

1

2

3

4

(phase)

14

, 18

1

35 (

10.8 )

, 6

8

. 18

3

15

, Mirra(1)

3

3

15

Mirra

8

, 5

, 2

1

T1

, T2

가

3

, 1

2

가

가

가

가

(2),

(tumor-like condition) 1%

5 15

(1-4).

Mirra

가

(1).

가

(magnetic resonance imaging,

'MRI'

(critical organ)

)

가

(5-7).

18

(proliferative phase)

Mirra(1)

MRI

(granulomatous phase),

(xanthomatous phase)

1  
2  
3  
4

1999 2 10

1999 4 15

1993 6

1998 10

MR

18 가 8 , 가 6  
1 35 ( 10.8 )  
3 , , , ,  
2 , , , 1 3

MR 1.5T Magnetom(Siemens, Erlangen, Germany),  
1.5T Sigma(GE, Milwaukee, U.S.A.), 1.0T Impact(Siemens,  
Erlangen, Germany), 0.5T Gyroscan T5-II(Philips,  
Netherlands) T1 500-800ms/15-40ms  
(TR/TE), T2 1500-4000ms/80-110ms(TR/TE)  
, 0.1mmol/kg gadopentatate dimeglumine(Gd-  
DTPA)(Schering, Berline, Germany)

Mirra(1)  
(tran-  
sition zone)가 (sclerotic rim)가  
, 가  
가 T2  
가  
(1).  
MRI  
, 가 2cm  
(mild), 2-4cm (moderate), 4cm (severe)  
가

(Table 1). T1

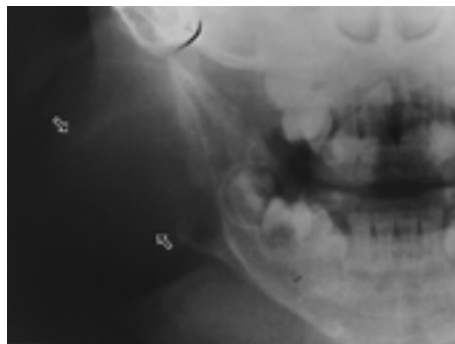
T2

T2

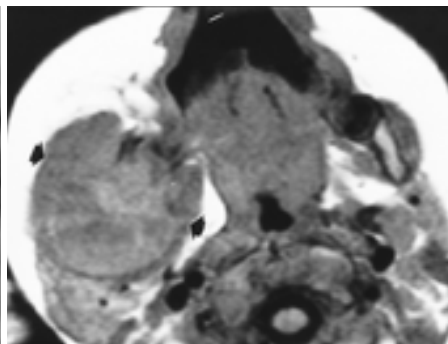
2 가

(Fig. 3).

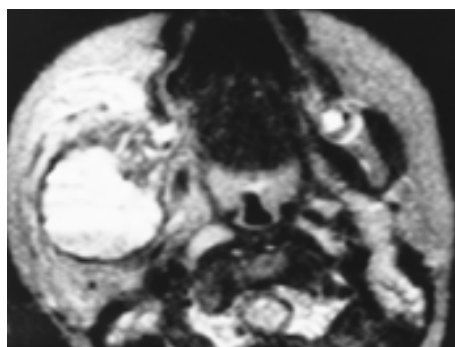
가 8 , 가 5 , 가 2  
15 12  
1  
15  
가 8 6  
(Fig. 1), 3  
가 5  
(Fig. 2), 2  
가



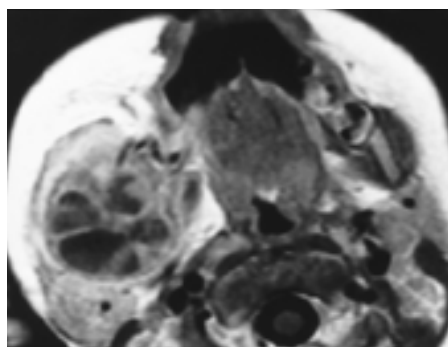
A



B



C



D

Fig. 1. Eosinophilic granuloma in 2-year-old child with an early phase.

A. Conventional radiography shows cortical destruction with an out-bulging soft tissue mass (open arrows) at right mandibular ramus.

