Benign Versus Malignant Compression Fracture: A Diagnostic Accuracy of Magnetic Resonance Imaging

Sopa Pongpornsup MD*,
Phromphiang Wajanawichakorn MD*, Nasuda Danchaivijitr MD*

** Department of Radiology, Siriraj Hospital Mahidol University, Bangkok, Thailand*

Objective: *To evaluate the accuracy, sensitivity, and specificity of various Magnetic Resonance Imaging (MRI) features in differentiating malignant from benign compression fracture of the spine.*
Material and Method: *Retrospective review of MRI spine of patients with vertebral compression fracture identified from the hospital database between June 2004 and February 2006 by two radiologists blinded to the clinical data. Various MRI features were evaluated for sensitivity, specificity, positive predictive value, and negative predictive value. An additional combination of two, three, four, and five MRI features that had statistically significant (P value less than 0.005) were also calculated for sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV).*
Results: *Fifty-eight spinal MRI were included from 35 patients with metastatic vertebral compression fractures and 23 patients with benign vertebral compression fractures. MR imaging features suggestive of malignant vertebral compression fracture were convex posterior border of the vertebral body, involvement of the pedicle or posterior element, epidural mass, paraspinal mass, and destruction of bony cortex. Among these, involvement of pedicle or posterior element was the most reliable finding (sensitivity 91.4% and specificity 82.6%) for diagnosis of malignant vertebral compression fracture. A combination of two or more MRI features gave very high specificity and PPV.*
Conclusion: *Certain MR imaging characteristics can reliably distinguish malignant from benign compression fracture of the spine. Combination of several MRI features strongly affirmed the diagnosis of malignant compression fracture, especially in a patient where tissue biopsy is not justified.*

Keywords: *Cerebrospinal fluid, Fractures, Compression, Magnetic resonance imaging, Neoplasm metastasis, Spinal neoplasms, Spine*

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Vertebral compression fracture is one of the most common clinical problems, especially in the elderly. Differentiating malignant compression fracture from a benign process with information from clinical findings, use of plain radiographs, bone scans and computed tomography may not be sufficient, in particular for those without a history of obvious trauma or known malignancy. Magnetic resonance (MR) imaging is a well-known useful method in evaluating disease of bone and bone marrow. Several MR imaging findings have been published as useful measures for differentiating benign and malignant compression fracture[1-4]. However, no recent comprehensive study of these measures was conducted in a Thai population, where causes of fracture are varied and different. Therefore, the authors conducted the present study to explore whether the previously published MR imaging features are applicable in differentiating a malignant compression fracture from a benign process in the presented population.

Correspondence to: Danchaivijitr N, Department of Radiology, Faculty of Medicine Siriraj Hospital, 2 Pran-nok Rd, Bangkok-noi, Bangkok 10700, Thailand. Phone: 0-2419-9039, 0-2419-7086, Fax: 0-2419-412-7785

Material and Method

The authors searched Siriraj Hospital database for patients with a diagnosis of compression

fracture between June 2004 and February 2006. The diagnosis of malignant compression fracture was made based on the presence of a malignant tumour from the bone biopsy specimen, or a radiological deterioration (progression of an old lesion or development of a new lesion), or a clinical progression of bone metastasis. Vertebral fracture in patients without a clinical history of cancer or there was no radiological deterioration during 6 months follow-up period were considered benign.

Demographic data, diagnosis, and relevant clinical data were extracted from the medical records. All MR imaging were reviewed by two radiologists independently, who were blind to the clinical data. In case of disagreement, the final judgment was rendered by a consensus. The signal intensity and enhancement patterns of the compressed vertebrae and normal bone marrow signal intensity of the vertebral body were evaluated in detail. Signal intensity in the marrow of abnormal vertebral bodies was considered hypointense, isointense, hyperintense or mixed in comparison with the signal intensity of normal vertebrae in the same patient on T1- and T2-weighted images. The enhancement pattern was classified as focal, linear, diffuse pattern on on fat suppressed contrast-enhanced T1-weighted. In addition, the following findings were particularly examined; convex posterior border of vertebral body, abnormal signal intensity of the pedicle or posterior element, epidural mass, paraspinal mass, destruction of bony cortex, retropulsion of a posterior bone fragment, fluid sign on T2-weight (classified as focal, linear and triangular shape), level of involvement, degenerative endplate change, presence of Schmorl's node, decreased disc height and multiple levels of compression fractures.

