Neurol Med Chir (*Tokyo*) *42, 137～139, 2002*

Intradiploic Arachnoid Cyst Identified by Diffusion-Weighted Magnetic Resonance Imaging

—Case Report—

Satoshi YAMAGUCHI, Taizo HIROHATA, Masayuki SUMIDA*, Kazunori ARITA**, and Kaoru KURISU**

*Department of Neurosurgery, Shobara Red Cross Hospital, Hiroshima; *Department of Neurosurgery, Hiroshima General Hospital, Hiroshima; **Department of Neurosurgery, Faculty of Medicine, Hiroshima University, Hiroshima*

Abstract

A 72-year-old woman presented with an intradiploic arachnoid cyst in the occipital intradiploic space which was found incidentally by magnetic resonance (MR) imaging. Computed tomography revealed a widened diploic space and thinning of the inner and outer tables of the occipital bone. The cyst appeared as isointense to the cerebrospinal fluid on both T_1- and T_2-weighted images. The differential diagnosis of intradiploic epidermoid cyst could be excluded because the lesion was low intensity on diffusion-weighted MR images. Arachnoid cyst is a benign lesion, so exploratory surgery should be avoided unless the cyst is symptomatic. Diffusion-weighted MR imaging is an effective modality to distinguish diploic epidermoid cysts from arachnoid cysts.

Key words: intradiploic arachnoid cyst, diffusion-weighted magnetic resonance imaging

Introduction

Intradiploic arachnoid cyst (IAC) is very rare lesion, with only 12 previous cases of IACs without antecedent head injury.[1,3,4,8,10,15] Exploratory surgery is usually required to establish the diagnosis. The lesion appears as isointense on both T_1- and T_2-weighted magnetic resonance (MR) imaging, so the differential diagnosis of epidermoid cyst and arachnoid cyst is difficult.[6,14] We encountered a case of IAC in which the diagnosis could be established based on diffusion-weighted MR imaging. The IAC was thought to be innocuous, so exploratory surgery was thought to be unnecessary.

Case Report

A 72-year-old woman was referred to our department because of MR imaging evidence of an abnormal lesion. She had undergone MR imaging to investigate occasional headaches. There was no history of head trauma.

Physical and neurological examinations found no abnormalities. MR imaging showed a cystic lesion in the midline suboccipital area appearing as isointense to the cerebrospinal fluid on both T_1- and T_2-weighted images, with no enhancement by gadolinium (Fig. 1). Computed tomography revealed a mass lesion in a widened diploic space, and thinning of the inner and outer tables of the skull (Fig. 2). There was a small defect in the inner table, and the lesion appeared to communicate with the intracranial space. The MR images performed 20 months earlier were reevaluated, finding that the cystic lesion was present at that time. The size and cystic nature of the lesion were the same at first and second MR imaging, so we considered that the lesion was benign and suspected IAC or intradiploic epidermoid cyst. Diffusion-weighted MR imaging showed the lesion as hypointense (Fig. 3). The diagnosis was IAC, and we considered that the lesion was not related to the occasional headaches of the patient. We determined that the patient should be observed by radiological follow-up examination without exploratory surgery.

Received October 12, 2001; Accepted December 28, 2001

Author's present address: S. Yamaguchi, M.D., Department of Neurosurgery, Faculty of Medicine, Hiroshima University, Hiroshima, Japan.

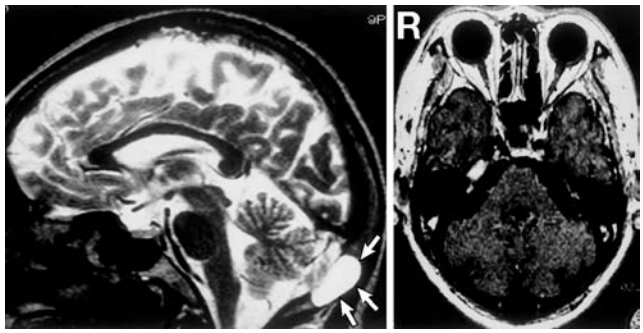

Fig. 1 *left*: **Midsagittal T_2-weighted magnetic resonance (MR) image showing a cystic lesion in the suboccipital region (*arrows*).** *right*: **Axial T_1-weighted MR image with gadolinium revealing no enhancement of the lesion.**

