

MR 가¹

2

: (MRI)

MRI

(MRI), 4,

:

, T2

T1

가 345 (86%) 가 , , ,

(P<0.001).

(P<0.001).

(P=0.436)

(P<0.001).

MRI

:

가

,

,

,

6 1 MRI

(1.0 T, Siemens, Erlangen, Germany)

(220 , 65%)

CT MRI

(180 , 45%)

400

CT [(191 , 48%), (26 , 7%), (55

가 , MRI , 14%), (20 , 5%),

(1-7),

(32 , 8%),

(29 , 7%), (31 , 8%), (16 ;

MRI CT 13, 2, 1, 4%)] MRI

.

. MRI

150mm,

4mm 0.4mm, NEX 3, matrix 200x256

T1(TR/TE = 600/15) T2(TR/TE = 3300/

90)

T2

1998 8 14

1999 4 14

가 1cm

, 1cm

(Fig. 1)(4). (P<0.001) (Table 3).
 (suprapatellar pouch), (central portion), (P<0.001), (P<0.01),
 (posterior femoral recess), (subpopliteal recess) 4 (0.01<P<0.05), (P<0.001), (P<0.001), (P<0.001),
 (P = 0.436)

T1 400 383 (96%) 가
 , T2 ,
 17 (4%) T1 T2 (6).
 (Fig. 2). (6),
 MR 10 가 345 (86%) 가
 (283 , 71%), (188 ,
 47%), (140 , 35%) 가 (5).
 가 (P<0.001) (Table 1). 가 4 (, ,
 가 237 (7).
 (84%) (214 , 76%) 가 ,
 가 (P<0.001) (Table 2). 가 ,
 가 ,
 (14%) 가
 29%, 62%,
 78%, 72%, 10%

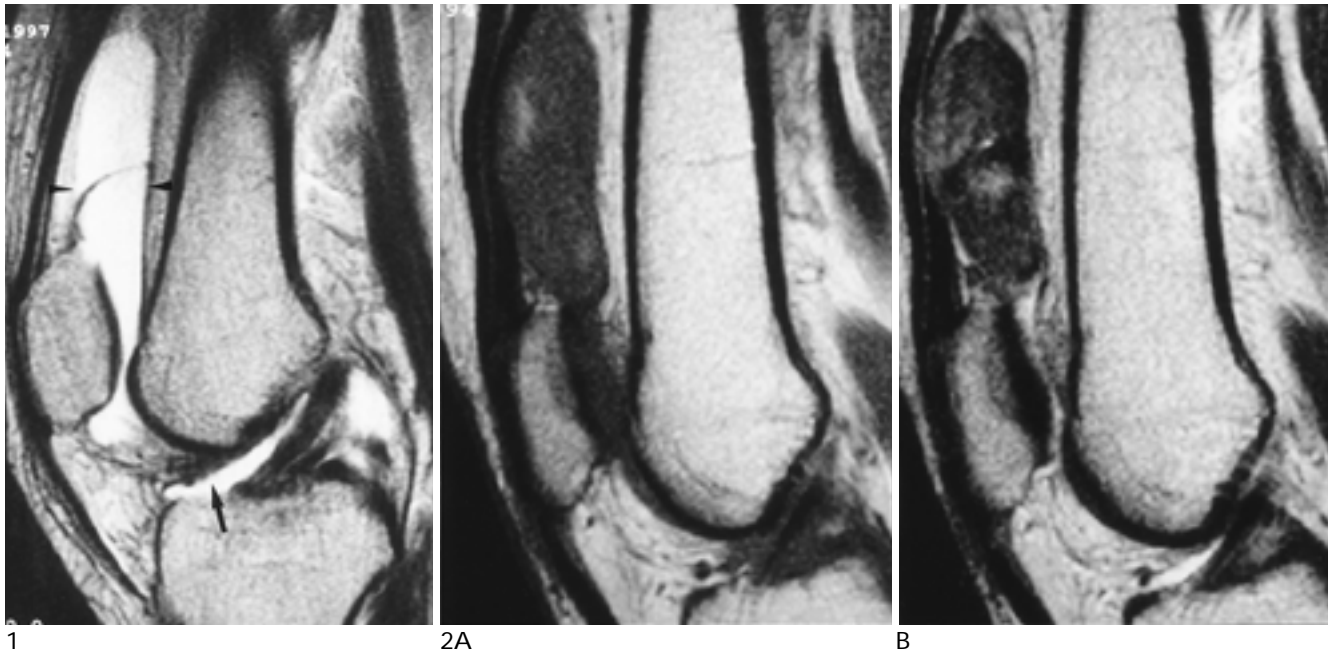


Fig. 1. Lateral tibial condyle fracture with joint effusion in a 35-year-old man. Sagittal T2-weighted MRI shows a large amount of effusion (between arrowheads) in the suprapatellar pouch, and a para-ACL effusion in the central portion (arrow).