Positive predictive value (PPV), negative predictive value (NPV), sensitivity, and specificity of each sign were calculated. P-value was also calculated by Fisher's exact test. P-value of 0.05 or less was considered to indicate a statistically significant difference. Interobserver agreement was assessed by kappa value in each finding and was classified as follows; poor, 0-0.20; fair, 0.21-0.40; moderate, 0.41-0.60; good, 0.61-0.80; and excellent, 0.81-1.00[5].

All MR Imaging were performed with a 1.5 Tesla MRI scanner (Intera, Phillips). The scanning sequences were as follows; Sagittal T1-weighted spin echo (repetition time msec/echo time msec = 450/12) and sagittal T2-weighted spin echo and axial T2-weighted spin echo (repetition time msec/echo time msec = 2966/120) were acquired in all cases. In addition, T1-Weighted with fat saturation in sagittal and axial planes were obtained after intravenous administration of 0.1mmol/ kg gadolinium in all cases. Imaging parameters were performed as follows; field of view, 220 x 132 mm for the axial plane and 320-360 x 320-360 mm for the sagittal plane; matrix size, 192-383 x 512 mm; section thickness, 3-4 mm; intersection gap, 0.3-0.4 mm.

The present study was approved by a local institutional review board. The board determined that this retrospective study could be conducted without acquiring a signed informed consent from the patients.

Results

One hundred six patients with a diagnosis of vertebral compression fracture were identified from the hospital database. Among these, only 58 patients were included in the present study. The remaining 48 patients were excluded due to absence of gadolinium-enhanced study (n = 10), follow-up period was less than 6 months (n = 7), missing medical notes (n = 25), and missing film (n = 6).

Of these 58 patients with compression fracture, 35 patients (14 men and 21 women with a mean age of 59 years; range 46-82 years) had a malignant compression fracture and 23 patients (9 men and 14 women with mean age of 67 years; range 49-90 years) had a non-malignant compression fracture. The primary malignancy of patients with bony metastasis caused compression fractures were breast cancer (n = 12), lung cancer (n = 4), malignant melanoma (n = 4), prostatic cancer (n = 5), colorectal cancer (n = 3), thyroid carcinoma (n = 2), unknown primary (n = 2),

Table 1. Kappa values in each MRI finding

MRI findings	Kappa
Convex posterior border	0.79
Involvement of pedicle or posterior element	0.86
Epidural mass	0.76
Paraspinal mass	0.72
Fluid sign	0.90
Destruction of cortex	0.66
Spared normal bone marrow	0.70
Retropulsion of posterior bony fragment	1.00
Multiple compression fracture	0.93
Degenerative endplate change	0.69
Schmorl's node	0.93
Compression fracture of T12 and/or L1	1.00
Loss of disc height	0.70

cholangiocarcinoma (n = 1), lower gum cancer (n = 1), and adenoid cystic carcinoma (n = 1). The causes of benign compression fractures were osteoporosis (n = 13), trauma (n = 5), and infection (tuberculosis n = 4 and pyogenic n = 1). Of these 35 metastatic fractures, 13 were confirmed with biopsy and the remaining 22 cases were confirmed either by further imaging studies (such as plain film, bone scan, CT or MRI) or a clinical follow-up.

The kappa value was evaluated in each finding from both radiologists. Almost all of the MRI findings were in good and excellent agreement (0.61-1.00) as described in table 1. The sensitivity, specificity, PPV, and NPV of each MRI findings are summarized in Table 2.

