Case 368

5. Bone marrow cell proliferation (regenerative bone marrow, myelodysplastic disease, myeloma, leukemia)

【Progress】

He is scheduled to be introduced to hospital where hematology physician can serve.

【Discussion】

As space occupying lesions, spine CT and MRI are useful for their differentiation. spine hemangioma, compression fracture, pyogenic spondylitis, metastatic bone tumor, myeloma, myelodysplastic syndrome, leukemia, and regenerative bone marrow are relatively characteristic on their images.

Spine hemangioma includes lipid component whose are depicted high signal intensity on T1WI and T2WI, though fat suppression T2WI depict low signal intensity (1, 2).

Compression fracture of fresh type is depicted marked high signal intensity on fat suppression T2WI and marked low signal intensity on T1WI, indicative of bone marrow edema. Spine CT images also depict slight high attenuation corresponded to bone edema (1, 2).

Metastatic spine tumor is also depicted the same signal intensity pattern on both T1WI and T2WI. It is needed their differentiation between them. Diffusion WI and ADC values might be useful for differentiation between them. It is reported that ADC values for metastatic bone tumors are 0.69 whereas those for benign compression fractures are 1.62 (3, 4). Other report said that ADC values of hemangioma are 1.82, those of benign collapse, 1.94, those of pyogenic spondylitis, 1.47 while those of metastases, 0.69 (5, 6). Cut off values between benign and malignant are 1.21 (1, 5, 6). Normal ADC values of bone marrow are 0.37-0.42 (2). Bone metastasis from prostate carcinoma usually forms osteoblastic, calcified mass, easily diagnostic on radiograph and CT, though most metastases to bone appear as osteolytic lesion.

Pyogenic spondylitis usually expands not just vertebral body but also vertebral disk, accompanied with extra vertebral growth. It sometimes invades to psoas muscle. ADC values of pyogenic spondylitis are relatively high, usually 1.2 or greater (5).

Bone marrow creating blood cells covert red bone marrow to yellow bone marrow as aging. When anemia emerges in the aged, red marrow proliferates, calling reconversion marrow of red marrow reappearing in yellow marrow. Red bone marrow including reconversion bone marrow is a compacted accumulation of bone marrow cells, approximately 7 microns in size. This situation causes diffusion disorder of water molecules whose ADC values are around 0.4 (6). On MRI imaging, bone marrow is depicted as low signal intensity on both T1WI and T2WI.

In our case, multiple lesions at spine vertebrae are depicted both low signal intensity on both of T1WI and T2WI, although multiple lesion of spine vertebrae are not depicted on CT. The lesion is considered compact accumulation of myeloma cells, indicative of regenerative bone marrow (bone marrow reconversion) or myeloma including leukemia and myelo-dysplastic syndrome.

【Summary】

We presented a seventy-six-year-old male with lumbago. Spine CT and MRI depict compression fracture of L1. Further, multiple lesions with both low signal intensity on T1WI and fat suppression T2WI are depicted at lower thoracic spine and L2-L5 spine, indicative of myeloma cell compact such as myeloma, myelodysplastic syndrome and regenerative red bone marrow. It is borne in mind that spine space occupying lesions are listed: hemangioma, benign compression fracture, metastatic spine tumor, pyogenic spondylitis, and compact myeloma cell proliferation such as myeloma, leukemia, myelodysplastic syndrome and regenerative bone marrow (bone marrow reconversion). For their differentiation, combination findings of CT and MRI are vital.

【References】

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