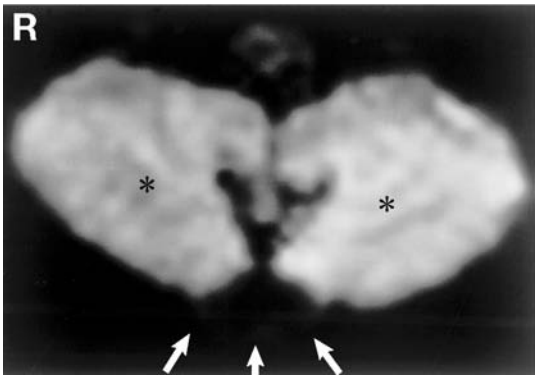

Fig. 3 Magnified diffusion-weighted magnetic resonance image showing the lesion as a low signal intensity mass (*arrows*). *Asterisk marks* indicate the cerebellar hemisphere.

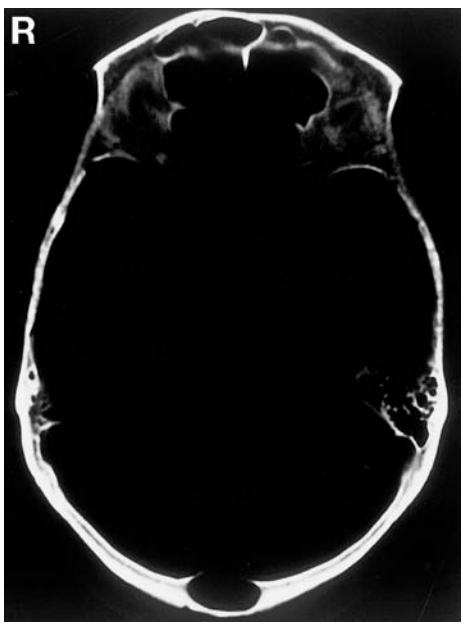

Fig. 2 Bone image computed tomography scan showing the widened diploic space and thinning of the inner and outer tables of the occipital bone, and a bony defect of the inner table in the lesion.

Discussion

The differential diagnosis of osteolytic lesions in the cranial vault includes metastatic bone tumor, multiple myelomas, eosinophilic granuloma, and epidermoid cyst.[8,10,11,15] In our patient, all lesions except epidermoid cyst could be excluded based on the cystic appearance of the lesion and the absence of growth. The characteristic radiological findings of the intradiploic epidermoid cyst are well-demarcated osteolysis, high signal intensity on T_2-weighted images, and varied signal intensity on T_1-weighted images. The signal intensity on the T_1-weighted images depends on the contents of the cyst.[2] The differential diagnosis between arachnoid cyst and epidermoid cyst is difficult, because epidermoid cyst may appear as low signal intensity on T_1-weighted images. Diffusion-weighted MR imaging can be used to differentiate arachnoid cysts from epidermoid cysts.[6,9,14] Epidermoid cyst appears as high signal intensity on diffusion-weighted MR images,[5,12] whereas arachnoid cyst has a low signal intensity. Therefore, the diagnosis for our patient was IAC.

''Intradiploic arachnoid cyst'' was first described in 1989.[15] Slowly-growing intradiploic cystic lesion had been confirmed previously as an arachnoid cyst in the intradiploic space.[4] However, only 12 patients with IAC without past history of head injury have been reported.[1,3,4,8,10,15] This disease is characterized by multiple, parasagittal, well-demarcated osteolytic lesions on radiological examination, commonly located in the suboccipital region of the elderly.[3] These characteristics were quite similar to those of the diploic lesion in our case.

The reason for the occurrence of these lesions in the diploic space remains unclear. Some IACs were associated with former skull fracture.[7,11,13] In most cases, including ours, the patient had no history of head injury.[1,3,4,8,10,15] The 12 previous and the present patients with IAC without antecedent head injury had a mean age of 61.6 years, and all except one[10] were over 50 years (Table 1). The lesion tended to occur in the parasagittal region. Three patients had local pain and one showed proptosis due to the

