

1

· · · · ·

:

:

T1

15

T1

T2

4가

(I:

, II:

, III:

, IV:II+III)

:

9

24

8

16

T2

“double line sign”

I

8

II

8

IV

IV

8

1

T1

, T2

7

T1

, T2

:

(Magnetic Resonance Imaging, MRI)

71

13:2

18

43

7

가 6

(1-4),

2

1.0 Tesla

(Magnetom Impact, Siemens,

Germany)

T1

(TR/TE

(5-7).

500/15, NEX 3),

T2

(TR/TE

(2, 8),

T1

3000/96, NEX 3)

gadopentetate dimeg-lumine

0.2cc/kg

T1

(TR/TE 600-700/15, NEX 3)

340mm,

(matrix) 210-240 × 256,

4 mm,

0.4mm

T1

T2

가

“double

1995

11

1997

7

,

line sign”

,

15

가

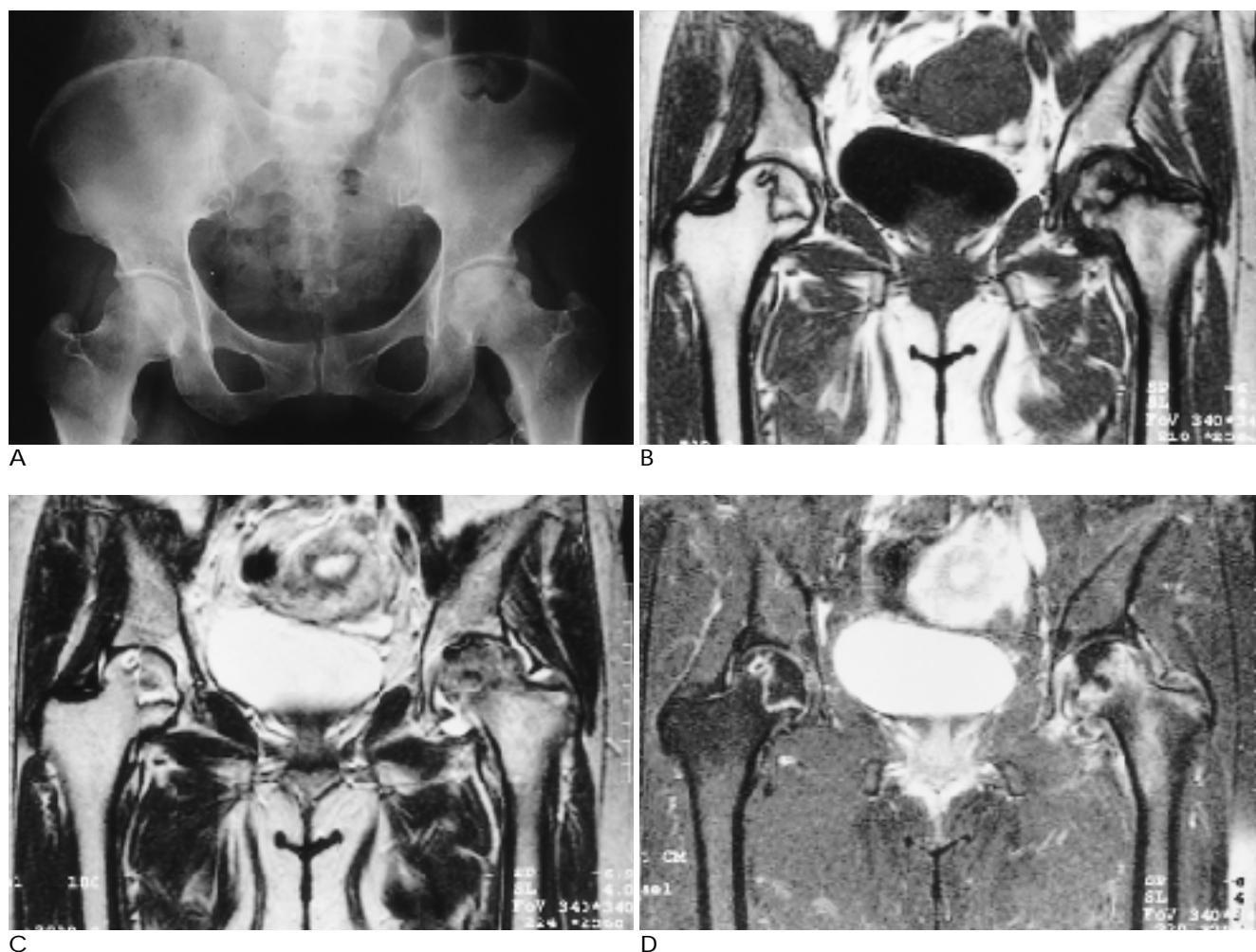
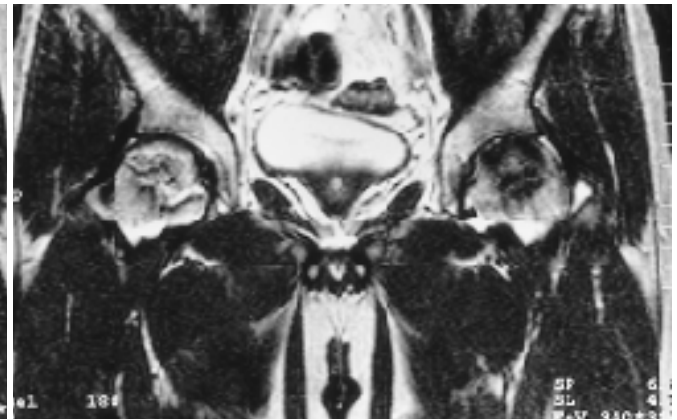