Fig. 2. Hemoarthrosis patient in a 45-year-old woman (three days after trauma). Sagittal T1-weighted (A) and T2-weighted (B) MRI show heterogeneous low signal intensity fluid in the suprapatellar pouch.

(8). (12). MRI
MRI
M-
3
RI 4ml
(9). MRI 4mm ,
10.0-12.5mm
(7, 10). (13).
, MRI
, CT, MRI 가
가
(5).
Hall(11) ,
(Hoffa's)
가
(fat pad separation sign)가 가
1-
2ml
(14). MRI
가 10mm T1 , T2
, 5mm 5mm MRI
() 1ml
가 (8, 13).
. Kaneko (4) 300

Table 1. Distribution of Knee Joint Effusions in Patients with Traumatic Knee Joint Disorders

Amount	Suprapatellar bursa	Central Posterior femoral recess		Subpopliteal pouch	Overall
Small	220 (84)	247 (95)	187 (72)	139 (53)	261
Large	125 (90)	36 (26)	1 (1)	1 (1)	139
Total(%)	345 (86)	283 (71)	188 (47)	140 (35)	400

Table 2. Internal Distribution of Central Knee Joint Effusion in Patients with Traumatic Knee Joint Disorders

Amount	Para-PCL (%)	Para-ACL (%)	Central portion (overall)
Small	189 (77)	223 (90)	247
Large	25 (69)	14 (39)	36
Total	214 (56)	237 (84)	283

Para-PCL: around posterior cruciate ligament

Para-ACL: around anterior cruciate ligament

Table 3. Amount of Knee Joint Effusion in Patients with Traumatic Knee Joint Disorders

	Normal	MT	CeL	CoL	CwoFx	CwFx	Fx only	etc
Small	164	39	10	17	7	8	12	8
Large	27	16	16	3	25	21	19	8
Total	191	55	26	20	32	29	31	16

MT: meniscus tear

CeL: central (anterior and posterior cruciate) ligament injury

CoL: collateral (medial and lateral) ligament injury

CwoFx: combined injury without fracture

CwFx: combined injury with fracture

Fx: fracture

etc: bone marrow edema: 13, chondromalacia: 2, septic knee: 1

MRI

condylar notch) (inter- (16).

MRI

(4,13). (86%) (71%) 가 (35%) (47%), MRI

가 가 가

(plicae)

가

(lipohemarthrosis)

가

(15, 16).

MRI

10

T1

MRI

, T2

MRI

10

MRI

가

MRI

T1

T2

CT, MRI

가

(17, 18).

T1

MRI

가

(16, 18).

(hemoarthrosis)

12-24

가

(5).

(19)