Signal intensity or enhancement of the vertebral body and intervertebral disc in malignant and benign compression fracture are demonstrated in Table 3. More than seventy percent of malignant compression fractures have hyposignal intensity on T1-weighted, heterogeneous signal intensity on T2-weighted and diffuse enhancement on post gadolinium study without intervertebral disc involvement, whereas a benign cause shows variable signal intensity on both T1-weighted and T2-weighted sequences with varying enhancement pattern.

Combinations of two, three, four and five MRI features that had individual statistical significance (p-value less than 0.005) were additionally calculated for sensitivity, specificity, PPV, and NPV in the present study (Table 4). These variable MRI findings were convex posterior border, involved pedicle or posterior element, epidural mass, paraspinal mass and destruction of cortex. Combination of some MRI features result in very high specificity and high PPV (100 and 100% respectively). However, the sensitivity of these combination MRI findings slightly decreased compared with calculated individual MRI finding.

Table 2. Statistical analysis of MRI finding between metastasis and non metastasis compression fracture

MRI Findings	Metastasis (n = 35)	Non-metastasis (n = 23)	Sensitivity (95% CI)	Specificity (95% CI)	PPV	NPV	p-value
Convex posterior border	25 (71.0%)	1 (4.3%)	71.0% (53.7-85.4)	95.7% (78.1-99.9)	96.2%	68.8%	<0.001
Involvement of pedicle or posterior element	32 (91.4%)	4 (17.4%)	91.4% (76.9-98.2)	82.6% (61.2-95.1)	88.9%	86.4%	<0.001
Epidural mass	26 (74.3%)	6 (26.1%)	74.3% (65.7-87.5)	73.9% (51.6-89.8)	81.3%	65.4%	<0.001
Paraspinal mass	25 (71.4%)	5 (21.7%)	71.4% (53.7-85.4)	78.3% (56.3-92.5)	83.3%	64.3%	<0.001
Destruction of bony cortex	27 (77.1%)	3 (13.0%)	77.1% (59.9-89.6)	87.0% (66.4-97.2)	90.0%	71.0%	<0.001
Fluid sign on T2W	2 (5.7%)	4 (17.4%)	5.7% (0.7-19.2)	82.6% (61.2-95.1)	33.3%	36.5%	0.202
Spared normal bone marrow SI	3 (8.6%)	12 (52.2%)	8.6% (1.8-23.1)	47.8% (26.8-69.4)	20.0%	25.6%	<0.001
Retropulsion of a posterior bone fragment	0	2 (8.6%)	-	91.3% (72.0-98.9)	-	37.5%	0.153
Multiple compression fracture	22 (62.9%)	15 (65.2%)	62.9% (44.9-78.5)	34.8% (16.4-57.3)	59.5%	38.1%	1.000
Degenerative endplate change	2 (5.7%)	8 (34.8%)	5.7% (0.7-19.2)	65.2% (42.7-83.6)	20.0%	31.3%	0.010
Schmol's node	3 (8.6%)	4 (17.4%)	8.6% (1.8-23.1)	82.6% (61.2-95.1)	42.9%	37.3%	0.418
Fracture T12 or/and L1 vertebral body	7 (20.0%)	14 (60.9%)	20.0% (8.4-36.9)	39.1% (19.7-61.5)	33.3%	24.3%	0.002
Loss of disc height	1 (2.9%)	8 (34.8%)	2.9% (0.1-14.9)	65.2% (42.7-83.6)	11.1%	30.6%	0.002

Discussion

Malignant compression fracture is the most common complication of ossesous metastasis, especially in osteolytic type. Pedicle is the most commonly affected site, which may be seen as loss of cortical outline of pedicle on plain radiograph[6]. However, plain radiography is not sensitive enough since signs of bony metastasis may be easily missed on plain radiography. Up-to-date, it is accepted that MR imaging is far superior to other techniques and can reliably distinguish benign versus malignant based on anatomical distribution, intensity of signal changes

