

:
 :
 =4:4) 8 (29.6 , :
 47.5 , : =2:6)
 (, , , , ,
), , , , , ,
 : 8 5 (62.5%)
 8 6 (75%)
 6 (75%) , 3 (37.5%)
 4 (50%)
 , 2 (25%)
 2 (25%), 4
 (50%) 6 (75%),
 1 (12.5%) 6 (75%)
 : , ,
 ,
 (4, 6).
 (1, 가
 2). (7-9).

(3).

(4, 5).

, , 가
 8
 4 53 (29.6)
 47.5) 가 6 2 35 70 (, 2

1.5T (Signa, GE medical systems, Milwaukee, U.S.A.) 0.5T (Gyroscan T5II, Philips, Amsterdam, Netherland)

T1 (TR/TE 400-600/25-30msec) T2 (TR/TE 2000-3000/60-90msec)

Gadolinium-DTPA (Magnevist, Schering) 0.1mmol/Kg

Fisher's exact test

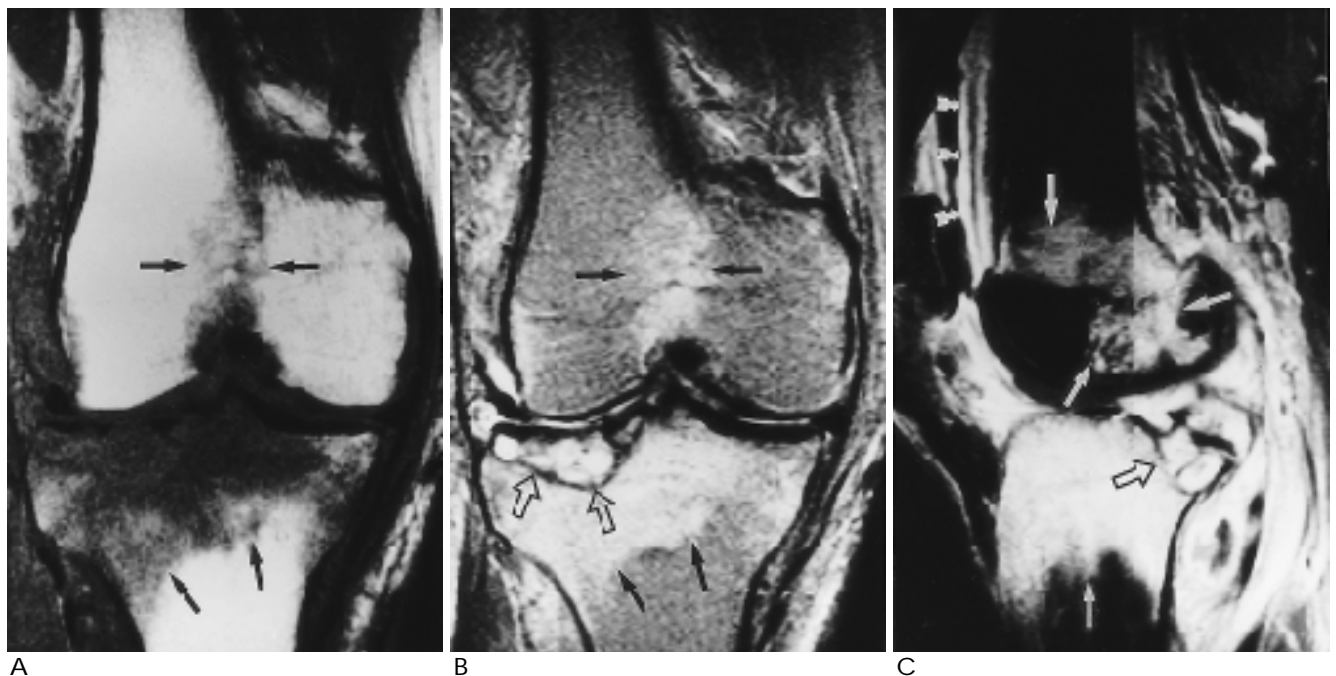


Fig. 1. Tuberculous arthritis in a 45-year-old male.

Coronal T1-weighted image(A), coronal T2-weighted image(B), and fat suppressed sagittal enhanced T1-weighted image(C) show several bony erosions(open arrows) in the lateral tibial condyle and extensive bone marrow edema(arrows) in the tibial plateau and the femoral condyle. There is irregular and nodular synovial thickening in the suprapatellar pouch(hatched arrows). Popliteal bursa is distended and its wall is thickened.

