

1

2                      3                      4

3.

4

: (eosinophilic granuloma)

: 9 9  
 6 - 35 ( :20.5 ) 가 3 , 가 6 .  
 T1 T2 , , (diploic  
 space) , , , ,  
 : (9/9) , 4 , 3 , 2  
 . (9/9) ,  
 . 8 (8/9)  
 T1  
 , T2 7 (7/9) , 1 (1/9)  
 1 (1/9) . 4 (4/9) , 5  
 (5/9) , (9/9)  
 .  
 :

(eosinophilic granuloma)

(tumorlike lesion) 1%

Letterer - Siwe disease, Hand -

Schüller - Christian disease      Langerhans ' cell histio -  
cytosis      (1 - 4).

(1 - 4).

(craniectomy)

가  
(1, 4-6).

(4 - 6) (4, 7)

가 6 9 ( :20.5 ) 가 3 ,

가 (8-10),

1.5T(Gyrosan ACS - NT,  
Philips, Amsterdam, Netherlands) 0.5T(MRT - 50A,  
Toshiba, Nasu, Japan)

T1 (TR/TE 400 - 650 msec/14 - 20 msec),

T2 (TR/TE 3000 - 3500 msec/90 -

120 msec), Gadolinium - DTPA (Magnevist, Schering,

Germany) T1 ,

6 mm, 2 mm .

(diploic space)

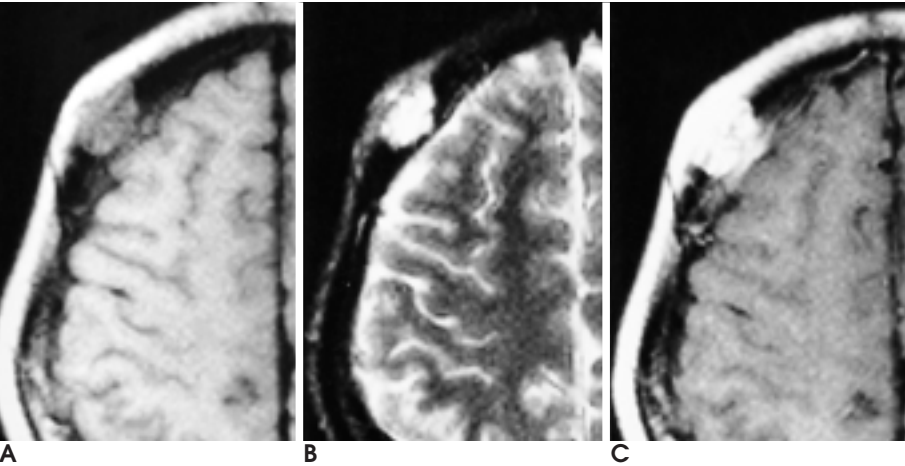
(Fig. 1, 2), 1 (1/9)  
 , 1 (1/9)  
 가 4 (4/9)  
 , 5 (5/9)  
 5 3 (but -  
 ton sequestrum)  
 (Fig. 3). (9/9)  
 (Fig. 1, 2, 3).

Table 1  
 (9/9)  
 4 , 3 , 2 (9/9)  
 , 8 (8/9)  
 (beveled edge)  
 (Fig. 1). (9/9)  
 (9/9) (Fig. 1, 2). 가 (2, 3).  
 T1 4 (4/9)  
 (Fig. 1), 3 (3/9)  
 (Fig. 2) T2 7 (7/9)  
 (curettage)  
 (11).

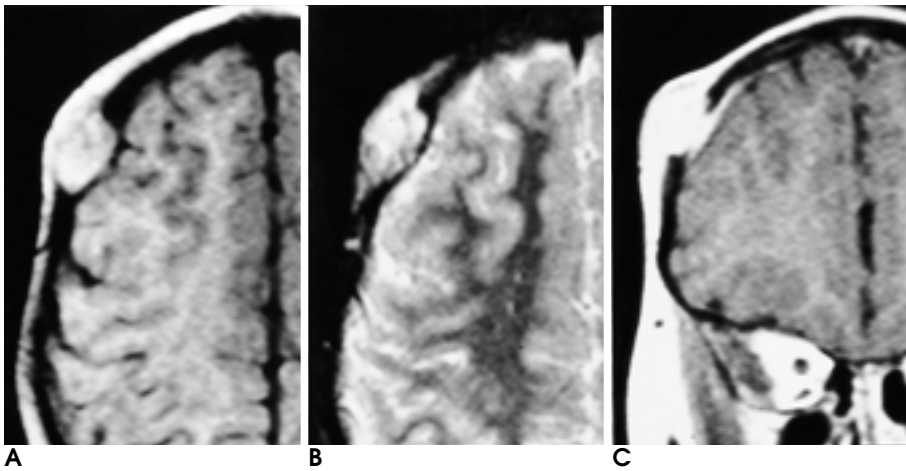
Table 1. Summary of Calvarial Eosinophilic Granuloma