Table 3. Comparison of MRI finding pattern of signal intensity of vertebral body, disc and enhancement between metastasis and non metastasis compression fracture

Sign	Metastasis	Non-metastasis
Signal intensity of vertebral body on T1 W (p = 0.013)		
Hypo SI	25 (71.4%)	15 (65.2%)
Iso SI	1 (2.9%)	6 (26.1%)
Hyper SI	0	0
Mixed SI	9 (25.7%)	2 (8.7%)
Signal intensity of vertebral body on T2 W (p < 0.001)		
Hypo SI	7(20%)	6 (26.4%)
Iso SI	1 (2.9%)	6 (26.4%)
Hyper SI	0	4 (17.4%)
Mixed SI	27 (77.1%)	7 (30.4%)
Contrast enhancement of vertebral body (p < 0.001)		
Focal	0	5 (21.7%)
Linear	0	5 (21.7%)
Diffuse	33 (94.3%)	8 (34.8%)
Nonenhancement	2 (5.7%)	5 (21.7%)
Signal intensity of intervertebral disc on T2 W (p < 0.001)		
Low SI	2 (5.7%)	1 (4.3%)
Normal SI	33 (94.3%)	15 (65.2%)
High SI	0	7 (30.4%)
Contrast enhancement of intervertebral disc (p = 0.002)		
Rim	0	4 (17.4%)
Homogeneous	0	1 (4.3%)
Inhomogeneous	0	1 (4.3%)
Nonenhancement	35 (100%)	17 (73.9%)

SI = signal intensity

Table 4. Combination MRI features in difference of metastatic and non-metastatic compression fracture

Combination MRI features	Sign	Sensitivity	Specificity	PPV	NPV
2 features	1+2	71.4	100.0	100.0	69.7
	1+3	68.6	95.7	96.0	66.7
	1+4	62.9	100.0	100.0	63.9
	1+5	65.7	95.7	95.8	64.7
	2+3	74.3	87.0	89.7	69.0
	2+4	71.4	87.0	89.3	66.7
	2+5	77.1	91.3	93.0	72.4
	3+4	62.9	82.6	84.6	59.4
	3+5	68.6	87.0	88.9	64.5
	4+5	68.6	91.3	92.3	65.6
3 features	1+2+3	68.6	100.0	100.0	67.6
	1+2+4	62.9	100.0	100.0	63.9
	1+2+5	65.7	100.0	100.0	65.7
	2+3+4	62.9	91.3	91.7	61.8
	2+3+5	68.6	91.3	92.3	65.6
	3+4+5	62.9	91.3	91.7	61.8
4 features	1+2+3+4	60.0	100.0	100.0	62.2
	1+2+3+5	65.7	100.0	100.0	65.7
	2+3+4+5	62.9	91.3	91.7	61.8
5 features	1+2+3+4+5	60.0	100.0	100.0	62.2

1 = Convex posterior border, 2 = Involved pedicle or posterior element, 3 = Epidural mass, 4 = Paraspinal mass, 5 = Destruction cortex

of bone and adjacent tissues, contrast enhancement characteristics and changes over time[1-4].

The sensitivity and specificity for metastatic compression fractures were 97.1%, 95% CI (85.1-99.9%) and 95.7%, 95% CI (78.1-99.9%), respectively. PPV and NPV were 97.1% and 95.7% respectively. The overall diagnostic accuracy in the present study was comparable with previous reports[4,7,8].

MR imaging findings suggestive of metastasis compression fracture were convex posterior border of the vertebral body, abnormal signal intensity of the pedicle or posterior element, epidural mass, paraspinal mass and destruction of bony cortex (Fig. 1). Among these findings, epidural mass and paraspinal soft tissue mass had lower specificity for malignancy than the other criteria. Combination of two or more described MRI features could confirm or reassure the diagnosis of malignant compression fracture, especially when convex posterior border combined with pedicle destruction. However, with its lower sensitivity and these may not be sensitive enough for early diagnosis of vertebral metastasis.