Table 1 Summary of reported cases of intradiploic arachnoid cysts

Author (Year)	Age/Sex	Multiplicity	Affected bones	Symptoms	Surgery
D'Almeida and King (1981)[4]	61/M	single	rt parietal	no	yes
	53/M	single	rt frontal	no	yes
Weinand et al. (1989)[15]	70/F	multiple	occipital, lt parietal	yes: local pain	yes
	68/F	multiple	occipital	yes: local pain	yes
Hasegawa et al. (1992)[8]	54/F	multiple	occipital	no	yes
	70/F	single	occipital	no	yes
	58/F	multiple	occipital	no	yes
	71/M	multiple	occipital	no	yes
	74/F	multiple	occipital	no	no
Alfieri et al. (1996)[1]	57/F	single	lt frontal	yes: local pain	yes
Asahi et al. (1998)[3]	63/M	single	rt parietal	no	yes
Krupp et al. (1999)[10]	30/M	multiple	rt frontal	yes: proptosis	yes
Present case	72/F	single	occipital	no	no

mass effect. Seven patients were asymptomatic, but exploratory surgeries were performed to obtain a histological diagnosis. Only one diagnosis was based on radiological findings, and the patient could be observed without undergoing surgery. Considering the benign nature of this type of lesion, exploratory surgery should be avoided unless the lesion is symptomatic.[1,15]

Diffusion-weighted MR imaging appears to be the best method to differentiate IAC from intradiploic epidermoid cyst without subjecting the patient to an exploratory surgical procedure.

References

1) Alfieri A, Zona G, Cirillo S, Spaziante R: Intradiploic arachnoid cyst: case report. *Neuroradiology* 38: 569–571, 1996
2) Arana E, Latorre FF, Revert A, Menor F, Riesgo P, Liaño F, Diaz C: Intradiploic epidermoid cysts. *Neuroradiology* 38: 306–311, 1996
3) Asahi T, Endo S, Akai T, Takaba M, Takaku A: Nontraumatic convexity intradiploic arachnoid cyst. Case report. *Neurol Med Chir* (*Tokyo*) 38: 374–376, 1998
4) D'Almeida ACG, King RB: Intradiploic cerebrospinal fluid fistula: report of two cases. *J Neurosurg* 54: 84–88, 1981
5) Dechambre S, Duprez T, Lecouvet F, Raftopoulos C, Gosnard G: Diffusion-weighted MRI postoperative assessment of an epidermoid tumor in the cerebellopontine angle. *Neuroradiology* 41: 829–831, 1999
6) Doll A, Abu Eid M, Kehrli P, Esposito P, Bogorin A, Jacques C, Dietemann JL: Aspects of FLAIR, 3-D CISS and diffusion-weighted MR imaging of intracranial epidermoid cysts. *J Neuroradiol* 27: 101–106, 2000
7) Hande AM, Karapurkar AP: Hemorrhage into an intradiploic arachnoid cyst. Case report. *J Neurosurg* 75: 969–971, 1991
8) Hasegawa H, Bitoh S, Koshino K, Obashi J, Iwaisako K, Fukushima Y: Nontraumatic intradiploic arachnoid cysts. Report of five cases. *Neurol Med Chir* (*Tokyo*) 32: 887–890, 1992
9) Inagaki T, Saito K, Okuyama T, Hirano A, Takahashi A, Inamura S: [A case of diploic epidermoid invading intradurally, which was diagnosed by MR diffusion-weighted image]. *No Shinkei Geka* 26: 917–921, 1998 (Jpn, with Eng abstract)
10) Krupp W, Döhnert J, Kellerman S, Seifert V: Intradiploic arachnoid cyst with extensive deformation of craniofacial osseous structures: case report. *Neurosurgery* 44: 868–870, 1999
11) Lunardi P, Missori P, Artico M, Fortuna A: Posttraumatic intradiploic leptomeningeal cyst in an adult. Case report. *Surg Neurol* 35: 475–477, 1991
12) Murakami N, Matsushima T, Kuba H, Ikezaki K, Morioka T, Mihara F, Inamura T, Fukui M: Combining steady-state constructive interference and diffusion-weighted magnetic resonance imaging in the surgical treatment of epidermoid tumors. *Neurosurg Rev* 22: 159–162, 1999
13) Sartawi M, Schwartz FT, Fox JL: An unusual osteolytic lesion of the skull due to a traumatic arachnoid cyst. *Neuroradiology* 6: 180–181, 1973
14) Tsuruda JS, Chew WM, Moseley ME, Norman D: Diffusion-weighted MR imaging of the brain: value of differentiating between extraaxial cysts and epidermoid tumors. *AJR Am J Roentgenol* 155: 1059–1065, 1990
15) Weinand ME, Rengachary SS, McGregor DH, Watanabe I: Intradiploic arachnoid cysts: report of two cases. *J Neurosurg* 70: 954–958, 1989

Address reprint requests to: S. Yamaguchi, M.D., Department of Neurosurgery, Faculty of Medicine, Hiroshima University, 1–2–3 Kasumi, Minami-ku, Hiroshima 734–8551, Japan.