．

． ． ．[1,2]． ． ． ．[3]． ．[4]

：

．

： 23

3

， ， ．

4 ． T2

Fisher's exact test ．

： 10 ， 6 7

． 11 ． 10 6

T2 ， 2 ， 2

． 7 3 T2

， 3 - ， 1

．

： ．

T2 -

．

MRI T2

， 10 - 20 ．

(apophysis) (1).

(2). MRI 27

23

(3). ， ， ． 17 ， 6 ，

(4) 12 46 21.4 ．

(MRI) ， MRI 12

， T2 T1 (TR/TE, 180-

683 msec/12- 30 msec) T2 (TR/TE, 1600- 5083

(2- 4). msec/60- 119 msec) Gadolinium- DTPA

T1 ．

10 fat saturation ．

T2

Table 1. Patient, MR Signal, and Enhancement Pattern in Chondroblastoma

Sex/Age	Location	T1WI	T2WI	Enhancement	Bone marrow enhancement	Fat saturation	Fluid-fluid level
/16	temporal fossa	low	low	homo	(-)	no	no
/19	proximal humerus	low	low	homo	(-)	no	no
/17	proximal fibula	iso	low	homo	(+ +)	no	no
/18	distal femur	iso	hetero	homo	(+)	yes	no
/16	proximal humerus	iso	iso	homo	(+ + +)	no	no
/16	proximal tibia	low	hetero	homo	(+ + +)	yes	no
/15	proximal tibia	high	low	homo	(+ +)	yes	no
/15	proximal tibia	high	iso	homo	(+ + +)	no	no
/21	proximal tibia	high	high	homo	(-)	no	no
/32	patella		high	homo	(+ + +)	yes	no
/19	proximal humerus	low	low	pph. Rim	(+ +)	yes	no
/46	mandible condyle	iso	high	pph. Rim	(-)	no	no
/24	distal femur	low	high	pph. Rim	(-)	no	no
/31	patella	low	high	pph. Rim	(-)	yes	no
/22	proximal femur	high	hetero	pph. Rim	(+ +)	yes	yes
/23	talus	high	hetero	pph. Rim	(-)	yes	yes
/27	capitulum	high	hetero	pph. Rim (septum)	(-)	no	yes
/12	talus	hetero	hetero	hetero	(-)	no	no
/15	proximal tibia	high	low	hetero	(+ +)	no	no
/14	distal femur	high	high	hetero	(+ + +)	no	no
/21	proximal humerus	high	hetero	hetero	(-)	no	yes
/23	proximal femur	low	hetero	hetero	(-)	yes	no
/31	distal femur	high	high	hetero	(-)	yes	no

