

Distal Femoral Cortical Irregularity :

1

2

3

distal femoral cortical irregularity(DFCI)

DFCI

25

120 (25-62)

5

DFCI

, DFCI

1 , 가

2 , 가

3

: 116 (97%)

DFCI가

. DFCI

3.7mm

(4.1mm)

(3.1mm)

75 (65%),

41 (35%)

1 45 (39%)

31 , 2

52 (45%)

38 , 3

19

(16%)

47

가

. DFCI

가

: DFCI

DFCI

(long bone)

Keats metaphyseal cor-

58

DFCI

(5).

tical irregularity

DFCI

DFCI

(1). 가

distal femoral

cortical irregularity(DFCI)

(2-5),

(medial

head of gastrocnemius muscle)

1996 8

1998 7

25

120 (68 , 52 , 25-71 , 40)

, 5

. DFCI CT

Suh 20

89

100

(31-52 , 42)

5

DFCI가

¹ 가
² 가
³ 가

1998 11 4

1999 6 4

1.5T

(Signa Horizon;General Electrics,

Milwaukee, WI, U.S.A.)

(TR/TE/ETL = 2000/14msec/5) T2 (TR/TE/ETL = 3500-4000/85-102msec/12-16)

18 × 18cm, 16 × 16cm

512 × 256matrix size, 4.5mm 2 excitation

5

T2

(true cortex) DFCI (Fig. 1).

DFCI DFCI DFCI

가

가

가

DFCI

t-test

120 116 (97%) DFCI가

4

T1 T2

(Fig. 1). DFCI 3.7mm

2-5mm

(p<0.05), 5

(Table 1).

(Fig. 1, 2B) 75 (65%), (Fig. 2A) 41 (35%)

3 47

(Table 2).

가

가

Table 1. Thickness of Distal Femoral Cortical Irregularity

Thickness (mm)	Male (n= 66)	Female (n= 50)	Total (n= 116)
2	4	12	16
3	15	22	37
4	29	16	45
5	13	0	13
6-9	5	0	5
Mean thickness	4.1 mm	3.1 mm	3.7 mm

Table 2. Three Types of Inner Cortex (N= 116)

Type	Cases(%)	Mean age
Type 1	45(39%)	31
Type 2	52(45%)	38
Type 3	19(16%)	47

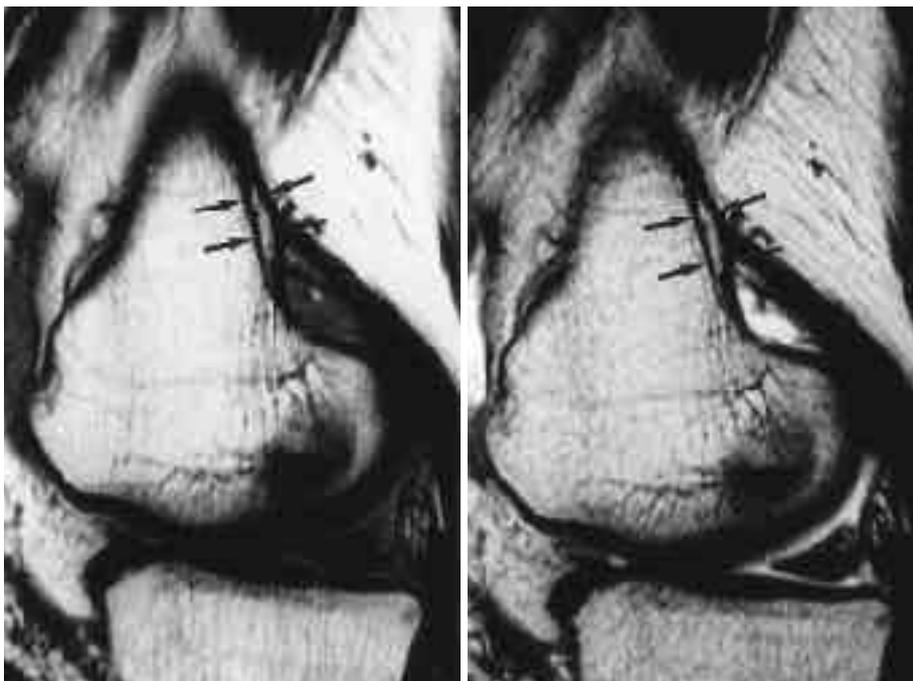


Fig. 1. Sagittal MR images reveal double cortical line (arrows) at attachment site of the medial head of gastrocnemius muscle. The intervening area shows same signal intensity to adjacent bone marrow on both proton density-weighted (A) and T2-weighted images (B).