	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8	Case 9
Sex/Age(yrs)	F/34	F/22	F/14	F/7	F/35	M/28	M/24	F/6	M/15
Site	P	F	F	F	F	O	P	O	P
DS involve	Y	Y	Y	Y	Y	Y	Y	Y	Y
Adj. BM change	N	N	N	N	N	N	N	N	N
TZ distinct	distinct	distinct	distinct	distinct	distinct	distinct	distinct	distinct	distinct
Bone destruction	asym-	asym-	asym-	asym-	asym-	asym-	asym-	sym-	asym-
T1 SI	low	low	iso	high	iso	low	low	high	iso
T2 SI	high	high	high	high	iso	high	high	low	high
Enhancement	inhomo-(BS)	homo-	homo-	homo-	inhomo-(BS)	inhomo-(BS)	inhomo-	inhomo-	homo-
Dura enhancement	Y	Y	Y	Y	Y	Y	Y	Y	Y

P: parietal, F: frontal, O: occipital, Y: Yes, N: No, DS: diploic space, Adj.BM: adjacent bone marrow, TZ: transitional zone, asym-: asym-  
 metric, sym-: symmetric, BS: button sequestrum, SI: signal intensity compared with brain cortex, homo-: homogeneous, inhomo-: inho-  
 mogeneous



**Fig. 1.** A 22-year-old woman with eosinophilic granuloma of the right frontal bone.  
**A.** Axial T1-weighted image shows an intradiploic mass hypointense to the gray matter of brain with asymmetric bony destruction.  
**B.** Axial T2-weighted image shows the lesion hyperintense to the gray matter of brain without signal change of the adjacent bone marrow.  
**C.** Gd-enhanced axial T1-weighted image shows strong homogeneous enhancement of the lesion, and the underlying dura is also enhanced.

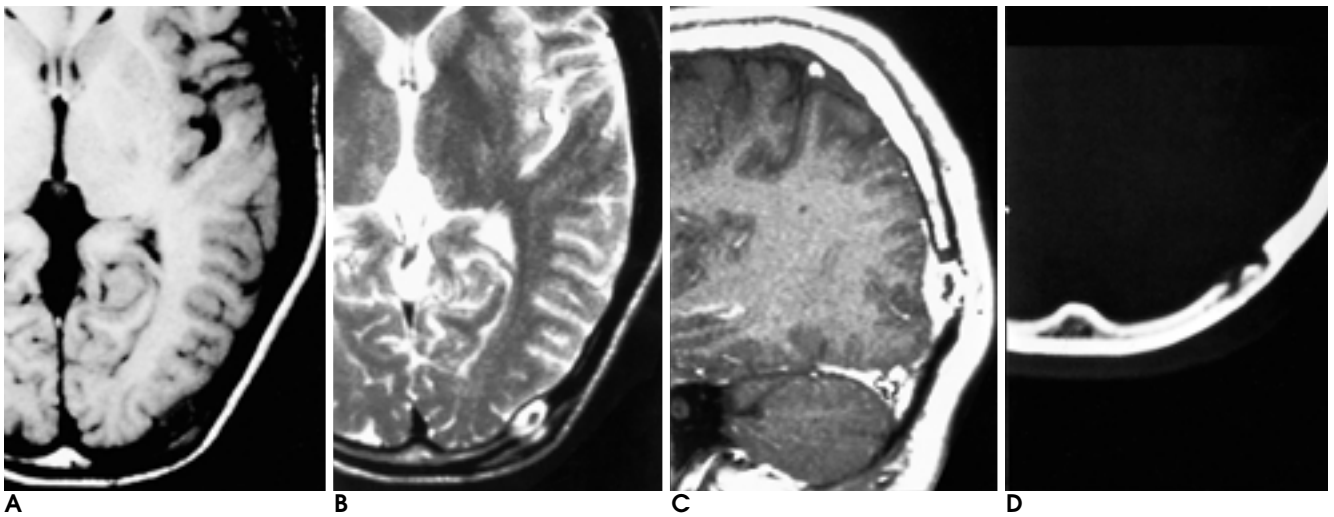


**Fig. 2.** A 7-year-old girl with eosinophilic granuloma of the right frontal bone.

**A.** Axial T1-weighted image shows a well-defined, hyperintense, intradiploic mass.

**B.** Axial T2-weighted image shows hyperintensity of the lesion.

**C.** Gd-enhanced coronal T1-weighted image shows dense homogeneous enhancement of the lesion, distinct transitional zone, and enhancement of the adjacent dura.



**Fig. 3.** A 28-year-old man with eosinophilic granuloma of the left occipital bone.

**A, B.** A well-defined intradiploic mass containing central dark signal intensity shows low signal intensity on T1-weighted image(A), and high signal intensity on T2-weighted image(B).

