the literature was reviewed.

Case Report

A 77 year old woman was admitted to our hospital. She had experienced 3 days of progressive right weakness, right facial palsy and dizziness. She had a diabetes mellitus 10 years earlier. There was no neurological abnormality on clinical examination. routine laboratory tests were normal. Computed tomography(CT) and magnetic resonance imaging(MRI) was performed. CT revealed a large low-density mass in the pericallosal area. The density of the lesion was similar to subcutaneous fat and there was no associated calcifications(Fig 1a).

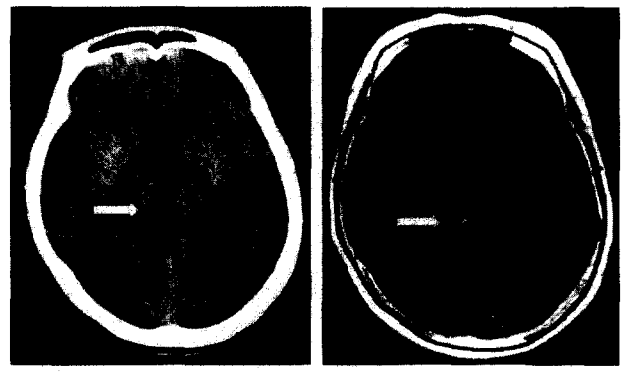

Fig. 1. CT and MR image at the level of cistern of velum interpositum. The lesion(white arrow) showed fat density lesion on CT(a) and high signal intensity on T1-weighted MR imaging(b).

T1 weighted sagittal MR imaging showed homogeneous high signal intensity lesion surrounding the splenium of corupus callosus and cistern of velum interpositum, measuring 5mm in cross-sectional diameter and 23mm in length(Fig 2a). mass effect or surrounding edema was not evident. T2 weighted sagittal MR imaging showed that the lesion has iso signal intensity(Fig. 2b). T1-weighted sagittal fat suppression MR sequence revealed low signal intensity confirming the fatty

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nature of the lesion, was classified as the curvilinear lipoma(Fig. 2c). T2 weighted sagittal MR imaging showed that another multiple small high signal intensity lesions in periventricular white matter, pons and basal ganglia. The lesions were believed small vessel disease in brain. In our case, common associated findings(agenesis, hypogenesis of the corpus callosum and choroid plexus lipoma) or hydrocephalus were not noted. The appearance of the lipoma was quite pathognomonic in the neuroimaging diagnostic test.

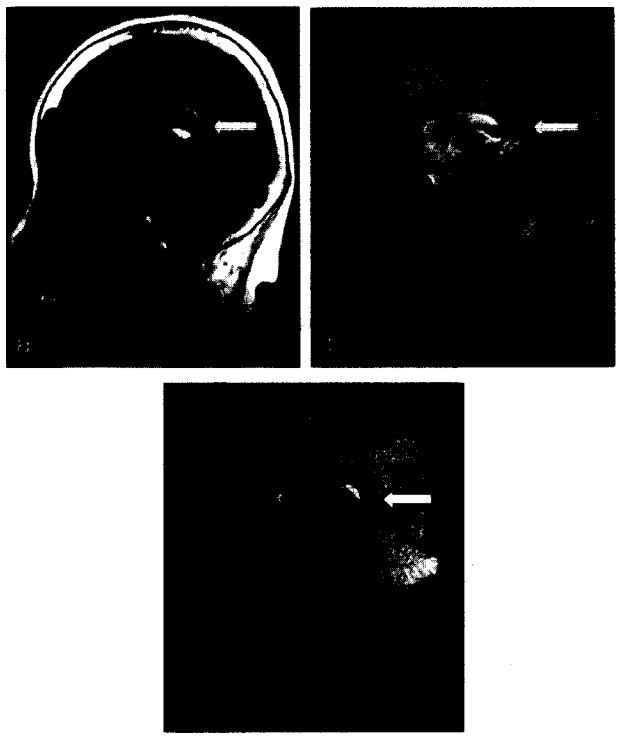

Fig. 2. mid-sagittal MR imaging (a) T1 weighted MR imaging showed homogeneous high signal intensity lesion surrounding the splenium of corupus callosus and cistern of velum interpositum(5mm wide and 23mm in long). (b) Note the empty sella and corpus callosum is intact T2 weighted MR imaging showed iso signal intensity lesion. (c) T1-weighted fat suppression sequence revealed low signal intensity lesion confirming the fatty nature.

Discussion

Intracranial lipomas are now believed to be a type of congenital malformation that results from abnormal persistence and maldifferentiation of the meninx primitiva, the mesenchymal precursor of the leptomeninges, during the development of the subarachnoid cisterns[1,9]. Intracranial lipomas are rare lesions and accounting for less than 0.1% of all intracranial tumors[3]. Intracranial lipoma is neither age- nor gender related[4].

