

## Lumbar MRI of the young focusing on spondylolysis cases

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### Abstract

We have often conducted lumbar MRI of junior and senior high school students who perform sport activity and have a chief complaint of persistent low back pain. The disease is often described as 'spondylolysis'. In this report, what we learned from lumbar MRI to examine spondylolysis in the growth period and points to pay attention to on the acquisition of images are summarized. The first case was a 17-year-old female with typical spondylolysis, the second case was a 14-year-old female with unilateral spondylolysis, and the third case was a 14-year-old male with spondylolysis accompanied by a fracture line in the sacral region. In patients suspected to have spondylolysis, the presence or absence of bone marrow edema in the vertebral arch is confirmed with a sagittal view on T2-STIR, and when an abnormally high intensity is observed, the coronal and transverse views sufficiently including the vertebral arch are imaged. The bilateral vertebral arch regions can be compared on coronal T2-STIR, and expansion of the lesion can be easily identified. When concomitant sacral bone injury is present, coronal T2-STIR images may be useful to make a diagnosis. Tottori J. Clin. Res. 7(1), 49-53, 2016

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### Objective

We have often conducted lumbar MRI of junior and senior high school students. Many of them perform sport activity and visit our hospital with a chief complaint of persistent low back pain. It is often described as 'spondylolysis' based on examination and image interpretation reports. Initially, we lacked knowledge about spondylolysis and did not know what we should pay attention to on examination. We performed examinations while obtaining advice from image-reading physicians and senior technologists. In this report, we summarize spondylolysis in the growth period with regard to what we learned from examinations performed at Hospital A and what we should pay attention to on the acquisition of images.

### Acquisition conditions

The MRI acquisition sequence was: sagittal and transverse views on T1- and T2-weighted and T2-fat suppression (T2-STIR) imaging and a coronal view on T2-STIR imaging. The fat suppression method depicts fat components in the acquisition area to a low signal. Since the intensity of water-containing tumors and edema is high with T2-fat suppression, the diagnostic performance increases in the presence of bone marrow edema

accompanying fracture. Among the fat suppression methods, the T2-STIR method utilizes differences in the longitudinal relaxation time among tissues, and the inversion time is measured when the longitudinal magnetization of fat becomes 0. Since it is unlikely to be influenced by magnetic homogeneity, a wide acquisition range can be set, but the acquisition conditions should be carefully set because the signal to noise ratio (SNR) (ratio of the image intensity to the noise level) may decrease.

### Case presentation

#### 1. Typical case of spondylolysis

The patient was a 17-year-old female with a chief complaint of low back pain. On sagittal T2-STIR (Fig. 1), high intensities were noted in the bilateral vertebral arch pedicles of the 5th lumbar vertebra (Fig. 1A, C). With a transverse view (Fig. 2), these regions showed a low intensity on T1-weighted imaging (Fig. 2B), a high intensity on T2-weighted imaging (Fig. 2A), and a distinct high intensity on T2-STIR (Fig. 2C). These are features of bone marrow edema, suggesting spondylolysis of the 5th lumbar vertebra.

Since bone marrow edema is small and unnoticeable, it is necessary to carefully observe the initially acquired sagittal image.