

Diffusion weighted MR imaging of bone marrow in the spine: Benign and malignant compression fractures, and osteomyelitis

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Purpose: To evaluate the usefulness of diffusion weighted MR imaging of vertebral bone marrow in osteoporotic, traumatic, and metastatic compression fracture, and osteomyelitis.

Materials and Method: 38 patients with vertebral compression fracture (7 traumatic, 17 osteoporotic, and 10 metastatic) and 4 patients with spondylitis (2 pyogenic, 2 tuberculous) were examined with MR Imaging. MR imaging was performed with a 1.5-T scanner (Magnetom Vision, Siemens, Erlangen, Germany) with a spine array coil. The diffusion-weighted imaging sequence is based on reversed fast imaging with steady-state precession (PSIF), in which the echo part of PSIF signal is used with TR of 21.6 msec and a diffusion pulse length of 5 msec. The diffusion gradient strength was 24 mT/m, with a relatively low b value. Also spin-echo MR images are available for all patients. The signal intensity characteristics were evaluated with contrast ratio and signal to noise ratio of bone marrow.

Results: Bone marrow contrast ratio and signal to noise ratio of vertebral compression fractures and osteomyelitis at diffusion-weighted MR imaging

Parameters \ Diagnosis	Compression Fracture			Osteomyelitis
	Traumatic	Osteoporotic	Metastatic	
Contrast Ratio	-0.44 ± 0.07	-0.51 ± 0.14	1.05 ± 0.72	0.97 ± 0.95
Signal to Noise Ratio	2.54 ± 1.54	2.46 ± 0.80	7.92 ± 4.14	3.78 ± 2.26

Data are given as the mean ± standard deviation

Conclusion: All traumatic and osteoporotic compression fractures were hypointense to adjacent normal vertebral bodies at diffusion-weighted MRI, but metastatic compression fractures were hyperintense. At diffusion weighted MRI, also all osteomyelitis were hyperintense to adjacent normal vertebral bodies, but signal to noise ratio were lower than those of metastatic compression fractures. Diffusion-weighted MR imaging is good method for differential diagnosis in abnormal vertebral bone marrow.