The MR imaging findings that favor benign compression fracture are spared normal bone marrow signal intensity, fracture of T12 or/ and L1 and loss of disc height (p-value less than 0.005). In contrast, retropulsion of posterior bone fragment, multiple compression fracture, degenerative endplate change and Schmorl's node were of no clinical significance for differentiate benign and malignant compression fracture (p value more than 0.005).The finding with sensitivity, specificity, PPV and NPV are shown in Table 1 and 2.

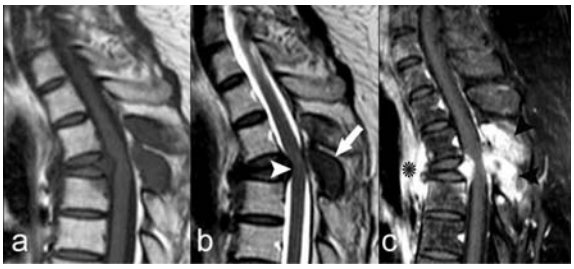

Fig. 1 Malignant vertebral metastasis. (a, b, c) Magnetic resonance images of thoracic spine of a 58-year-old female with a history of breast carcinoma who presented with back pain. (a) Pre-Gadolinium T1-weighted in sagittal plane, (b) T2-weighted in sagittal plane, (c) Post-Gadolinium T1-Weighted in sagittal plane show severe compression fracture at 8th thoracic spine with convex posterior border (white arrow head). The posterior compartment involvement of 7th and 8th vertebral bodies (white arrow) and paravertebral soft tissue (asterisk) were also apparent. After gadolinium injection, there is a vivid heterogeneous enhancement of the involved vertebrae and paraspinal soft tissue mass. All findings were typical characteristics of malignant compression fracture (black arrow heads)

Involvement of pedicle or posterior element is the most reliable finding in the present study (sensitivity 91.4% and specificity 82.6%), which is consistent with results of previous reports[4,8,9]. This finding is plausible because in most cases of malignant compression fractures, tumoral cell has already spread to the pedicles and neural arch before it collapses, whereas the reactive bone marrow changes usually spare the pedicles in osteoporotic compression fractures[3]. In addition, most vertebral metastases spread via hematogenous, and then it usually spares avascular regions such as cartilaginous endplate and intervertebral disks[10].

Convex posterior border is a secondary reliable finding with high sensitivity (71%) and specificity (95%) in the diagnosis of malignant compression fracture, which is consistent with previous study[1,3,8]. Charles et al suggested that this finding was suggestive, but not specific for malignant nature; 6% of osteoporotic vertebral collapses also showed this finding. Two mechanisms that may explain the presence of this finding in osteoporotic vertebral collapses, especially when the height of the vertebral body is greatly reduced, are fracture lines that extend into the posterior part of the vertebral body (resulting in an apparent convexity of posterior cortex) and bone marrow that may have been pushed out of the vertebral body during collapse[2].

Retropulsion of posterior bone fragment was only found in cases of benign compression fracture in the present study. It is relatively uncommon (2/23) compared to the previously published articles[1-3,11-13], which saw a high incidence of this finding in up to 93% of patients with benign compression fracture[2]. However, the presented much lower incidence could be explained by the fact that this sign was more commonly seen in high-force fracture (such as traumatic fracture) than low-force fracture (such as osteoporosis)[14], in which, the former is a minority in the present study. Retropulsion of a bone fragment into spinal canal may cause narrowing of the spinal canal and compression spinal cord or nerve roots and must be distinguished from a diffuse bulging of the posterior cortex, a rather common finding in malignant vertebral collapses.