(suprapatella bursa)
 (popliteal bursa)
 4
 sa)
 2 ,
 (gastrocnemius bur-
 2
 (prepatella bursa) 1 , (pes
 anserinus bursa) 1 가
 6

(Fig. 1, 2, 3).

(p <0.05) (Table 1).

(Fig. 3).

T1 , T2

(10, 11).

(1,

2, 3).

가
 s cyst)
 6
 가 (Fig. 4).

(Baker ,

Table 1. Comparison of Tuberculous and Rheumatoid Arthritis in the Knee on MRI

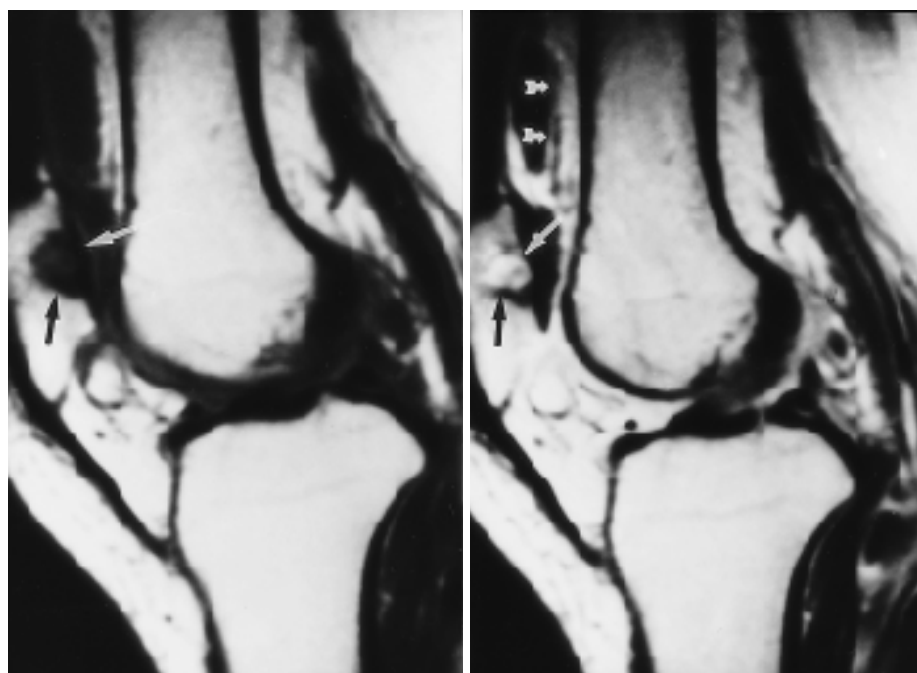
	Tuberculous arthritis No= 8 (%)	Rheumatoid arthritis No= 8 (%)	p-value
Synovial thickening regular and even	3 (37.5)	6 (75)	NS
irregular and nodular	5 (62.5)	2 (25)	NS
Bone marrow edema	4 (50)	2 (25)	NS
Bone erosion	6 (75)	3 (37.5)	NS
Bursitis			
suprapatella	8 (100)	8 (100)	NS
popliteal	2 (25)	4 (50)	NS
Paraarticular mass	6 (75)	1 (12.5)	< 0.05
Lymphadeonopathy	6 (75)	0	< 0.05

Fisher's exact test

NS: no significant statistically

0.05) , T2

(p <



A

B

Fig. 2. Rheumatoid arthritis in a 51-year-old female.

Sagittal T1-weighted image(A) and sagittal enhanced T1-weighted image(B) show a small erosion in the posterior aspect of the patella(arrows). Surrounding bone marrow edema is subtle. There is regular and even synovial thickening in the suprapatellar pouch(hatched arrows).