Fig. 1. Type I enhancement of right femoral head with early AVN and type II enhancement of left femoral head with advanced AVN in a 41-year old woman

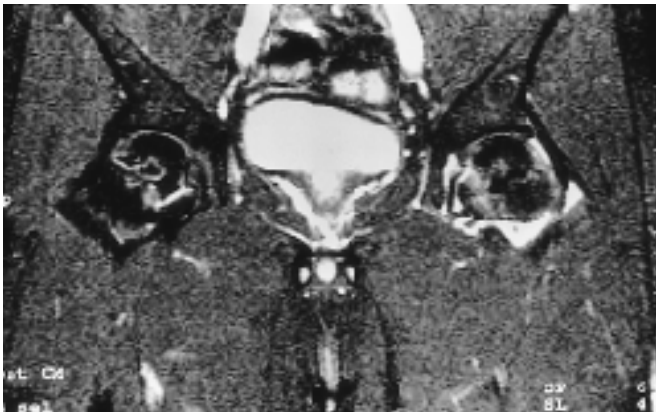
Plain radiograph shows subchondral sclerotic change and mild deformity of left femoral head and normal right femoral head(A). Right femoral head shows double line sign on T2-weighted coronal image(C) and type I enhancement pattern on contrast-enhanced fat-suppression coronal image(D). Left femoral head shows mixed iso- and low signal intensity with surrounding serpentine low signal intensity rim on T1-weighted image(B), heterogeneous low signal intensity on T2-weighted image(C) and type II enhancement pattern on contrast-enhanced fat-suppression image(D). Joint effusion is noted.



A



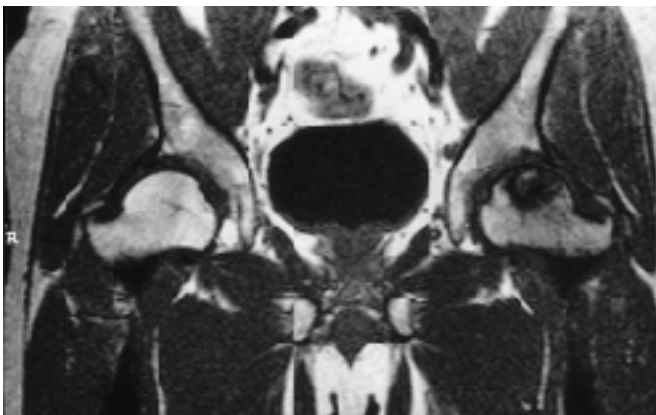
B



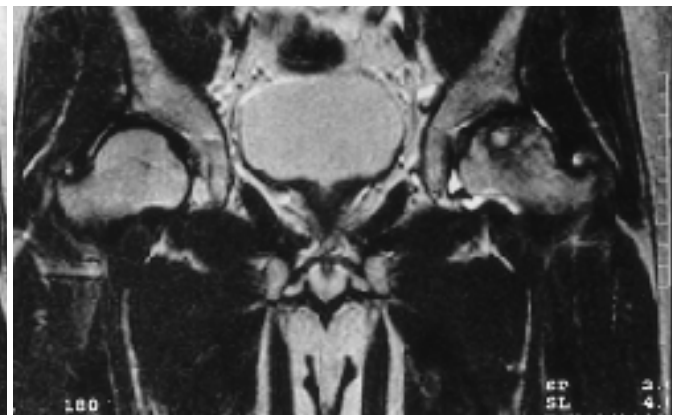
C

Fig. 2. Type I enhancement of right femoral head with early AVN and type IV enhancement of left femoral head with advanced AVN in a 35-year old man