Paravertebral soft tissue mass was another sign that had high sensitivity, specificity for suggestive of malignant compression fracture (71.4% and 78.9% respectively). This finding in the present study had a higher incidence than a previous study, which is possibly due to a larger number of advanced stage of metastasis in the presented population[3]. However, many cases of the presented benign compression fracture also demonstrated this sign. Van et al described the difference in shape of paravertebral soft tissue in benign and malignant compression fractures of which paravertebral soft tissue mass associated with malignant compression fracture were typically focally developed and involved only a part of the periphery of vertebral body. Whereas, paravertebral soft tissue associated with osteroporosis compression fracture typically has a diffuse shape, surrounding the whole vertebral body passing from one transverse process to the other[15]. In addition, paravertebral soft tissue in osteroporosis compression fracture is typically less than 10 mm. thickness and had equal thickness all around the vertebral body or slightly predominated at the anterior aspect of vertebra [15].

Signal intensity and pattern of enhancement of both vertebral body and intervertebral disc could not definitely differentiate malignant from benign causes of fracture (Table 2). Decreased T1-weighted and increased T2-weighted signals on subacute compression fracture are sensitive but not specific for tumor involvement[7,16]. Most of malignant compression fracture in the present study had hyposignal intensity on T1-weighted, mixed signal intensity on T2-weighted, diffuse enhancement of vertebral body on post gadolinium study, no disc involvement, where as benign cause showed iso to hyposignal intensity on T1-weighted, varying signal on T2-weighted and varying enhancement pattern.

Fluid sign is another helpful finding in differentiating non-malignant from malignant fracture. William et al first described this sign as fluid equivalent signal intensity located adjacent to the end plate and suggested that it is commonly seen in osteoporotic fracture. This sign is related to the severity of the fracture and has been reported in rare cases of avascular necrosis of the vertebral body[17-19]. The pathogenesis of osteonecrosis in vertebral body is two fold; the first mechanism is that of avascular necrosis, known as Kummel disease. The second mechanism is focal bone weakness in patients with osteoporosis in conjunction with minor trauma or even because of tumor infiltrate in metastatic disease. Baur et al propose that in acute osteoporotic fractures with bone marrow edema, fluid is pressed into space of osteonecrosis and causes fluid sign on MR imaging. In rare cases, the fluid sign can also occur in metastasis fractures because of blood supply and vascularity in the metastatic bone are likely to be more abundant than those in the aged osteoporotic bone[17,19]. In the present study, this sign had no clinical significant (p-value > 0.005) that may be due to the small number of patients or lesser number of acute stage of compression fracture (Fig. 2). The authors found this sign in both benign (4 patients) and malignant cases (2 patients).

Compression fracture involving T12 or/and L1 vertebral body is suggestive of benign compression fracture (p-value < 0.005) in the present study. These levels are involved in 60% of benign compression fracture whereas only 20% of malignant compression fracture occurred at these levels. Arther et al suggestive that Isolated fractures above T7 should alert the radiologist to a cause other than benign osteoporosis compression fracture[20].

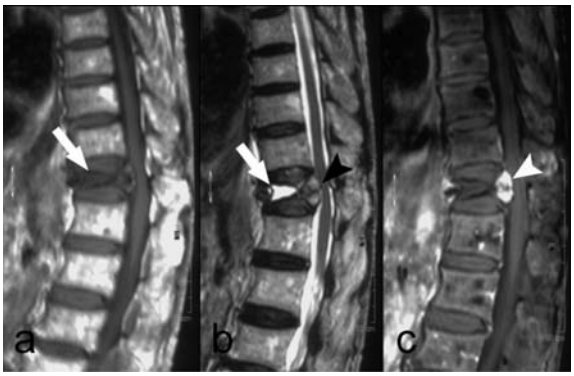

Fig. 2 Benign compression fracture. (a, b, c) Magnetic resonance images of the thoracic spine in a 85-year-old male presented with back pain without history of trauma. (a) Pre-Gadolinium T1-weighted in sagittal plane, (b) T2-weighted in sagittal plane, (c) Post-Gadolinium T1-weighted in sagittal plane reveal severe compression fracture at T12 vertebral body with triangular shaped accumulation of fluid equivalent signal intensity at the centre of the collapsed vertebra (white arrows). The finding represents fluid sign, which favours a benign process. Retropulsion of the fractured vertebra into the spinal canal is noted (black arrow head), which caused severe thoracic canal narrowing and compression of thoracic cord at this level. After Gadolinium enhancement, there is markedly homogeneous enhancement of retropulsion bony fragment (white arrow head)

