

Figure 1. The fracture line (arrow) from the caudal side of the pars interarticularis to the superior intervertebral foramen.

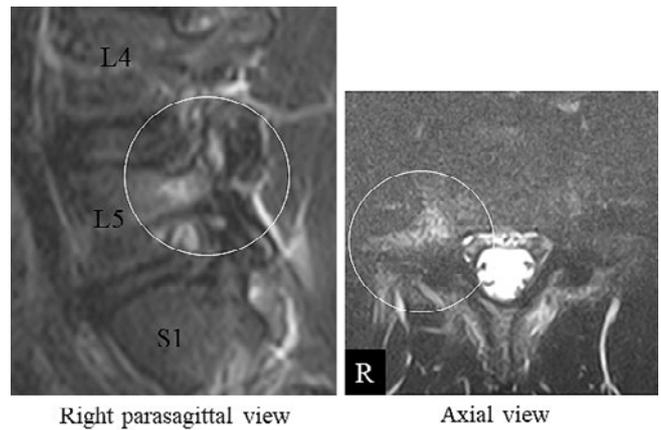


Figure 3. High signal intensity (circle) in the superior articular process and the pedicle around the fracture line.

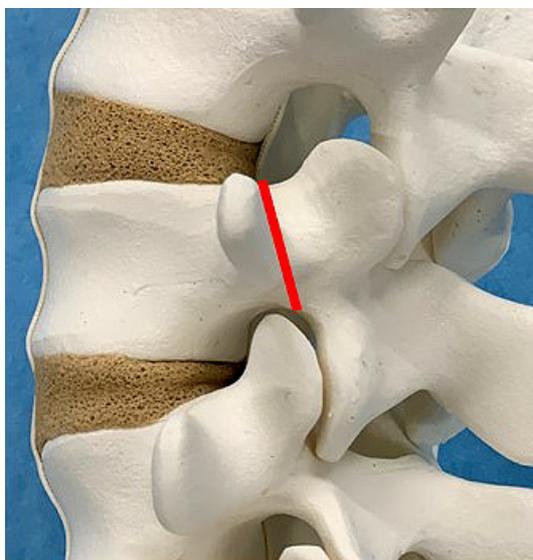


Figure 2. A model showing the atypical fracture line in the coronal plane along the dorsal side of the right transverse process from the caudal side of the pars interarticularis to the superior intervertebral foramen seen in this case.

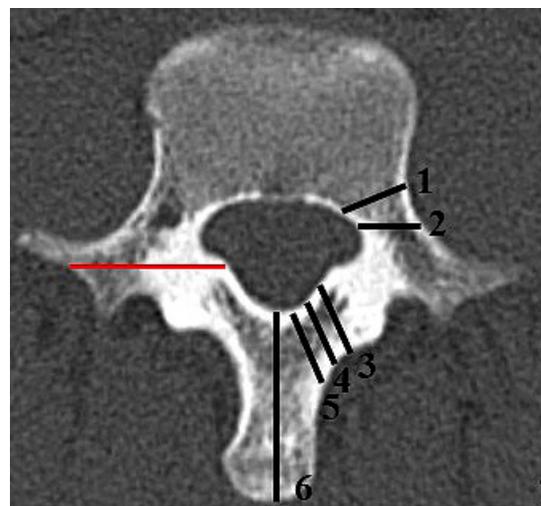


Figure 4. Illustration showing the six previously reported atypical fracture lines depicted by black lines. Red line indicates the new fracture line type reported in this case.

condition.

A comprehensive understanding of all variations of non-isthmic spondylolysis will not only help to prevent misdiagnosis and overlooks but will also facilitate appropriate treatment.

Conflicts of Interest: The authors declare that there are no relevant conflicts of interest.

Author Contributions: Hiroaki Manabe drafted this report. Kosuke Sugiura, Yoshihiro Ishihama, Fumitake Tezuka, Kazuta Yamashita, Yoichiro Takata, Toshinori Sakai, and Toru Maeda collected patient data. Koichi Sairyō made significant revisions to the manuscript. All authors approved the final version of the manuscript submitted for publication.

Informed Consent: Informed consent was obtained by all participants in this study.

References

1. Sakai T, Sairyō K, Takao S, et al. Incidence of lumbar spondylolysis in the general population in Japan based on multidetector computed tomography scans from two thousand subjects. *Spine (Phila Pa 1976)*. 2009;34(21):2346-50.
2. Wiltse LL, Widell EH Jr, Jackson DW. Fatigue fracture: the basic lesion is isthmic spondylolisthesis. *J Bone Joint Surg Am*. 1975; 57(1):17-22.
3. Micheli LJ, Wood R. Back pain in young athletes. Significant differences from adults in causes and patterns. *Arch Pediatr Adolesc Med*. 1995;149(1):15-8.
4. Viana SL, Viana MA, de Alencar EL. Atypical, unusual, and misleading imaging presentations of spondylolysis. *Skeletal Radiol*. 2015;44(9):1253-62.
5. Nakayama T, Ehara S. Spondylolytic spondylolisthesis: various imaging features and natural courses. *Jpn J Radiol*. 2015;33(1):3-

- 12.
6. Miyagi R, Sairyo K, Sakai T, et al. Two types of laminolysis in adolescent athletes. *J Orthop Traumatol.* 2012;13(4):225-8.
7. Sairyo K, Katoh S, Sasa T, et al. Athletes with unilateral spondylolysis are at risk of stress fracture at the contralateral pedicle and pars interarticularis: a clinical and biomechanical study. *Am J Sports Med.* 2005;33(4):583-90.
8. Sairyo K, Katoh S, Komatsubara S, et al. Spondylolysis Fracture Angle in Children and Adolescents on CT Indicates the Fracture Producing Force Vector: A Biomechanical Rationale. *Internet J Spine Surg.* 2004;1(2).
9. Oshikawa T, Morimoto Y, Kaneoka K. Unilateral rotation in baseball fielder causes low back pain contralateral to the hitting side. *J Med Invest.* 2018;65(1.2):56-9.
10. Conte SA, Thompson MM, Marks MA, et al. Abdominal muscle strains in professional baseball: 1991-2010. *Am J Sports Med.* 2012;40(3):650-6.

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