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:   82 (37
                        45)   ,   ,   ,
,   , T2   ,   T1   ,
                            .

                                                  .
:   21~ 40   61~ 80 ,   3. 0 cm
,   -   -   ,   , 50%
                        .
:   -   -   -   -

                                                                    .

2)
.

.

1)   3)
.   .

:
                        1   10

Tel: 051) 240- 7387,   Fax: 051) 244- 7534,   E- mail: tymn@pusan. ac. kr

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1 , 　　　　1 , 　　　　　1 , 　　　　1
, 　　　1

4 , 　　　1 ,
. 　　　　　　　　　1 　　　　45 　.
(1~ 20), 　　(21~ 40),
(41~ 60), 　　(61~ 80) 　　　　　　,
3
,
2. 9 cm 　　　3. 0 cm 　　　　　　　　,
- 　　- 　　　　　- 　-
,
. 1998 　1 　　2004 　5 　　　　　　　　　, 　　　T 1 　　T 2
, 　　　　　　　　　　　　　　　　,
,
.

82 　82 　　　　　　　　　　　　　　　　　　　2 , 　　　　　　1 ,
. 　　　　　　1. 5 T SONATA (Siem 　　　　　1 , 　　　1 , 　　　　1 ,
ens, Erlangen, Germany) 　　　　T 2 　　1 , 　　　　　　1
(TR /TE 3000/96 ms), T 1 　　　　　　　　　　　　　　　.
(TR /TE 320/20 ms), 　　　　　　　T 1
. 　　　　　　　1
75 　　　43. 2 　　　19 (
48. 8) 　18 (　37. 3), 　　　　　　　　　　　　　　　4
4 　　75 　　　, 　14 , 　10 , 　　9
34. 2 　　25 (　32. 2) 　20 　　　　　　　　15 , 　11 ,
(　36. 7) . 　　　　　　　15 , 　4
6 , 　　　　4 , 　4 ,
2 , 　2 , 　　1 ,
1 , 　　1 , 　　1 , (Table 1). 　2. 9 cm 　　3. 0 cm
1 , 　　1 , 　　　　　　2. 9 cm
(intermediate tumor) 　8 　20 　3. 0 cm 　17 　　　　2. 9
5 　　　37 cm 　40 　3. 0 cm 　5
16 , 　8 , 　　3. 0 cm 　　　　77. 3%
3 , 　2 , 　2 , (p

Table 1. Frequency of Malignant and Benign Soft Tissue Tumors by Age

Age (years)	1~20	21~40	41~60	61~80	Total
Malignant tumors	4	14	10	9	37
Benign tumors	15	11	15	4	45
Total	19	5	25	13	82

─ : : ─

>. 05) (Table 2). - - -

- - - (Fig. 1, 2, 3, 4).

11 （29.7%) 26 （70.3%) (irregular)

36 （80.0%) 9 （20.0%) (smooth) 12

(X²=23.08, （32.4%) 25 （67.6%) 6

p<. 01) (Table 3). , - - （13.3%) 39 （86.7%)

Table 2. Frequency of Malignant and Benign Soft Tissue Tumors by Size

Size	Below 2.9 cm	Above 3.0 cm	Total
Malignant tumors	20	17	37
Benign tumors	40	5	45
Total	60	22	82

Table 3. Frequency of Malignant and Benign Soft Tissue Tumors by Location

Location	UE-SH-SP*		TU-PV-LE†		Total
	UE-SH	SP	TU	PV-LE	
Malignant tumors	10	1	5	21	37
Benign tumors	29	7	3	6	45
Total	39	8	8	27	82