pph: peripheral, homo: homogeneous, hetero: heterogeneous, (+ + +): strong, (+ +): moderate, (+): mild, (-): none
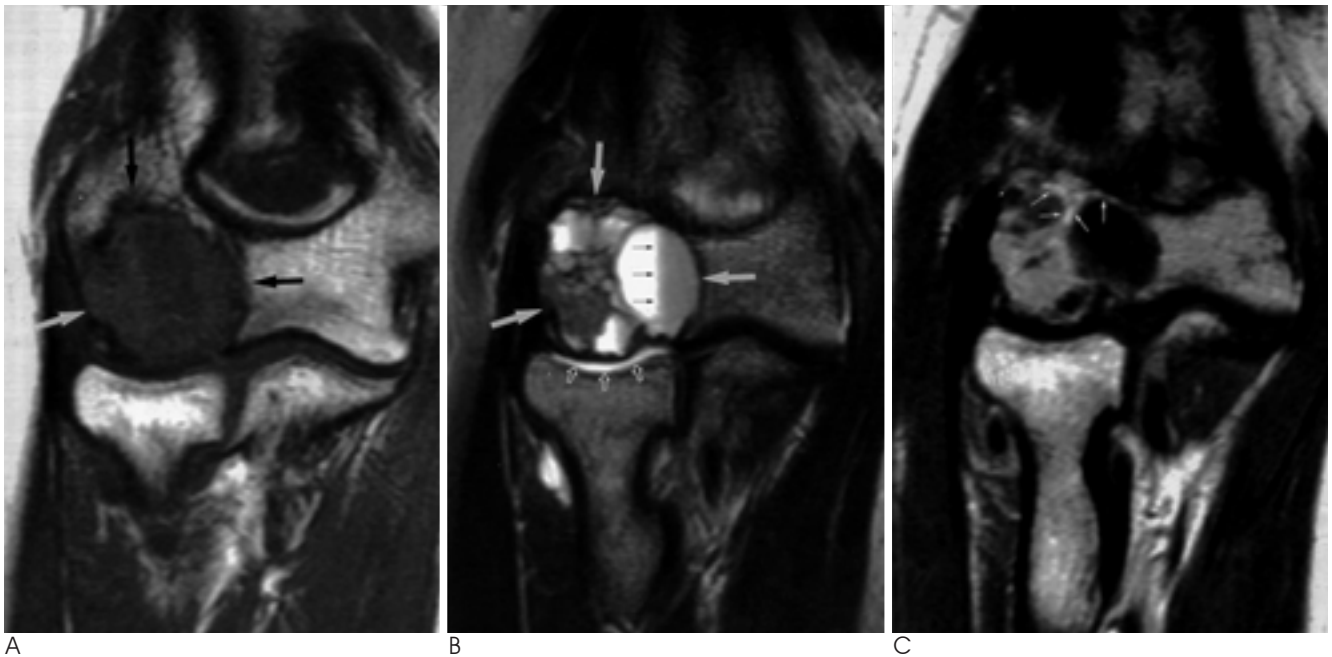

Fig. 1. Coronal MR images show a small, multi-loculated mass in the capitulum of the right humerus in a 27-year-old woman.
A. T1-weighted image reveals homogeneously iso signal intensity (arrows) compared with muscles.
B. T2-weighted image reveals heterogeneous signal intensities (arrows) with fluid-fluid levels (small arrows) in the small multi-lobular mass lesion. Joint effusion (hollow arrows) is observed.
C. Gadolinium-enhanced T1-weighted image reveals interlobular septal enhancement (small arrows).

(-   )   .

2/3   +++, 1/3

++, 1/3   +   23   10

.   Fisher's exact test   (43.5%),   7 (30.4%)   6

.   (26.1%)   .