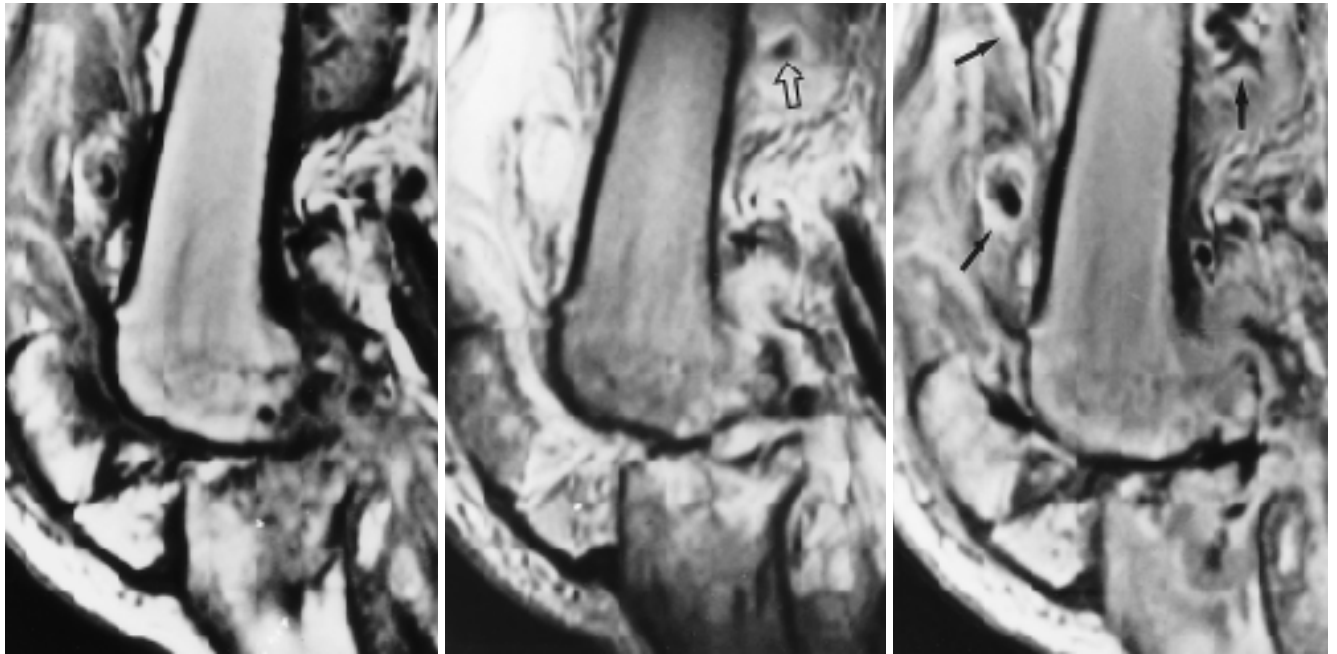


Fig. 3. Tuberculous arthritis in a 53-year-old female. Sagittal T1-weighted image(A), sagittal T2-weighted image(B) and sagittal enhanced T1-weighted image(C) show extensive intermuscular and intramuscular paraarticular abscess formation(arrows) and soft tissue edema around the knee. A portion of abscess shows low signal intensity on T2-weighted image(open arrow). Multiple large bone erosions with bone marrow edema are noted in the tibial condyle.



Fig. 4. Tuberculous arthritis in a 6-year-old male. Sagittal T1-weighted image shows several enlarged lymph nodes(arrows) in the popliteal fossa.

(5),
(6, 12).
X-
, , 가
(4, 6).
, 가 가
,
(7),
(8, 13, 14).
T1 T2
가
Singson (15) T1 T2 가
. Peterfy (16) saturation transfer subtraction technique
T1
(10, 17-19).

(20)
가 , König (18) (31)
(hypervas- (32). Herve-Somma (33)
cular) (pannus) (fibrous) 24 20
, 가
(9). 8 6
가 (18). 2 (rice body)
14 (fibrous body)
(34, 35).
가 Cheung (36)
(10). fibrin
(7, 8, 21). T1 Popert (37)
, T2 fibronectin/fibrin
(7). T1 T2
(38, 39).
가 가
가 가
(6). 가
가 가
cyst) (bursa) (synovial
(22).
(23-25).
가 (26),
(27). (28, 29),
T2
Schultz (30) he-
, Suh (12)
mosiderin, (caseous necrosis) (cold abscess)
T2 (hemophilic
arthropathy), pigmented villonodular synovitis
(synovial chondromatosis)

1. Iguchi T, Matsubara T, Kawai K, Hirohata K. Clinical and histologic observations of monoarthritis: Anticipation of its progression to rheumatoid arthritis. *Clin Orthop* 1990;250:241-249
2. Fletcher MR, Scott JT. Chronic monoarticular synovitis: Diagnostic and prognostic features. *Ann Rheum Dis* 1975;34:171-176
3. Resnick D. *Rheumatoid arthritis*. In Resnick D. *Bone and joint imaging*. 2nd ed. Philadelphia : Saunders, 1996:210-211
4. Versfeld GA, Solomon A. *A diagnostic approach to tuberculosis of bones and joints J Bone Joint Surg [Br]* 1982;64:446-449
5. Garrido G, Gomez-Reino JJ, Fernandez-Dapica P, Palenque E, Prieto S. A review of peripheral tuberculous arthritis. *Semin Arthritis Rheum* 1988;18:142-149
6. Resnick D. *Osteomyelitis, septic arthritis, and soft tissue infection: organisms*. In Resnick D. *Bone and joint imaging*. 2nd ed. Philadelphia : Saunders, 1996:688-694
7. Poleksic L, Zdravkovic D, Jablanovic D, Watt I, Bacic G. Magnetic resonance imaging of bone destruction in rheumatoid arthritis: Comparison with radiography. *Skeletal Radiol* 1993;22:577-580
8. Beltran J, Caudill JL, Herman LA et al. Rheumatoid arthritis: MR imaging manifestations. *Radiology* 1987;165:153-157
9. Winalski CS, Palmer WE, Rosenthal DI, Weissman BN. Magnetic