* UE-SH-SP=upper extremity-shoulder-spine
† TU-PV-LE=trunk-pelvis-lower extremity
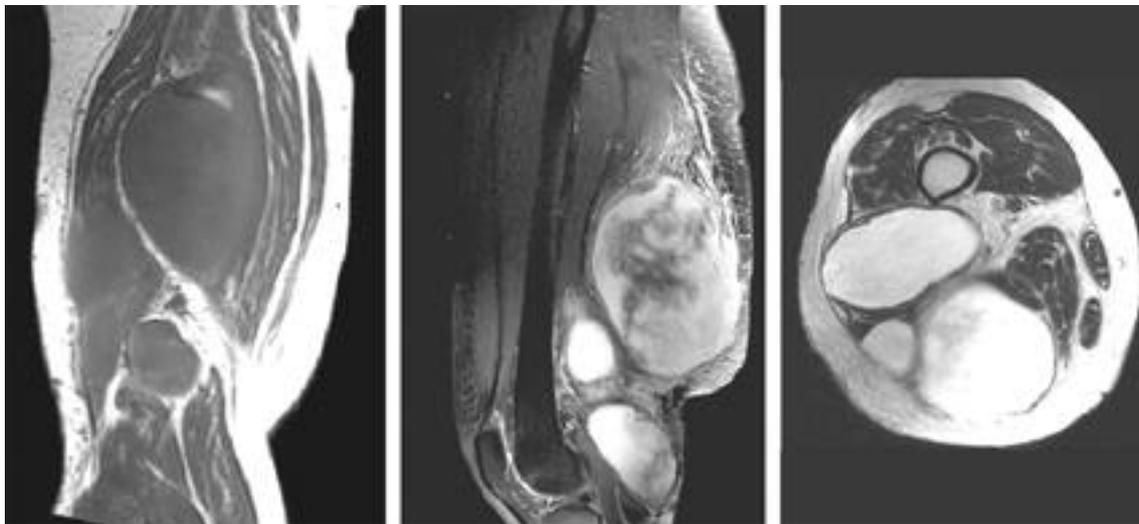
Fig. 1. 40-year-old female patient was confirmed as myxoid liposarcoma in the muscle of the lower thigh. There are multiple soft tissue tumors with well defined border, inhomogenous enhancing high signal pattern on the sagittal contrast-T1 MR image (middle picture), and relatively homogenous high signal pattern on the axial T2-MR image (right picture)

(p>. 05)(Table 4).   9　(24. 3％)　28

T2-   (75. 7％)   15　(33. 3％)　30

(homogenous)   (heterogenous)   (66. 7％)
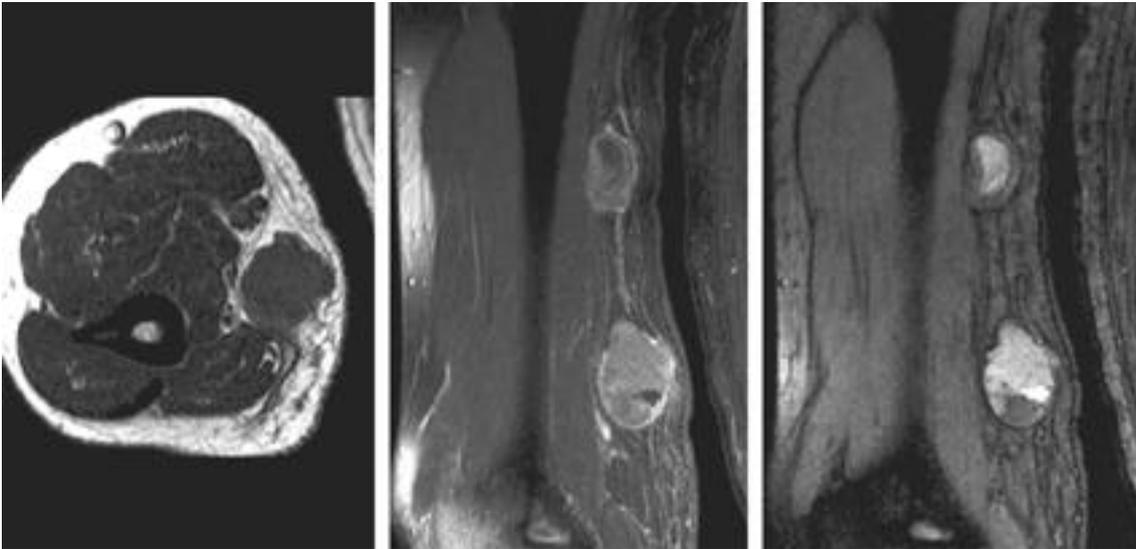
Fig. 2. 60-year-old male patient was confirmed with metastatic melanoma in the subcutaneous fat tissue of the upper thigh. Above three pictures reveal relatively well defined lower signal tumor on the axial T1 weighted MR image (left picture), inhomogenous enhancing high signal pattern on the coronal contrast-T1 MR image (middle picture), and irregular high signal tumor on the coronal T2 weighted MR image (right picture).
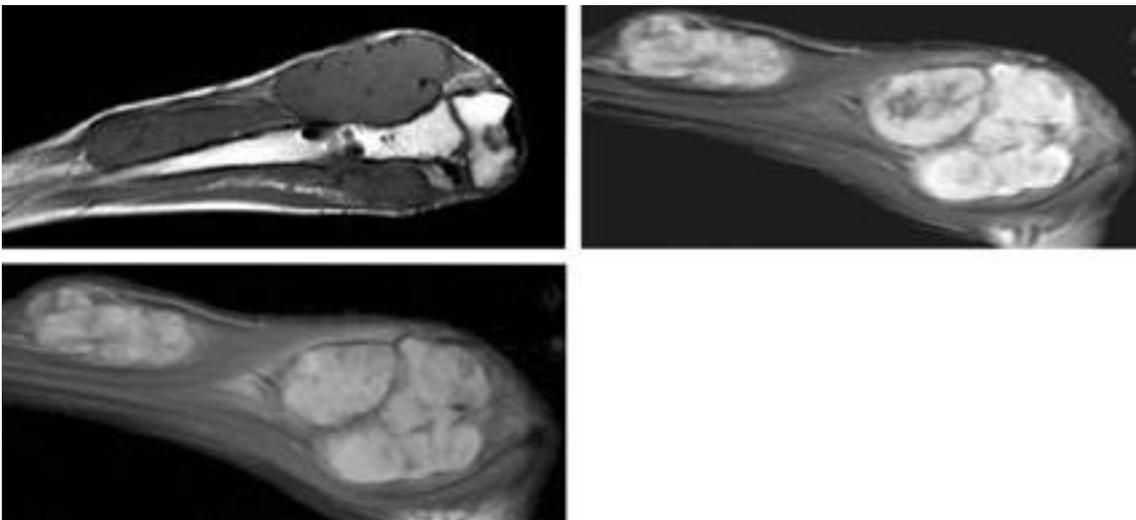
Fig. 3. 15-year-old male patient was confirmed with nodular fasciitis as benign soft tissue tumor. The first coronal T1-weighted MR image show multiple well-defined lower signal masses in the muscles and previous surgical wound in the proximal ulnar shaft (dark signals) of the forearm. The second sagittal contrast-T1 MR image reveal heterogenous enhancing pattern with central necrosis looking like malignancy. The last sagittal T2-MR image shows inhomogenous high signal pattern.