A

B

가

(Fig. 3).

regularity

cortical desmoid, avulsive cortical ir-
, CT

가

DFCI

DFCI

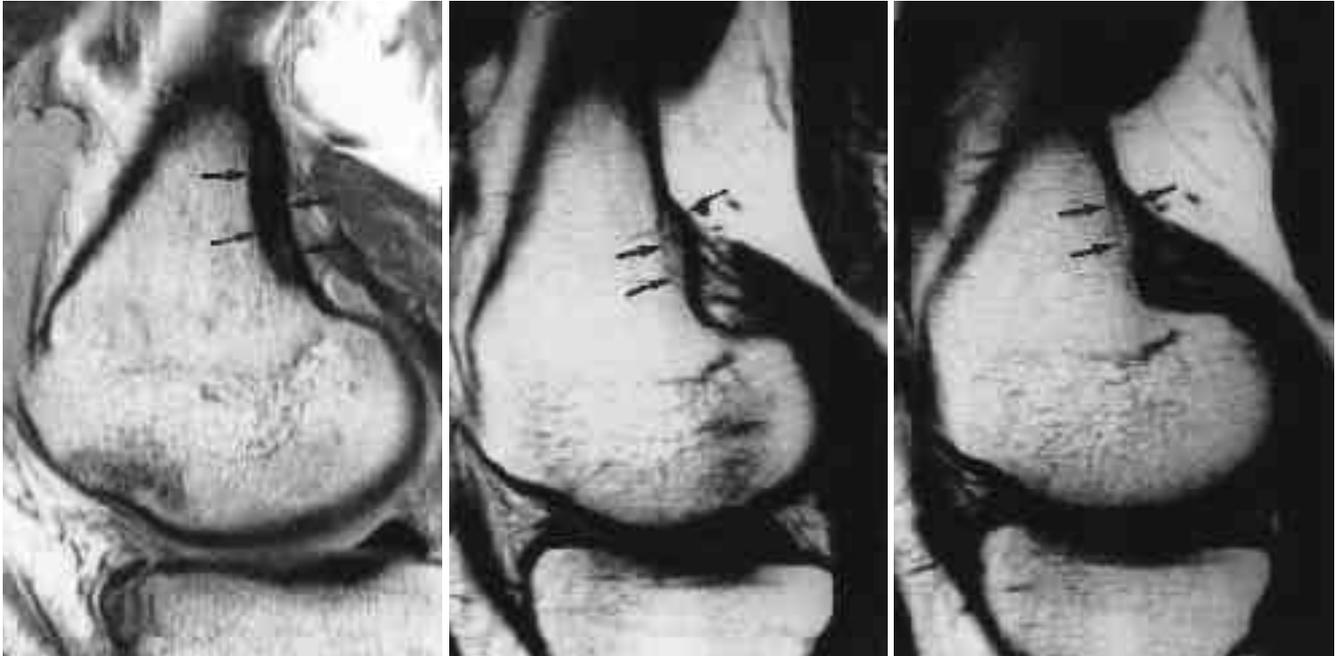


Fig. 2. Proton density-weighted sagittal MR images.
 A. Thick-continuous inner cortex and flat outer cortex.
 B. Thin-continuous inner cortex and convex outer cortex.
 C. Thin-discontinuous inner cortex and convex outer cortex.

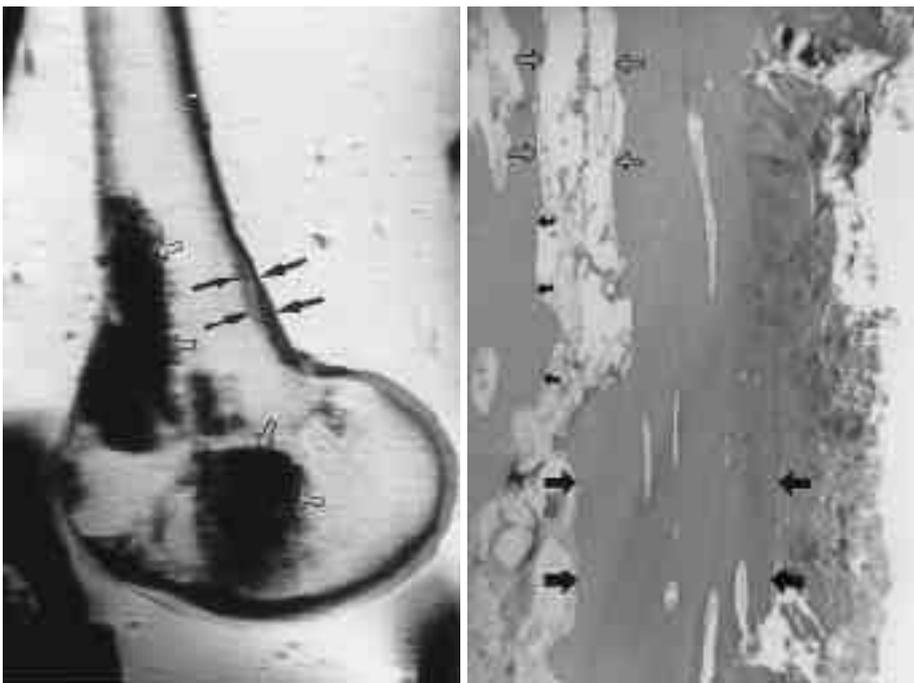


Fig. 3. A . Proton density-weighted im-
 age of cadaveric femur reveals double
 cortical line (arrow). Areas of dark sig-
 nal intensity represent postmortem
 change (open arrow).
 B. Microscopic finding show outer
 compact bone (true cortex) (large ar-
 row), inner compact bone (small ar-
 row), and intervening normal marrow
 (open arrow) (H & E, x 100)