B. T1-weighted axial section. Iso signal intensity with inhomogeneous lesion (arrows) is seen in the posterior aspect of destroyed mandibular ramus.

C. T2-weighted axial section. Multiple fluid-fluid levels are seen within the lesion.

D. Enhanced T1-weighted axial section. Contrast enhancement is demonstrated in parts of the lesion and adjacent swollen tissue.

8 4 , 4 가 1  
5 2 , 3 16  
2 3 MRI 가 3 1  
(Fig. 4) 2

Table 1. MRI Findings of Eosinophilic Granuloma

No	Sex/ Age	Location	Phase	MRI Manifestation				
				T1WI	T2WI	Enhancement	Marrow Edema	Soft Tissue Reaction
1	F/1	ileum	early	I (het)	H (het)	moderate (het)	mild	moderate
2	M/2	clavicle, D	early	I (hom)	H (hom)	marked (hom)	mild	moderate
3	M/2	femur, D	early	I (hom)	H (het)	moderate (het)	mild	severe
4	M/7	femur, DM	early	H (het)	H (het)	moderate (het)	mild	severe
5	M/2	mandible	early	I (het)	H (het)	marked (het)	mild	severe
6	M/17	maxilla	early	I (het)	H (het)	marked (het)	mild	severe
7	M/2	ulnar, D	early	I (hom)	H (hom)	marked (hom)	mild	moderate
8	F/3	femur, D	early	I (het)	H (het)	marked (het)	severe	moderate
9	F/3	skull	mid	I (hom)	H (hom)	marked (hom)	mild	mild
10	M/35	skull	mid	I (hom)	H (hom)	moderate (hom)	mild	mild
11	F/3	tibia	mid	I (hom)	H (het)	moderate (het)	mild	moderate
12	F/4	ulnar, M	mid	H (hom)	H (hom)	moderate (het)	mild	moderate
13	F/31	scapular	mid	I (hom)	H (hom)	marked (hom)	mild	mild
14	M/27	ileum	late	H (hom)	H (hom)	moderate (hom)	mild	mild
15	F/6	tibia, D	late	I (hom)	H (hom)	moderate (hom)	mild	mild

D, diaphysis; M, metaphysis; H, high signal intensity; I, iso signal intensity;

L, low signal intensity; hom, homogeneous; het, heterogeneous.