- resonance imaging of rheumatoid arthritis. *Radiol Clin North Am* 1996;34:243-258
10. Rosenberg AE. *Skeletal system and soft tissue tumors*. In Cotran RS, Kumar V, Robbins SL. *Robbins Pathologic basis of disease*. 5th ed. Philadelphia : Saunders, 1994:1249-1253
11. Kursunoglu-Brahme S, Riccio T, Weisman MH, et al. Rheumatoid knee: Role of gadopentetate-enhanced MR imaging. *Radiology* 1990; 176:831-835
12. Suh J-S, Lee JD, Cho J-H, Kim MJ, Han DY, Cho NH. MR imaging of tuberculous arthritis: Clinical and experimental studies. *J Magn Reson Imaging* 1996;1:185-189
13. Sugimoto H, Takeda A, Masuyama J-I, Furuse M. Early-stage rheumatoid arthritis: Diagnostic accuracy of MR imaging. *Radiology* 1996;198:185-192
14. , , , , . : . 1996 ; 35 : 123-129
15. 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
16. Peterfy CG, Majumdar S, Lang P, Van Dijke CF, Sack K, Genant HK. MR imaging of the arthritic knee: Improved discrimination of cartilage, synovium, and effusion with pulsed saturation transfer and fat-suppressed T1-weighted sequences. *Radiology* 1994 ; 191 : 413-419
17. Smith H-J, Larheim TA, Aspestrand F. Rheumatic and non-rheumatic disease in the temporomandibular joint: Gadolinium-enhanced MR imaging. *Radiology* 1992 ; 185 : 229-234
18. Konig H, Sieper J, Wolf K-J. Rheumatoid arthritis: Evaluation of hypervascular and fibrous pannus with dynamic MR imaging enhanced with Gd-DTPA. *Radiology* 1990 ; 176 : 473-477
19. Bjorkengren AG, Geborek P, Rydholm U, Holtas S, Petterson H. MR imaging of the knee in acute rheumatoid arthritis: Synovial uptake of Gadolinium-DOTA. *AJR* 1990 ; 155 : 329-332
20. Drape J-L, Thelen P, Gay-Depassier P, Silberman O, Benacerraf R. Intraarticular diffusion of Gd-DOTA after intravenous injection in the knee: MR imaging evaluation. *Radiology* 1993 ; 188 : 227-234
21. Gilkeson G, Polisson R, Sinclair H, et al: Early detection of carpal erosions in patients with rheumatoid arthritis: A pilot study of magnetic resonance imaging. *J Rheumatol* 1988 ; 15 : 1361-1366
22. Resnick D, Kang HS. *Internal derangements of joints: Emphasis on MR imaging*. Philadelphia : Saunders, 1997 ; 578-583
23. Solomon L, Berman L. Synovial rupture of the knee joint. *J Bone Joint Surg [Br]* 1972 ; 54 : 460-467
24. Perri JA, Rodnan GP, Mankin HJ. Giant synovial cysts of the calf in patients with rheumatoid arthritis. *J Bone Joint Surg [Am]* 1968 ; 50 : 709-719
25. Fedullo LM, Bonakdarpour A, Moyer RA, Tourtellotte CD. Giant synovial cysts. *Skeletal Radiol* 1984;12:90-96
26. Janzen DL, Peterfy CG, Forbes JR, Tirman PFJ, Genant HK. Cystic lesions around the knee joint: MR imaging findings. *AJR* 1994;163: 155-161
27. Dungan DH, Seeger LL, Grant EG. Case report 707. Hemorrhagic Baker's cyst of the right calf. *Skeletal Radiol* 1992;21:52-55
28. Zahraa J, Johnson D, Lim-Dunham JE, Herold BC. Unusual features of osteoarticular tuberculosis in children. *J Pediatr* 1996;129: 597-602
29. Valdazo J-P, Perez-Ruiz F, Albarracin A, et al. Tuberculous arthritis. Report of a case with multiple joint involvement and periarticular tuberculous abscesses. *J Rheumatol* 1990;17:399-401
30. Schultz E, Richterman I, Dorfman HD. Case report 739. Tuberculous arthritis of knee. *Skeletal Radiol* 1992;21:330-334
31. Williams PL, Warwick R, Dyson M, Bannister LH. *Gray's anatomy*. 37ed. Edinburgh : Churchill Livingstone, 1989:848-849
32. Misgar MS, Mir MA, Wani MA, Narboo T, Chirvi SK. Regional lymph gland biopsy in tuberculous synovitis of the knee. *Int Surg* 1978;63:25-27
33. Herve-Somma CMP, Sebag GH, Prieur A-M, Bonnerot V, Lallemand DP. Juvenile rheumatoid arthritis of the knee: MR evaluation with Gd-DOTA. *Radiology* 1992;182:93-98
34. Berg E, Wainwright R, Barton B, Puchtler H, McDonald T. On the nature of rheumatoid rice bodies. *Arthritis Rheum* 1977;20:1343-1349
35. Wynne-Roberts CR, Cassidy JT. Juvenile rheumatoid arthritis with rice bodies: Light and electron microscopic studies. *Ann Rheum Dis* 1979;38:8-13
36. Cheung HS, Ryan LM, Kozin F, McCarthy DJ. Synovial origins of rice bodies in joint fluid. *Arthritis Rheum* 1980;23:72-76
37. Popert AJ, Scott DL, Wainwright AC, Walton KW, Williamson N, Chapman JH. Frequency of occurrence, mode of development, and significance of rice bodies in rheumatoid joints. *Ann Rheum Dis* 1982;41:109-117
38. Griffith JF, Peh WCG, Evans NS, Smallman LA, Wong RWS, Thomas AMC. Multiple rice body formation in chronic subacromial/subdeltoid bursitis: MR appearances. *Clin Radiol* 1996;51:511-514
39. Spence LD, Adams J, Gibbons D, Mason MD, Eustace S. Rice body formation in bicipito-radial bursitis: ultrasound, CT, and MRI findings. *Skeletal Radiol* 1998;27:30-32