**C.** Gd-enhanced sagittal T1-weighted image shows heterogeneous enhancement of the lesion with central dark signal intensity, and adjacent dura enhances.

**D.** Precontrast CT scan with bone setting shows an osteolytic lesion with a central high density representing a button sequestrum.

## Histiocytosis X

(8 - 10).

### Langerhans' cell histiocytosis

(1).

가

(3).

가  
(punch - out defect)

Mirra (12)

가

가

,

가

(5,

가

6).

가

(7),

Beltran (9) 16

Mirra

,

가

가

2 가 가 , 가 (13).

가 T1

, T2

Murayama (10) 1 ,

T2 T1 ,

Schepper (8) 11

2

T1 - , T2

- T1 , T2

T1

, T2

Murayama (10)

, Schepper (8)

4

5

3

2

가 가 ,

(radiating trabecular) T1

(13,14),

(13,15)

,

,

1. Resnick D. *Diagnosis of bone and joint disorders*. 3rd ed. Philadelphia: Saunders, 1995:2214-2221
2. Lieberman PH, Steinman RM, Smith J, Pilar GC, Martin SP. Langerhans 'cell granulomatosis. *Am J Surg Pathol* 1996;20:519-552
3. Favara BE. Langerhans 'cell histiocytosis pathobiology & pathogenesis. *Semin Oncol* 1991;18:3-7
4. Stull MA, Kransdorf MJ, Devaney KO. Langerhans 'cell histiocytosis of bone. *Radiographics* 1992;12:801-823
5. David R, Oria RA, Kumar R, et al. Radiologic features of eosinophilic granuloma of bone. *AJR Am J Roentgenol* 1989;153:1021-1026
6. Fisher AJ, Reinus WR, Friedland JA, Wilson AJ. Quantitative analysis of the plain radiographic appearance of eosinophilic granuloma. *Invest Radiol* 1995;30:466-473
7. Mitnick JS, Pinto RS. Computed tomography in the diagnosis of eosinophilic granuloma. *J Comput Assist Tomogr* 1980;4:791-793
8. Schepper AM, Ramon F, Marck EV. MR imaging of eosinophilic granuloma: report of 11 cases. *Skeletal Radiol* 1993;22:163-166
9. Beltran J, Aparisi F, Bonmati LM, Rosenberg ZS, Present D, Steiner GC. Eosinophilic granuloma: MRI manifestations. *Skeletal Radiol* 1993;22:157-161
10. Murayama S, Numaguchi Y, Robinson AE, Richardson DE. Magnetic resonance imaging of calvarial eosinophilic granuloma. *J Comput Assist Tomogr* 1988;12:251-252
11. Rawlings III CE, Wilkins RH. Solitary eosinophilic granuloma of the skull. *Neurosurgery* 1984;15:155-161
12. Mirra JM, Gold RH. *Eosinophilic granuloma*. In Mirra JM ed. Bone tumor. Philadelphia: Lea & Febiger, 1989:1021-1039
13. Arana E, Bonmati LM. CT and MR imaging of focal calvarial lesions. *AJR Am J Roentgenol* 1999;172:1683-1688
14. Bastug D, Ortiz O, Schochet SS. Hemangiomas in the calvaria: Imaging findings. *AJR Am J Roentgenol* 1995;164:683-687
15. Arana E, Latorre FF, Revert A. Intradiplonic epidermoid cysts. *Neuroradiology* 1996;38:306-11

## MR Findings of Calvarial Eosinophilic Granuloma<sup>1</sup>

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**Purpose:** The purpose of this study was to evaluate the MR findings of calvarial eosinophilic granuloma.

**Materials and Methods:** We reviewed the MR imaging studies of nine patients [M:F = 3:6, aged 6 - 35 (mean, 20.5) years] with pathologically proven eosinophilic granuloma in the calvaria. The findings were evaluated for involvement of the diploic space, changes in adjacent bone marrow, distinction of the transitional zone, pattern of bone destruction, signal intensity and contrast enhancement of the tumor, and contrast enhancement of the adjacent dura.

**Results:** All lesions involved the diploic space, showed no change in adjacent bone marrow, and had a distinct transitional zone. In most (8/9) cases there was asymmetric bony destruction. On T1-weighted images, signal intensities of the tumors varied, while on T2-weighted images, hyperintensity was observed in seven cases, isointensity in one, and hypointensity in one. After the administration of contrast material, enhancement was homogeneous in four cases and inhomogeneous in five. Enhancement of the adjacent dura was demonstrated in all nine cases.

**Conclusion:** The characteristic MR findings of calvarial eosinophilic granuloma are variable signal intensity on T1WI, high signal intensity on T2WI, and marked contrast enhancement; in addition, there is a distinct transitional zone, asymmetrical bony destruction, and associated dural enhancement.

**Index words :** Skull, MR

Histiocytosis

Bone neoplasms, MR

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