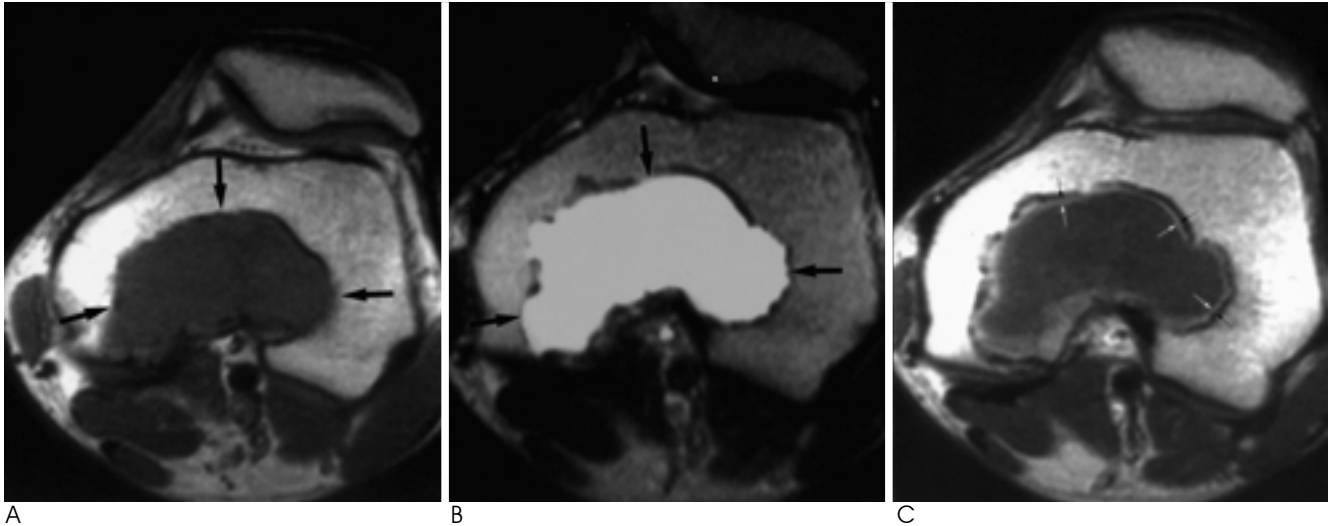A   B   C

Fig. 2. Axial MR images show a lobulated mass in the left distal femur in a 24-year-old man.
A. T1-weighted image reveals homogeneously iso signal intensity (arrows) compared with muscles.
B. T2-weighted image reveals homogeneously high signal intensity (arrows) compared with bone marrow.
C. Gadolinium-enhanced T1-weighted image reveals peripheral rim enhancement (small arrows).