Tuberculous Arthritis and Monoarticular Rheumatoid Arthritis in the Knee : Differential Diagnosis using MR Imaging¹

Yeon Soo Lim, M.D., Jeong Mi Park, M.D., Kwang Heun Shinn, M.D., Won Hee Jee, M.D.,
Jee Young Kim, M.D., Kyung Ah Chun, M.D., Jae Mun Lee, M.D.

¹*Department of Radiology, College of Medicine, The Catholic University of Korea*

Purpose : To determine the extent to which magnetic resonance(MR) imaging findings can help differentiate between tuberculous arthritis (TA) and rheumatoid arthritis(RA).

Materials and Methods : This study involved sixteen patients with pathologically proven arthritis of the knee. In eight patients(mean age, 29.6 years; M:F= 4:4) this was of the tuberculous variety, while eight (mean age, 47.5 years; M:F= 2:6) suffered from the rheumatoid variety, which was monoarticular. For 14 patients, contrast enhancement studies were available. We retrospectively analyzed MR findings according to the demonstrated pattern of synovial thickening (regular and even, or irregular and nodular), bone erosion or abscess, bone marrow(BM) edema, the sites at which bursae were present, para-articular mass formation, and lymphadenopathy.

Results : In five of eight TA cases (62.5 %), irregular and nodular enhanced synovial thickening was present, while in six of eight RA cases (75 %), thickening was regular and even. Bone erosions or subarticular abscesses were found in six TA cases (75 %) and small erosions in three cases (37.5 %) of RA. BM edema surrounding the erosion was found in four cases of TA (50 %) and two of RA (25 %). In TA, edema was more extensive. In both TA and RA, all suprapatella bursae were distended while popliteal bursae were present in two cases of TA (25 %) and four of RA (50 %). Para-articular masses with rim like enhancement were found in six cases of TA (75 %) and in one case of RA (12.5 %). In particular, para-articular lymphadenopathy was seen in six cases of TA (75 %), but not in RA.

Conclusion : MR findings of irregular and nodular synovial thickening, extensive bone erosion, extensive BM edema, particular, para-articular abscess formation and lymphadenopathy, may help differentiate tuberculous arthritis of the knee from the rheumatoid variety.

Index words : Knee, MR
Arthritis, tuberculosis
Arthritis, rheumatoid

Address reprint requests to : Yeon Soo Lim, M.D., Department of Radiology, St. Mary 's Hospital
#62 Youido-dong, Yongdungpo-gu Seoul, 150-010, Korea.
Tel. 82-2-3779-1277 Fax. 82-2-783-5288