One malignant lesion was misinterpreted by both radiologists as benign (Fig. 3). The pathological of this lesion is multiple myeloma. Frederic et al found that most vertebral compression fractures in patients with multiple myeloma appear benign on MR imaging, and their distribution is similar to that observed in osteoporotic fractures with predominant involvement of lower thoracic and upper lumbar vertebrae[21]. Multiple myeloma is characterized by a widespread dissemination of neoplastic plasma cells in the axial skeleton. Increased osteoclastic resorption is observed in association with diffuse spread of myeloma cells. Two main patterns of marrow involvement by myeloma cells have been recognized at histological examination: A diffuse infiltrative pattern and a focal nodular pattern, which appear as diffuse osteoporosis and focal osteolytic lesion on conventional radiographs, respectively. Therefore, there is a possibility of multiple myeloma with benign appearing vertebral compression fracture on MR imaging[22].

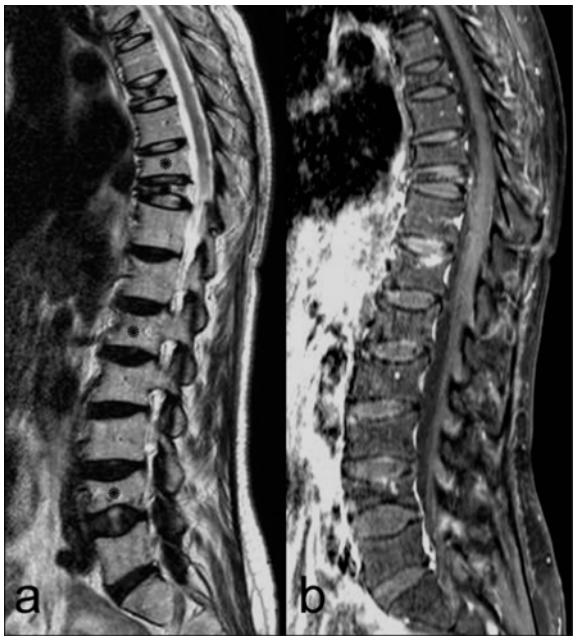

Fig. 3 Multiple myeloma. (a, b) Magnetic resonance image of the thoracolumbar spine in a 47-year-old female with multiple myeloma (a) T2-weighted in sagittal plane, (b) Post-Gadolinium T1-weighted in sagittal plane reveals multiple levels of compression fracture involving T7, T9, T10, L1 and L4 vertebral body (asterisks), most severe at T10 level. The vertebral marrow shows homogeneous signal intensity without bone marrow replacement and there is no destruction of the vertebral body present. After gadolinium injection, no significant enhancement of the vertebral marrow is observed, both anterior and posterior compartment. These findings were misinterpreted as benign compression fracture. Eventually, tissue biopsy at T10 vertebral body reveals multiple myeloma

Recently, diffusion-weighted imaging (DWI) is another useful method in differentiating malignant from osteoporosis compression fracture. Acute osteoporotic or traumatic vertebral compression fractures, the increase of free water in bone marrow due to edema and hemorrhage leads to an increase in the extracellular volume fraction relative to adjacent normal bone marrow. Therefore, the water mobility in the fractured vertebral body increased. In other words, there is no restrictive diffusion in the fracture region. Therefore, the apparent diffusion coefficient was high, which produces low signal intensity on DWI. Conversely, in malignant fractures the reduction of extracellular volume in densely packed tumorous tissue might lead to water restriction and an increase in signal intensity in DWI[23-26]. This new technique is another promising method for more accuracy in differential diagnosis in these two entities, especially in acute compression fracture where diagnostic problems usually occur.