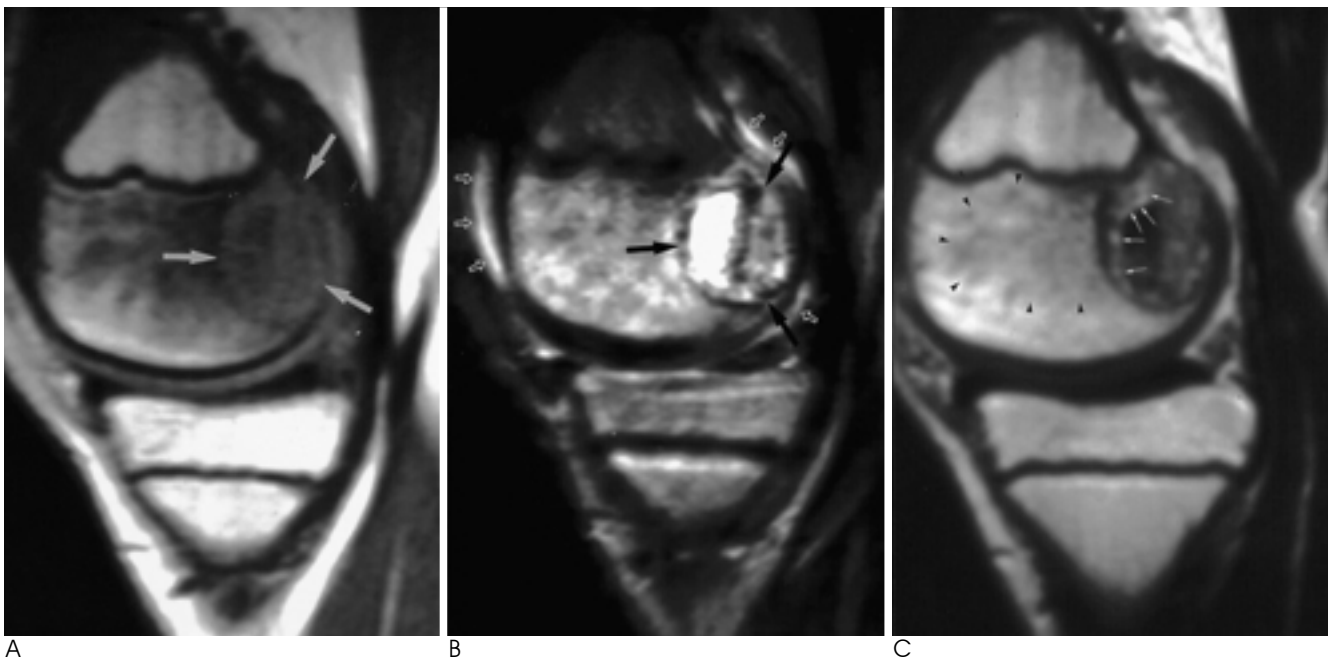A   B   C

Fig. 3. Sagittal MR images show a lobular mass in the left distal femur in a 14-year-old boy.
A. T1-weighted image reveals high signal intensity (arrows) compared with muscles.
B. T2-weighted image reveals high signal intensity (arrows) compared with bone marrow. Joint effusion (hollow arrows) is observed.
C. Gadolinium-enhanced T1-weighted image reveals heterogeneous enhancement (small arrows). Strong bone marrow enhancement (arrow heads) is observed.
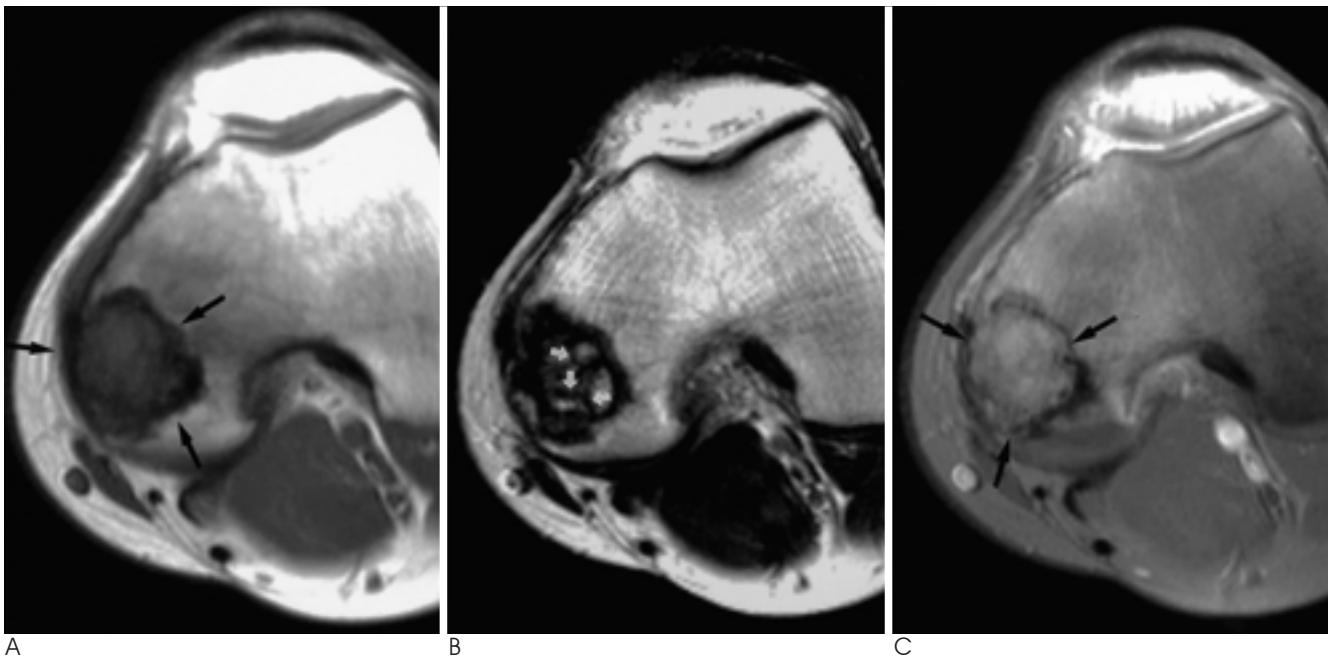
A   B   C

Fig. 4. Axial MR images show a lobular mass with internal septa in the left distal femur in a 18-year-old boy.
A. T1-weighted image reveals homogeneously iso signal intensity (arrows) compared with muscles.
B. T2-weighted image reveals a heterogeneous signal intensity mass with septation (short arrows).
C. Gadolinium-enhanced T1-weighted image reveals homogeneous enhancement (arrows).