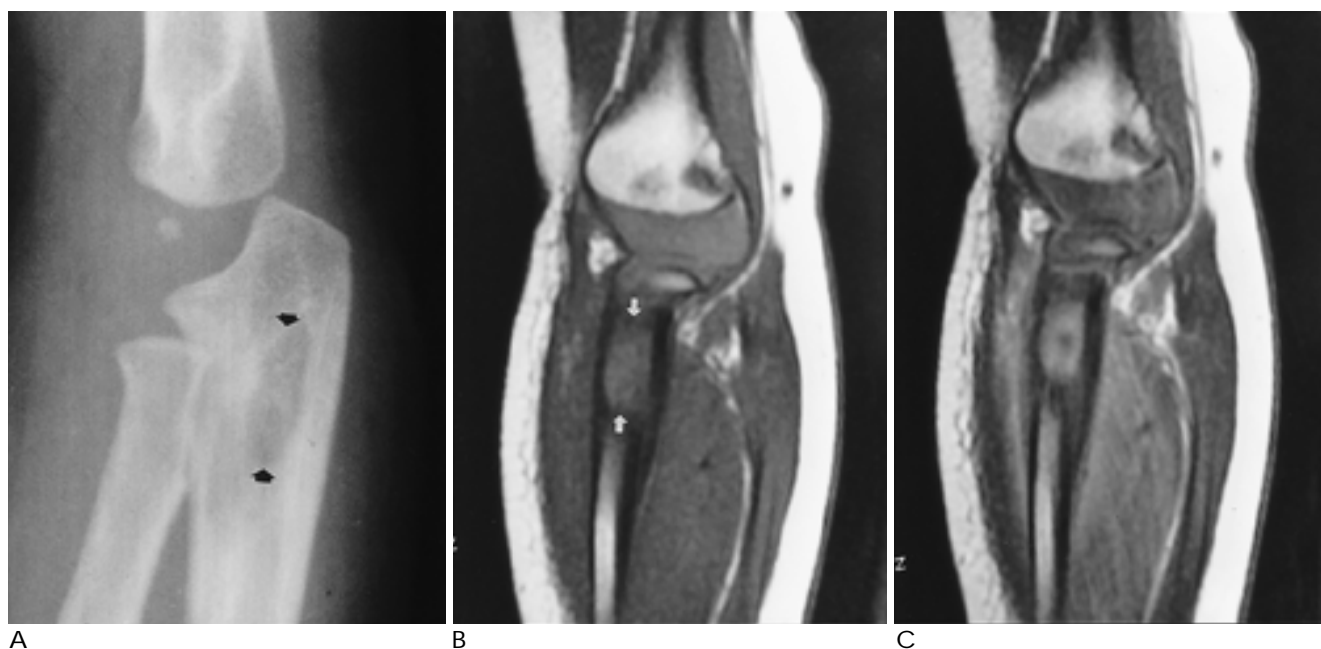


Fig. 2. Eosinophilic granuloma in 2-year-old child with a mid-phase.

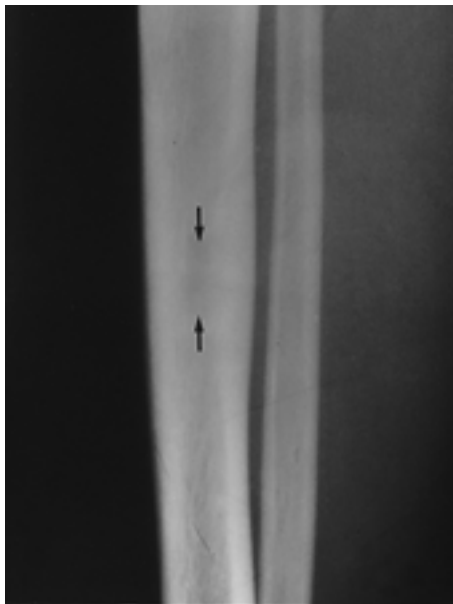
A. Conventional radiography shows oval osteolytic lesion (arrows) with one layer of periosteal lamellation in metaphysis of proximal ulnar.

B. T1-weighted coronal image, the lesion (white arrows) shows homogeneous iso-signal intensity with ill defined margin.

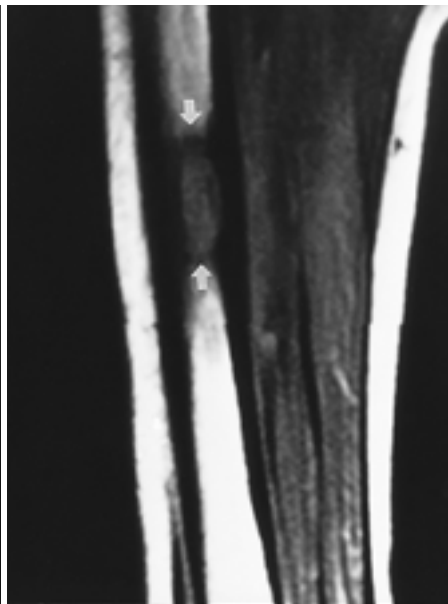
C. Enhanced T1-weighted coronal image shows contrast enhancement in part of the lesion except for central necrotic region, and adjacent soft tissue shows mild swelling.

Table 2. MRI Findings of Eosinophilic Granuloma in Spines

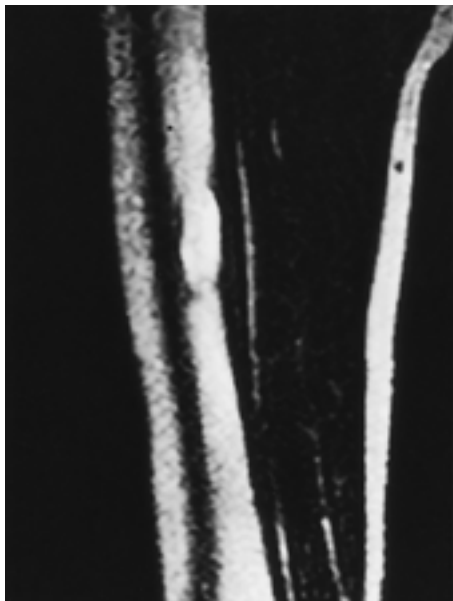
No	Sex/Age	Location	Soft tissue reaction	Cord compression
1	F/2	T8	minimal	-
2	M/6	T4	minimal	-
3	M/8	T6	severe	+