More than 80% of intracranial lipomas are located supratentorially in the midline. Interhemispheric lipomas were the most common, accounting for 45% of the cases. The remainder of the lesions were clustered in the quadrigeminal/superior cerebellar(25%), suprasellar/interpeduncular(14%), cerebellopontine angle(9%), and Sylvian(5%) cisterns[1,3-4].

Many intracranial lipomas are benign and asymptomatic, Symptomatic intracranial lipomas are uncommon, and the symptoms depend on the location of the lipoma. Intracranial lipomas can present with seizure, headache, mental changes, paresis or paralysis[3,4,10]. Lipomas localized in the ambient and quadrigeminal cisterns often present with signs of Intracranial pressure caused by hydrocephalus[3]. Assoiciated brain anomaly with intracranial lipoma have been reported include agenesis or dysplasia of the corpus callosum, frontonasal dysplasia, encephalocele, uronoschisis, cheiloschisis, Spina bifida, absence of septum pellucidum, cranium bifidum, cranial ectopia, agenesia of vermis, and microgyria[4,11].

Truwit and Barkovich distinguished two groups of interhemispheric lipoma having different morphologies and associated brain anomalies : curvilinear lipoma and tubulonodular lipoma. tubulonodular lipomas consist of anteriorly situated round or cylinder-shaped lipomas. These lipomas are generally greater than 2cm in diameter and have a high incidence of extensive callosal and possibly fronto-facial anomalies. Curvilinear lipomas consist of thin, posteriorly situated lipomas curving around the splenium and These lipomas are generally associated with a normal corpus callosum and otherwise have a low incidence of associated anomalies. Tubulonodular lipomas are more commonly associated with anomalies of brain than curvilinear lipomas[1].

In particular, dysgenesis of the corpus callosum is found in 88% of tubulonodular cases and only 35% of curvilinear cases, Similarly, calcification is associated with 60% of tubulonodular and only 19% of curvilinear lesions. Facial defects, frontal masses, and/or encephaloceles are seen in 43% of tubulonodular cases and are absent in the curvilinear group. The exact pathogenesis of lipomas remains unclear. several pathological theories have been proposed including the following: 1) hypertrophy of preexisting meningeal fatty tissue; 2) origin from within the brain substance, lipomatous glioma; 3) transformation or metaplasia of meningeal connective tissue; 4) fatty degeneration of proliferated glia; 5) mesodermal inclusion within the lips of the closing neural tube(dysraphism theory); and 6) derivation from the embryological "meninx primitiva," a mesenchymal derivative of neural crest[1].

The final theory has invalidated previous pathogenic theories, suggesting an abnormal, persistent focus of meninx primitiva differentiation into adipose tissue and maturation into a lipoma. Because intracranial lipomas grow very slowly and are usually asymptomatic, the clinical diagnosis of

intracranial lipoma is difficult.

Intracranial lipomas show characteristic radiological features. Findings of skull X-rays reveal distinctive but rare. Criteria for their diagnosis : (1) a midline lesion lying just above the corpus callosum; (2) a radiolucent area at the site of the tumor and (3) symmetrical, typically eggshell mural calcifications in the anteroposterior projection[3,12].

Non-contrast CT shows a very low density that has attenuation characteristics similar to adipose tissue (-50 to -100units) and may has calcified shells at its periphery. Lipoma do not enhance following contrast administration. Peritumoral edema is usually absent. The CT scan has also been found associated congenital anomalies such as dysraphism, hydrocephalus and porencephaly[13-17]. The MRI technique is superior to CT in terms of exact anatomical localization of the lesions, and the origin of the lipoma and its relationship to surrounding structures[18].

On MRI, an intracranial lipoma shows a homogeneous high signal intensity lesion in Tl-weighted MR images. On T2-weighted MR images, its intensity ranges from iso to slightly high signal intensity lesion. A T1-weighted fat suppression sequence confirmed the fatty nature of the lesion[19-22]. The differential diagnosis includes other fatty tumors, such as dermoid cyst, epidermoid cyst and teratoma. In addition to lipomas, dermoids and teratomas need to be considered when evaluating an intracranial tumor with fat intensity by imaging[3]. Dermoids usually show fat density (-20 or -120 Hounsfield units) on CT, MR signal intensity has more heterogeneous than lipoma and rupture with cisternal fat droplets is common. Dermoids often demonstrate characteristic fluid-fluid level. Teratomas have heterogeneous tissues usually lead to inhomogenous appearance on CT or MRI. MR imaging is capable of differentiating lipomas from dermoid cysts and teratomas, making this the diagnostic method of choice.

Intracranial lipomas are typically avascular masses with neither tumor stain, contrast pooling, or vascular encasement. Prominent vessels often course within lipoma, particularly the tubulonodular lipoma that is associated with callosal dysgenesis[23]. In the majority of cases , Surgical removal of lipomas can result in significant morbidity because these lesions are often highly vascularized and very strong attachment of tumor to surrounding structures[3,4,14,15]. Surgical treatment is rarely indicated. Carbon dioxide lasers can be alternative to surgery[24].