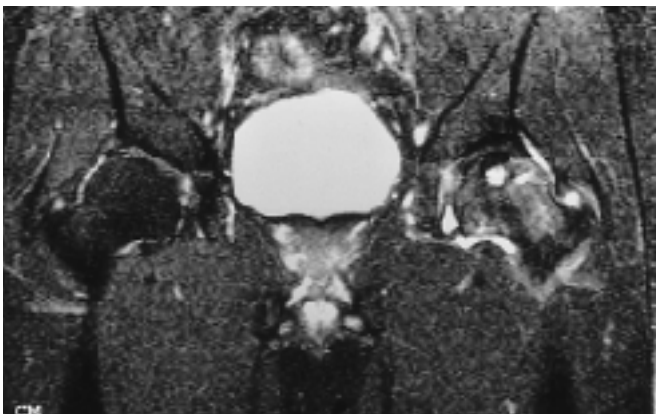
Right femoral head shows double line sign on T2-weighted coronal image(B) and type I enhancement pattern on contrast-enhanced fat-suppression coronal image(C). Left femoral head shows heterogenous low signal intensity on T1-weighted coronal image(A), mixed low and isosignal intensity on T2-weighted image(B), and type IV enhancement pattern on contrast-enhanced fat-suppression image(C). The intralesional enhanced portion shows isosignal intensity on T2-weighted image(B). Joint effusion is noted.



A



B



C

Fig. 3. Type IV enhancement of left femoral head with advanced AVN in a 53-year old man

Left femoral head shows heterogenous low signal intensity on T1-weighted coronal image(A), mixed low and high signal intensity on T2-weighted coronal image(B), and type IV enhancement pattern on contrast-enhanced fat-suppression coronal image(C). The intralesional enhanced portion shows high signal intensity on T2-weighted image(B). Joint effusion is noted.

(7), (2, 8). T1 T2 (13). T1 T2 가 T2 (14) T1 가 T1 T2 T1 10 7 가 T1 7 (14) 가 T1 가 II IV 가 (Fig. 1). 가

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14. 1995;32:953-958

Contrast-Enhanced Fat-Suppression MR Imaging of Avascular Necrosis of Femoral Head¹

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Purpose : To evaluate the findings and role of contrast-enhanced fat suppression MR imaging in avascular necrosis (AVN) of the femoral head.

Materials and Methods : In 15 patients with AVN of the femoral head, MR T1-weighted and T2-weighted images and contrast-enhanced fat-suppression T1-weighted images were obtained, and the findings were reviewed. Early and advanced groups were classified on the basis of clinical findings and imaging, and the enhancement pattern was classified as either type I, rim enhancement; type II, surrounding diffuse enhancement; type III, intralesional enhancement; or type IV, II + III.

Results : Twenty-four cases of AVN of the femoral head were detected; in nine patients, lesions were bilateral. Eight cases occurred in the early group and 16 in the advanced. All eight in the early group showed the "double line sign" on T2-weighted images, with a type-I enhancement pattern. In the advanced group, type II (8/16) and type IV (8/16) enhancement patterns were seen. Among the cases showing the type-IV pattern, the intralesional enhancing area showed low signal intensity on T1-weighted images and isosignal intensity on T2-weighted in one case, and low signal intensity on T1-weighted images and high signal intensity on T2-weighted in the other cases. There was no difference in the extent of the disease before and after enhancement.

Conclusion : Contrast-enhanced fat-suppression MR images may be helpful in evaluating the extent of AVN of the femoral head and predicting the histopathologic findings of the disease.

Index words : Femur, necrosis

Hip, MR

Hip, necrosis

Magnetic Resonance (MR), contrast enhancement

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Tel. 82-2-22700-135 Fax. 82-2-2266-6799

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08:00 - 08:50

08:50 - 08:55

08:55 - 09:00

(I)

09:00 - 09:20

(Contrast Media)

09:20 - 09:40

(Double Contrast Barium Study)

09:40 - 10:00

(Video Fluoroscopy)

(II)

10:00 - 10:20

10:20 - 10:40

CT

10:40 - 11:00

MR

11:00 - 11:30

11:30 - 12:00

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12:00 - 12:30

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12:30 - 13:30

13:30 - 14:00

14:00 - 14:30

14:30 - 15:00

15:00 - 15:30

15:30 - 16:00

16:00 - 16:30

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17:00 - 17:30