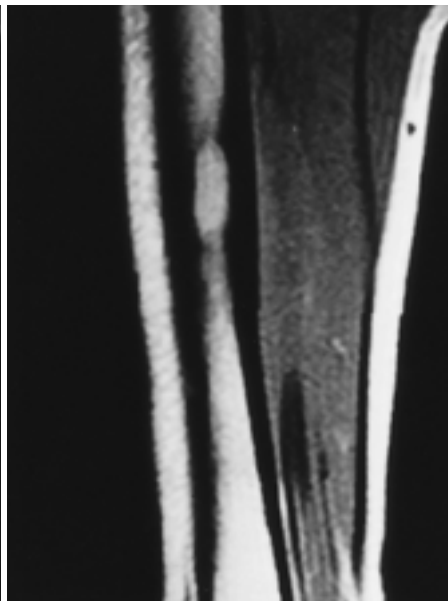
A



B



C



D

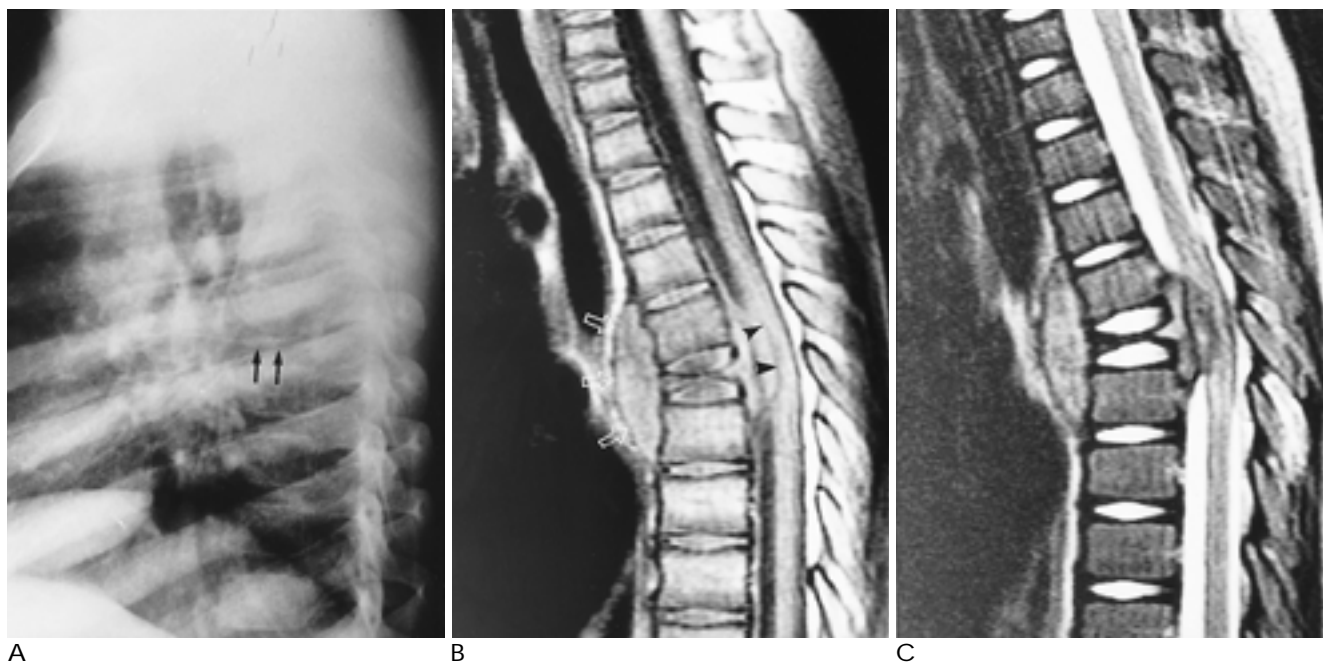
Fig. 3. Eosinophilic granuloma in 6-year-old child with a late phase.