10   6   T2   (1).
      , 2   ,   2
         .   7   (1, 2).
   3   T2   15- 20%
, 3   -   , 1
                  .   .
   6   3   T2
   , 2   ,   1   (1).
           .   Jee (2)   22   59% (13/22)
   23   11   (47%)   (+ : 1, + + : 6, + + + : 4)   41% (9/22)
       7   T2
           , 4   .
   .   10   ,   -   4   30.4% (7/23)   Jee
         .   3   7   3
     .   T2   3
      Fisher's exact test   -
          T2   .
       ,   T2   T2
        ,
T2   Jee (2)
       -               (p< 0.05).   45% (10/22), Weatherall (3) 70% (14/20),
               Oxtoby (4)   100% (12/12)
            .   Cohen (5)
           (hypercellularity)
      ,   ,   ,   (   ),
            .

T2

MRI T2

(2)

(hypercellularity),

23

Hudson (6) Hayes (7)

T2

MRI

-

T2

Brower (8)   ,

,   53% (96/181),

15% (5/33)   47% (101/214)

.   T2

41% (7/17),   0% (0/6),

30% (7/23)   Brower

Weatherall (3)

,   MRI

,

(enchondroma),

(chondromyxoid fibroma)

(giant cell tumor)   MRI

,   ,

(eosinophillic granuloma),   (lym-

phoma),   (giant cell tumor),

(osteoblastoma)   T2

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MR Findings of Chondroblastoma with Emphasis on Enhancement Pattern[1]

Kyung Joong Oh, M.D., Sung Hye Go, M.D., Gyung kyu Lee, M.D., Jung Eun Kim, M.D.[1,2],
Jung-A Choi, M.D., Chang Min Park, M.D., Seung Hong Choi, M.D., Jung Mo Ahn, M.D.[3],
Sung Moon Kim, M.D.[4], Heung Sik Kang, M.D.

[1]Department of Radiology, Seoul National University College of Medicine, and the Institute of Radiation Medicine, SNUMRC
[2]Department of Radiology, Kangnam Sacredheart Hospital, College of Medicine, Hallym University
[3]Department of Radiology, Samsung Medical Center, Sungkyunkwan University College of Medicine
[4]Department of Radiology, Asan Medical Center, Ulsan University College of Medicine

Purpose: To analyze the MR findings of chondroblastoma and peritumoral bone marrow, focussing on the enhancement pattern.

Materials and Methods: Enhanced MR images obtained from 23 patients with pathologically proven chondroblastoma were retrospectively reviewed by three radiologists. The enhancement pattern was classified as one of three types: homogeneous, heterogeneous, or peripheral rim, while peritumoral bone marrow enhancement was assigned one of four grades. Correlation between the enhancement pattern and T2 signal intensity of a tumor was analyzed by Fisher's exact test.

Results: The enhancement pattern was homogeneous in ten cases, heterogeneous in six, and involved the peripheral rim in seven. In 11 cases, peritumoral bone marrow enhancement was observed. Among the ten instances of homogeneous enhancement the signal intensity seen at T2WI was homogeneously iso or low in six cases, homogeneously high in two, and heterogeneous in two. Among the seven cases in which there was peripheral rim enhancement, the signal intensity observed at T2WI was homogeneously high in three, fluid-fluid level in three, and homogeneously iso or low in one.

Conclusion: At MR imaging, chondroblastoma shows variable signal intensities and enhancement patterns. The peripheral rim enhancement observed at T2WI correlated with homogeneously high signal intensity or fluid-fluid levels.

Index words : Chondroblastoma
Magnetic resonance (MR)
Images, enhancement

Address reprint requests to : Heung Sik Kang, M.D., Department of Radiology, Seoul National University College of Medicine,
and the Institute of Radiation Medicine, SNUMRC, 28 Yeongeon-dong, Jongno-gu, Seoul 110-744, Korea.
Tel. 82-2-760-3217   Fax. 82-2-743-6385   E-mail: kanghs@radcom.snu.ac.kr