Conclusion.

Intracranial lipomas are rare condition. Most Intracranial lipomas usually detected incidentally during the course of a neuroimaging examination. MR imaging easily confirms and characterizes the location, size and extension of lipoma and associated anomaly.

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References

1. Truwit, C.L., Barkovich, A.J. Pathogenesis of intracranial lipoma: An MR study in 42 patients. AJR 155, Vol 4, 855-864, 1990.
2. von Rokitansky, C. Lehrbuch der Pathologischen Anatomie, Vienna: Wilhelm Braumuller, Vol 2, 468, 1856.
3. Maiuri, F., Cirillo, S., Simonetti, L., De Simone, M.R., Gangemi, M. Intracranial lipomas, diagnostic and therapeutic considerations. J Neurosurg Sci 32, 161-167, 1988.
4. Donati, F., Vasella, F., Kaiser, G., Blumberg, A. Intracranial lipomas. Neuropediatrics 23, 32-38, 1990.
5. Demaerel, P., Van de Gaer, P., Wilms, G., Baert, A.L. Interhemispheric lipoma with variable callosal dysgenesis: relationship between embryology, morphology, and symptomatology. Eur Radiol 6, 904-909, 1996.
6. Kazner, E., Stochdorph, O., Wende, S., Grumme, T. Intracranial lipoma, diagnostic and therapeutic considerations. J Neurosurg 52, 234-245, 1980.
7. Uchino, A., Hasuo, K., Matsumoto, S., Masuda, K. MRI of dorsal mesencephalic lipomas. Clin Imaging 17, 12-16, 1993.
8. Eghwrudjakpor, P.O., Kurisaka, M., Fukuoka, M., Mori, K. Intracranial lipomas. Acta Neurochir (Wien) 110, 124-128, 1991.
9. Barkovich, A.J. Congenital malformations of the brain and skull. In: Pediatric neuroimaging, 2nd edn. Raven Press, New York, 177-275, 1995.
10. Halmagy, G.M., Evans, W.A. Lipoma of the quadrigeminal plate causing progressive obstructive hydrocephalus. Case report. J Neurosurg 49, 453-456, 1978.
11. Zettner, A., Netsky, M. lipoma of corpus callosum. J Neuropatho Exp Neurol 19, 305-319, 1960.
12. Roukkula, M., Anttinen, E.E. Lipoma of the corpus callosum. Clinical and roentgenological aspect. Ann Chir Gyn Fenn 51, 228-237, 1962.
13. Catala, M., Lazareth, J.P., Coquillo, F., Binoche, T. Dorsal mesencephalic lipoma with inferior collicular hypoplasia : a case report and review of literature. Clin Neurol Neurosurg 99, 271-275, 1997.

14. Eghwrudjakpor, P.O., Kurisaka, M., Fukuoka, M., Mori, K. Intracranial lipomas : current perspectives in their diagnosis and treatment. Br J Neurosurg 6, 139-144, 1992.
15. Kazner, E., Stochdorph, O., Wende, S., Grumme, T. Intracranial lipoma, diagnostic and therapeutic considerations. J Neurosurg 52, 234-245, 1980.
16. Uchino, A., Hasuo, K., Matsumoto, S., Masuda, K. Solitary choroid plexus lipomas, CT and MR appearance. Am J Neuroradiol 14, 116-118, 1993.
17. Wallace, D. Lipoma of the corpus callosum. J Neurol Neurosurg Psychiat 1976; 39, 1179-85, 1976.
18. Kikuchi, K., Kowada, M., Watanaba, K. Computed tomography of an intracranial lipoma confined in the suprasellar cistern. Comput Med Imaging Graphics 18, 187-192, 1994.
19. Faerber, E.N., Wolpert, S.M. The value of computed tomography in the diagnosis of intracranial lipomata. J Comput Assist Tomogr 2, 297-299, 1978.
20. Friedman, R.B., Segal, R., Latchaw, R.E. Computerized tomographic and magnetic resonance imaging of intracranial lipoma. Case report. J Neurosurg 65, 407-410, 1986.
21. Martuza, R.L., Parker, S.W., Nadol, J.B.J., Davis, K.R., Ojemann, R.G. Diagnosis of cerebellopontine angle tumors. Clin Neurosurg 32, 177-213, 1985.
22. Steimle, R., Pageaut, G., Jacquet, G., Bourghli, A., Godard, J., Bertaud, M. Lipoma in the cerebellopontine angle. Surg Neurol 24, Vol 1, 73-76, 1985.
23. Eghwrudjakpor, P.O., Kurisaka, M., Fukuoka, M., Mori, K. Intracranial lipoma Acta Neurochir(Wien)110, 124-128, 1991.
24. Clarici, G., Heppner, F. (1979) The operative approach to lipomas of the corpus callosum. Neurochirurgia 22, 77-81, 1979.