—   :   :   —

(p>. 05)(Table 5).   12 (32. 4%) 25 (67. 6%)

     T1-   20 (44. 4%) 25 (55. 6%)

(homogenous)

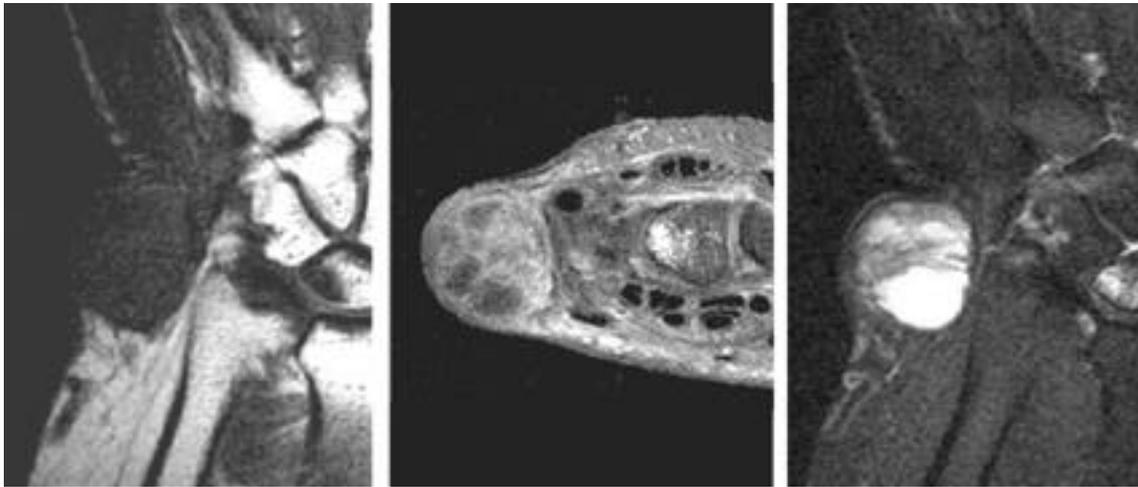(heterogenous)   (p>. 05)(Table 6).