A

B

Suh 100 58 9mm DFCI가 2-
 89 100 58 9mm DFCI가 2-
 DFCI (concave) Suh 43 (convex) 5 6mm
 10 (divergent)
 가 DFCI 가 가
 가 58% DFCI D-
 FCI가 512 x 256
 2 3
 DFCI 가 , , ,
 가
 DFCI T1
 , T2
 CT (46). DFCI DFCI 가 (9)
 T1 T2 DFCI 가 DFCI
 DFCI
 (2,4), DFCI DFCI
 가
 DFCI
 (2),
 가
 가
 DFCI 가 가
 가 가
 DFCI
 가
 가 가
 DFCI
 (7,8),

1. Keats TE, Joyce JM. Metaphyseal cortical irregularities in children: A new perspective on a multi-focal growth variant. *Skeletal Radiol* 1984;12:112-118
2. Resnick D, Greenway G. Distal femoral cortical defects, irregularities, and excavations. *Radiology* 1982;143:345-354
3. Pennes, DR, Braunstein EM, Glazer GM. Computed tomography of cortical desmoid. *Skeletal Radiol* 1984;12:40-42
4. Yamazaki T, Maruoka S, Takahashi S, et al. MR findings of avulsive cortical irregularity of the distal femur. *Skeletal Radiol* 1995; 24:43-46
5. Suh JS, Cho JH, Shin KH, et al. MR appearance of distal femoral cortical irregularity. *J Comput Assist Tomogr* 1996;20(2) :328-332
6. Sklar DH, Philips JJ, Lachman RS. Case report 683. *Skeletal Radiol* 1991;20:394-396
7. Dunham WK, Marcus NW, Enneking WR, et al. Developmental defects of the distal femoral metaphysis. *J Bone Joint Surg [Am]* 1980;62:801-806
8. Bernasek TL, Sim FH, Wold LE, et al. Avulsive cortical irregularities. *Orthopedics* 1987;10:1423-1425
9. Spaeth HJ, Chandnani VP, Beltran J, et al. Magnetic resonance image detection of early experimental periostitis. *Invest Radiol* 1991; 26:304-308

Distal Femoral Cortical Irregularity in Adult : MR Imaging and Pathologic Correlation¹

Sang Hoon Shin, M.D., Young Hwan Lee, M.D., Hyeun Yong Jang, M.D., Young Chan Park, M.D.,
Nak Kwan Sung, M.D., Duck Soo Chung, M.D., Ok Dong Kim, M.D.,
Chang Ho Jo, M.D.², In Hwan Song, M.D.³

¹Department of Radiology, Catholic University of Taegu-Hyosung College of Medicine

²Department of Pathology, Catholic University of Taegu-Hyosung College of Medicine

³Department of Anatomy, Catholic University of Taegu-Hyosung College of Medicine

Purpose : To correlate the pathologic and MR findings of distal femoral cortical irregularity(DFCI) in adult.

Materials and Methods : We retrospectively reviewed knee MR images of 120 adult patients(25-62 years old) without infection, tumor, or fracture. Five femoral specimens of adult cadaver were used to correlate pathologic and MR findings. A ' double cortical line ' on MR images was interpreted as DFCI, and MR findings were analyzed to determine the thickness, internal signal intensity, location of the DFCI, shape of the external cortex, and clarity of the inner cortex. The outer cortex was classified as either convex or flat, and the inner cortex was classified according to its thickness and continuity as one of three types.

Results : One hundred and sixteen patients(97%) had DFCI, which in all cases was observed at the attachment site of the medial head of the gastrocnemius muscle. Mean thickness was 3.7mm and DFCI was thicker in men than in women($p < 0.05$). The outer cortex was convex in 75 cases(65%) and flat in 41(35%). The inner cortex was thick and continuous in 47cases(41%, mean age 31), thin and continuous in 54(47%, mean age 38), and thin and discontinuous in 19(16%, mean age 47). Clarity tended to diminish with age. The internal area of DFCI showed signal intensity equal to that of adjacent bone marrow and was pathologically proven to be normal marrow tissue .

Conclusion : DFCI was observed in most adults and was considered to be a normal variation. Its MR and pathologic findings were different to those observed during periods of growth.

Index words : Bones, abnormalities

Femur, MR

Bones, MR

Address reprint requests to : Young Hwan Lee, M.D., Department of Diagnostic Radiology, Catholic University of Taegu-Hyosung
College of Medicine, #3056-6, Taemyung-4 dong, Nam-gu, Taegu, 705-718, Korea.
Tel. 82-53-650-4329 Fax. 82-53-650-4339 E-mail. yhlee@cuth.cataegu.ac.kr