가

가

1. Li KC, Henkleman M, Poon PY, Rubenstein J. MR imaging of the normal knee. *J Comput Assist Tomogr* 1984 ; 8 : 1147-1154
2. Turner DA, Prodromos CC, Petasnick JP, Clark JW. Acute injury of the ligaments of the knee: magnetic resonance evaluation. *Radiology* 1985 ; 154 : 717-722
3. Beltran J, Noto AM, Herman LJ, Mosure JC, Burk JM, Christoforidis AJ. Joint effusions: MR imaging. *Radiology* 1986 ; 158 : 133-137
4. Kaneko K, De Mouy EH, Robinson AE. Distribution of joint effusion in patients with traumatic knee joint disorder: MRI assessment. *Clin Imag* 1993 ; 17 : 176-178
5. Resnick D, Kang HS. *Internal derangement of joints*, 1st ed. Philadelphia: Saunders, 1997 : 566-567
6. Sledge CB : Biology of the joint. In Kelley WN, Harris ED Jr, Ruddy S, Sledge CB. (Eds): *Textbook of Rheumatology*, 4th Ed. Philadelphia, Saunders, 1993 : 17-18
7. Resnick D, Niwayama G. *Anatomy of individual joints: knee*. In Resnick D, Niwayama G, eds. *Diagnosis of bone and joint disorders*. Philadelphia: Saunders, 1981 : 125-150
8. Resnick D, Georgen TG, Pathria MN. *Traumatic, iatrogenic, and neurogenic diseases*. In Resnick D. *Bone and joint imaging*, 2nd ed. Philadelphia : Saunders, 1996 : 842-844
9. Pedowitz RA, Gershuni DH, Crenshaw AG, et al : Intraarticular pressure during continuous passive motion of the human knee, *J Orthop Res* 1989 ; 7 : 530-537
10. Knight AD, Levick JR. Physiology compartmentation of fluid within the synovial cavity of the rabbit knee. *J Physiol* 1982 ; 331 : 1-15
11. Hall FM. Radiographic diagnosis and accuracy in knee joint effusions. *Radiology* 1975 ; 115 : 49-54
12. McCarthy DL. *Synovial fluid*. In McCarthy OJ, ed. *Arthritis and allied conditions*, 11th ed. Philadelphia: Lea & Febiger, 1989 : 70-71
13. Schweitzer ME, Falk A, Berthoty D, Mitchell M, Resnick D. Knee effusion: normal distribution of fluid. *AJR* 1992 ; 159 : 361-363
14. Schweitzer ME, Falk A, Pathria M, Brahme S, Hodler J, Resnick D. MR imaging of the knee: can changes in the intracapsular fat pads be used as a sign of synovial proliferation in the presence of an effusion? *AJR* 1993 ; 160 : 823-826
15. Kier R, McCarthy SM. Lipohemarthrosis of the knee: MR imaging. *J Comput Assist Tomogr* 1990 ; 14 : 395-396
16. Chan WP, Fritz RC, Steinbach LS, Wu CY, Genant HK, Cannon WD. *The knee, other pathologic conditions*. In Chan WP, Lang P,

- Genant HK, eds. *MRI of the musculoskeletal system*. 1st ed. Philadelphia: Saunders, 1994 : 337-339
17. Stoller DW, Cannon WD, Anderson LJ. *The knee*. In Stoller DW. *Magnetic resonance imaging in orthopaedic and sports medicine*, Philadelphia: J.B. Lippincott, 1993 : 338-341
18. Singson RD, Zalduondo FM. Value of unenhanced spin-echo MR imaging in distinguishing between synovitis and effusion of the knee. *AJR* 1992 ; 159 : 569-571
19. 1995;32:321-324

J Korean Radiol Soc 1999;40:1211-1215

MR Assessment of Distribution and Amount of Joint Effusion in Patients with Traumatic Knee Joint Disorders¹

Mi Gyoung Ko, M.D., Ik Yang, M.D., Kyung Won Lee, M.D., Yul Lee, M.D.,
Soo Young Chung, M.D., Kwan Seop Lee, M.D., Jung Han Yoo, M.D.²

¹Department of Radiology, College of Medicine Hallym University

²Department of Orthopedic Surgery, College of Medicine Hallym University

Purpose : To clarify the distribution of joint effusion, and the relationship between type of injury and amount of joint effusion seen in traumatic knee joint magnetic resonance imaging (MRI).

Materials and Methods : We retrospectively reviewed the MR images of 400 patients with traumatic knee joint effusion. The knee joint space was divided into four compartments: central portion (para-ACL, para-PCL), suprapatellar pouch, posterior femoral recess, and subpopliteal recess, and we then compared the amount and distribution of effusion. For statistical analysis, the chi-square test was used.

Results : Among 400 MRI examinations of joint effusion, 383 knees (96%) showed homogeneous low intensity on T1-weighted images, and - except for ten cases of fluid-fluid levels- homogeneous high intensity on T2-weighted images. Knee joint effusion was clearly shown to be distributed mainly in the suprapatellar pouch (345, 86%), followed by the central posterior femoral recess, and the subpopliteal recess ($P < 0.001$). Extensive joint effusion was less frequently found in the normal group, but was occasionally found in the combined injury group ($P < 0.001$). The relationship between amount of joint effusion and type of injury was statistically significant ($P < 0.001$), except in the case of medial and lateral collateral ligament injury.

Conclusions : The distribution of joint effusion in patients with traumatic knee disorders is a reflection of anatomic communication, and whether the amount of joint effusion was small or large depended on the anatomical location and type of injury.

Index words: Knee, MR
Joints, fluid

Address reprint requests to : Mi Gyoung Ko, M.D., Department of Radiology, Kangnam Sacredheart Hospital, College of Medicine Hallym University, 948-1, Daelim-1-dong, Youngdeungpo-ku, Seoul 150-071, Korea.
Tel. 82-2-829-5241, Fax. 82-2-832-1845