Fig. 4. 44-year-old female patient was confirmed with giant cell tumor of tendon sheath in the soft tissue adjacent to distal ulna and carpal bones. The left coronal T1-MR image shows an well-defined lower signal intensity tumor. The middle axial contrast-T1 fat saturated MR image reveal inhomogenous enhancing high signal intensity tumor with multiple cysts. The last coronal T2 fat saturated MR image shows moderate high signal and bright signal intensity components.

Table 4. Frequency of Malignant and Benign Soft-Tissue Tumors by Tumor Border on MR

Tumor border on MR	Irregular	Smooth	Total
Malignant tumors	12	25	37
Benign tumors	6	39	45
Total	18	64	82

Table 5. Frequency of Malignant and Benign Soft-Tissue Tumors by Tumor Texture on T2-MR

Texture on T2 MR	Homogenous	Inhomogenous	Total
Malignant tumors	9	28	37
Benign tumors	15	30	45
Total	24	58	82

Table 6. Frequency of Malignant and Benign Soft-Tissue Tumors by Tumor Texture on Contrast-T1 MR

Texture on Contrast-T1 MR	Homogenous	Inhomogenous	Total
Malignant tumors	12	25	37
Benign tumors	20	25	45
Total	32	50	82

30 （81. 1%） 7
（18. 9%） 　　　　　　 27 （60. 0%） 18
（40. 0%） 　　　　　　　　　　　　　　　　　　　　　　　　 .
（p
> . 05）（Table 7）.

Kransdorf

. Kransdorf
12, 370
（24%）, 　　　 （14%）,
（8%）, 　　　　　 （6%）,
（6%） 　　　　　 18, 677
（16%）, 　　　 （13%）,
（11%）, 　　 （8%）, 　　 （7%）
.

,

, 　　　　　　　　　　　 （21. 6%）,
（16. 2%）, 　　　　　 （13. 5%）,
2). 　　　　　　　 4, 5) 　　　　 （10. 8%）, 　　 （10. 8%）
, 　　　　　　　　 （35. 6%）, 　　　 （17. 8%）,
5 cm 　　　　　, 　　　　　　　　 （8. 9%）, 　　　　 （6. 7%） 　　　 .
（
: ） 0~ 15 25: 75, 16~ 35 29: 71,
36~ 55 35: 65, 56~ 75 52: 48, 76
. 3 cm 68: 32
.

1~ 20 21: 79, 21~ 40 56: 44, 41~ 60
6, 7). Kransdorf 40: 60, 61~ 80 69: 31

.

8, 9). 　　　　　　　　　 - 28: 72, - 44: 56, 35: 65
.

Table 7. Frequency of Malignant and Benign Soft-Tissue Tumors by Enhancement Area on Contrast-T1 MR

Area of enhancement on MR	above 50%	below 49%	Total
Malignant tumors	30	7	37
Benign tumors	27	18	45
Total	25	57	82

- 26: 74,   -   T2

78: 22,   63: 37   -   .

- -

.   T2

Kransdorf   10-12).

10, 184 (38%)   16, 670 (62%)

,   3

37 (8%)   5 (11%)   T2

(45%)   45 (55%)

.

Kransdorf   .

. Kran-sdorf

(retroperitoneum)

70%   50%

15%   . Berquist   6)   30 (81%)   27

(60%)

T2

.

, 90%

. Berquist   45   - -

(47%)   50 (53%),   3   - -

cm   45 (100%)   39 (78%),   - -

38 (84%)   ,

28 (56%), T2   ,   ,   ,   T2

32 (71%)   12 (24%)   ,

3 cm   ,   T2

.

. Myhre-Jensen   4)

5 cm   5%

.

3 cm   17 (46%)   5

(11%),

12 (32%)   6 (13%), T2

28 (76%)   30

(67%) Berquist

. Berquist

3 cm   88% (84/95)

27% (22/82)

, 3 cm

REFERENCES

1) **Kransdorf MJ, Murphey MD**. Radiologic evalua-
   tion of soft-tissue masses: a current perspective.
   AJR, 175: 575-586, 2000.
2) **Nishimura H, Zhang Y, Ohkuma K, Uchida M,
   Hayabuchi N, Sun S**. MR imaging of soft tissue
   masses of the extraperitoneal spaces. *Radio
   Graphics,* 21: 1144-1156, 2001.
3) **Kransdorf MJ, Jelinek JS, Moser RP, et al**. Soft-
   tissue masses: diagnosis using MR imaging. *AJR,*
   153: 541-547, 1989.
4) **Myhre-Jensen O**. A consecutive 7-year series of
   1331 benign soft tissue tumors: clinicopathologic
   data-comparison with sarcomas. *Acta Orthop*

Scand, 52: 287-293, 1981.