A. Conventional radiography shows ill-defined low density lesion (arrows) with cortical thickening in mid-diaphysis of tibia.

B. T1-weighted sagittal image, the lesion (white arrows) shows oval shaped homogeneous iso-signal intensity.

C. T2-weighted sagittal image, the lesion shows homogeneous high signal intensity.

D. Enhanced T1-weighted sagittal image, well contrast enhancement is demonstrated in the lesion.



A B C  
Fig. 4. Eosinophilic granuloma in 8-year-old child with vertebra plana  
A. Conventional radiography shows total collapse of T6 vertebral body (arrows).  
B,C. T1-weighted after IV gadolinium injection(B) and T2-weighted(C) sagittal scan show paravertebral soft tissue swelling (open arrows) and cord compression (arrowheads).

가  
(8, 12-14) 가  
. Davis (13) 9 2  
(dystrophic calcification)  
Davis (13) 9 8  
가  
가  
5, Fig. 1) ( 6)  
( 1)  
1 ( 3) 가  
(2),  
8 6 가  
(inflammatory infiltration or edema)  
가 (16). Monroc (12)  
(17).  
(5, 17).  
가  
가  
MR (16).

가

MR

T1

, T2

가

가

가

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

Jong O Choi, M.D., Mi Kyeong Yee, M.D., Kil Ho Cho, M.D.<sup>1</sup>,  
Sung Moon Lee, M.D.<sup>2</sup>, Young Hwan Lee, M.D.<sup>3</sup>, Kyung Jin Suh, M.D.<sup>4</sup>

<sup>1</sup>Department of Diagnostic Radiology, College of Medicine, Yeungnam University,

<sup>2</sup>Department of Diagnostic Radiology, College of Medicine, Keimyung University,

<sup>3</sup>Department of Diagnostic Radiology, College of Medicine, Hyosung Catholic University,

<sup>4</sup>Department of Diagnostic Radiology, College of Medicine, Suh-Joo MR Clinic, Taegu, Korea

**Purpose :** To describe the MR findings for the three phases of eosinophilic granuloma, as defined by Mirra 's conventional radiographic criteria.

**Materials and Methods :** Eighteen lesions in 14 patients with proven eosinophilic granuloma were retrospectively analyzed. Among this total, three vertebral lesions were excluded, and the remaining is were classified as early, middle, or late phase on the basis of Mirra 's radiographic criteria. For each phase, we compared MR findings with regard to signal intensity, homogeneity, contrast enhancement, perilesional marrow edema, and soft tissue change. For the three vertebral lesions excluded because the application of radiographic criteria was difficult, MR findings for paravertebral soft tissue reaction and degree of cord compression were compared.

**Results :** Of the fifteen cases classified, eight were early phase, five were mid phase, and two were late phase. During each phase, all lesions except one, as seen on T1-weighted images(T1W1), showed iso-signal intensity. On T2WI, all lesions showed high signal intensity. Contrast study demonstrated marked contrast enhancement. Thus, no remarkable differences were found in the signal intensity degree of contrast enhancement of each phase. With regard to heterogeneity, this was demonstrated in most early phase lesions, reflecting necrosis and hemorrhage of those lesions. Soft tissue swelling was more severe during the early phase than the mid or late phase, but marrow edema was similar in each of the three phase. One of three patients with vertebra plana showed para-vertebral soft tissue swelling and cord compression, but this was not seen in the two other cases.

**Conclusion :** For evaluating the extent of eosinophilic granuloma and its relationship with surrounding structures, MRI was superior to conventional radiography. During the early phase of the disease, lesions showed greater inhomogeneity and more aggressive soft tissue reaction than during the mid and late phase. The use of MRI for the evaluation of eosinophilic granuloma can help decide a therapeutic plan of action and follow up evaluation.

**Index words:** Bone, neoplasms, MR  
Histiocytosis

Address reprint requests to : Jong O Choi, M.D., Department of Diagnostic Radiology, Collage of Medicine, Yeungnam University  
# 317-1 Daemyung-Dong, Nam-Ku, Taegu 705-717, Korea.  
Tel. 82 - 53 - 620 - 3030 Fax. 82 - 53 - 653 - 5484