Some limitations of the present study were that there was no histologic confirmation in all cases and small sample sizes. Some bias may also arise because both reviewers knew that all cases of compression fractures were either metastatic or osteoporotic, which may have increased the sensitivity of MR imaging for diagnosis of metastatic compression fractures.

Conclusion

MRI was the reliable method to differentiate between benign and malignant compression fracture. MR imaging findings suggestive of metastasis compression fracture are convex posterior border of the vertebral body, abnormal signal intensity of the pedicle or posterior element, epidural mass, paraspinal mass, and destruction of bony cortex. Combination of two or more than two MRI features resulted in very high specificity and PPV, especially when convex posterior border were found with pedicle destruction. Tissue diagnosis may not be necessary in the patient whom the procedure is not justified. The MR imaging that was suggestive of benign compression fracture were spared normal bone marrow signal intensity, fracture T12 or/and L1 and loss of disc height. Last but not least, multiple myeloma should certainly not be excluded in

patients with benign-appearing vertebral compression fracture on MR imaging.

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ความแม่นยำในการวินิจฉัยแยกโรคภาวะกระดูกสันหลังหักจากมะเร็งลุกลามจากภาวะโรคกระดูกอื่น ๆ โดยใช้การตรวจคลื่นแม่เหล็กไฟฟ้า

โสภา พงศ์พรทรัพย์, พร้อมเพรียง วจนะวิชากร, ณสุดา ด่านชัยวิจิตร

วัตถุประสงค์*: เพื่อศึกษาความแม่นยำในการวินิจฉัยแยกโรคและลักษณะเฉพาะทางภาพถ่ายคลื่นแม่เหล็กไฟฟ้าในผู้ป่วยกระดูกสันหลังยุบตัวจากมะเร็งลุกลาม*

วัสดุและวิธีการ*: ศึกษาย้อนหลังจากผู้ป่วยที่ได้รับการตรวจคลื่นแม่เหล็กไฟฟ้าของกระดูกสันหลังที่มีภาวะกระดูกยุบตัว ในโรงพยาบาลศิริราชตั้งแต่เดือนมิถุนายน พ.ศ. 2547 ถึง กุมภาพันธ์ พ.ศ. 2549 โดยศึกษาความไว ความจำเพาะ ความแม่นยำของ ลักษณะที่พบทางภาพถ่ายคลื่นแม่เหล็กไฟฟ้า*

ผลการศึกษา*: พบผู้ป่วย 58 คน โดย 35 คนมีภาวะกระดูกสันหลังยุบตัวจากภาวะกระจายของมะเร็งระยะลุกลาม ผู้ป่วย 23 คนมีภาวะกระดูกสันหลังยุบตัวจากภาวะกระดูกพรุน ลักษณะภาพคลื่นแม่เหล็กไฟฟ้าที่พบในผู้ป่วยกระดูกสันหลังยุบตัวจากภาวะกระจายของมะเร็งระยะลุกลามได้แก่ convex posterior border of the vertebral body, involvement of the pedicle or posterior element, epidural mass, paraspinal mass and destruction of bony cortex ซึ่ง involvement of pedicle or posterior element มีค่าความไวและจำเพาะมากที่สุด (91.4% และ 82.6% ตามลำดับ) นอกจากนี้เมื่อรวมลักษณะภาพที่พบหลายๆลักษณะจะช่วยเพิ่มความจำเพาะในการวินิจฉัยโรคได้สูงมากขึ้น*

สรุป*: ลักษณะภาพคลื่นแม่เหล็กไฟฟ้ามีความน่าเชื่อถือค่อนข้างสูง ที่จะแยกภาวะกระดูกยุบตัวจากมะเร็งระยะแพร่กระจายและจากภาวะโรคกระดูกอื่น ๆ การรวมลักษณะภาพที่พบหลาย ๆ ลักษณะ จะช่วยเพิ่มความจำเพาะในการวินิจฉัยโรคได้สูงมากขึ้น*