5) **Rydholm A**. Mangement of patients with soft-tissue tumors: strategy developed at a regional oncology center. *Acta Orthop Scand Suppl,* 203: 13-77, 1983.

6) **Berquist TH, Ehman RL, King BF, Hodgman CG, Ilstrup DM**. Value of MR imaging in differentiating benign from malignant soft-tissue masses: study of 95 lesions. *AJR,* 155: 1251-1255, 1990.

7) **Crim JR, Seeger LL, Yao L, Chandnani V, Eckardt JJ**. Diagnosis of soft-tissue masses with MR imaging: can benign masses be differentiated from malignant ones? *Radiology,* 185: 581-586, 1992.

8) **Kransdorf MJ**. Malignant soft-tissue tumors in a large referral population: distribution of diagnoses by age, sex, and location. *AJR,* 164: 129-134, 1995.

9) **Kransdorf MJ**. Benign soft-tissue tumors in a large referral population: distribution of diagnoses by age, sex, and location. *AJR,* 164: 395-402, 1995.

10) **McDonald DJ**. Limb-salvage surgery for treatment of sarcomas of the extremities. *AJR,* 163:509-513, 1994.

11) **Benedikt RA, Jelinek JS, Kransdorf MJ, Moser RP, Berry BH**. MR imaging of soft-tissue masses: role of gadopentetate dimeglumine. *JMRI,* 4: 485-490, 1994.

12) **Verstraete KL, Deene YD, Roels H, Dierick A, Uyttendaele D, Kunnen M**. Benign and malignant musculoskeletal lesions: dynamic contrast-enhanced MR imaging-parametric" first-pass" images depict tissue vascularization and perfusion. *Radiology,* 192: 835-843, 1994.

Abstract

Differentiation of Malignant from Benign Soft-Tissue Solid Tumors: Clinical and MR Finding Complex

Tae-Yong Moon, M.D., Jung-Il Kim, M.D.*, Su-Mi Shin, M.D., Hye-Jeung Choo, M.D., Hyun-Wook Choi, M.D., Soo-Jin Kim, M.D.

Departments of Diagnostic Radiology and Orthopedic Surgery*, Pusan National University Hospital

Purpose: The recent development of MR has made to possible radiological diagnosis in various soft tssue tumors. But multifarious components within soft tissue tumors and their periodic change have made to difficult even differentiation of malignant from benign soft tissue tumors solely on the MR. So authors retry to differentiate malignant from benign soft tissue tumors with clinical and MR finding complex.

Materials and methods: We were analysed 82 pathologically confirmed soft tissue solid tumors (37 cases as malignancy including intermediate tumors and 45 cases as benign including inflammatory masses) which are correlated with clinical findings such as age, size, and location, MR findings such as tumor border, texture on T2 and contrast-T1 images, and enhancement area retrospectively. Many typical lipoma and cysts including of ganglion and abscess are rejected in the benign soft tissue tumor group because not difficult to diagnose on MR.

Results: Malignant soft tissue tumors were more frequent in 21~40 and 61~80 years old of the age, above 3.0 cm of the size, trunk-pelvis-lower extremities of the location, and MR findings with irregular border and above 50% of the enhancement area than those of benign soft tissue tumors.

Conclusion: The clinical finding that divided to two locations as trunk-pelvis-lower extremities and upper extremities-shoulder-spine was statistically significant to differentiate malignant from benign soft tissue solid tumors. However, the others would provide some useful informations to differentiate them never specific.

Key Words: Soft tissues, Neoplasms, Soft tissues, MR studies, Neoplasms, Diagnosis, Neoplasms, MR

Address reprint requests to
Tae-Yong Moon, M.D.
Department of Diagnostic Radiology, Pusan National University Hospital,
#10, Amidong 1Ga, Seo-Ku, Busan 602-739 Korea
TEL: 82-051-240-7387, Fax: 82-051-244-7534, E-mail: tymn@pusan.ac.kr