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Case Report

# Bilateral Pedicle Stress Fracture Accompanying Spondylolysis in a Patient with Ankylosing Spondylitis

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Bilateral pedicle stress fracture is a rare entity and few cases have been reported in the literature. Furthermore, the majority of these reports concern previous spine surgery or stress-related activities. Here, the authors report ankylosing spondylitis as a new cause of bilateral pedicle stress fractures accompanying spondylolysis. The reported case adds to the literature on bilateral pedicle stress fracture and spondylolysis by documenting that ankylosing spondylitis is another cause of this condition.

**KEY WORDS :** Spine fracture · Spondylolysis · Ankylosing spondylitis.

## INTRODUCTION

Bilateral pedicle stress fractures in the spine are uncommon and most are associated with previous spine surgery or stress related activities[6,7,9-12]. We report a rare case of bilateral pedicle stress fracture accompanying spondylolysis in a patient with ankylosing spondylitis. To the best of our knowledge, no such case has been previously described.

## CASE REPORT

A 63-year-old man with a 4-year history of ankylosing spondylitis (AS) was admitted to our institute due to severe low back pain. The patient presented with a history of several years of mild back pain but the pain had exacerbated progressively without any history of a traumatic episode or spinal surgery to the extent that he had not been able to walk for 2 months at admission. A physical examination revealed a marked reduction in all back movement and increased pain especially on extension. The pain worsened with activity, and the patient experienced relief pain by sitting or lying down. He had no straight leg raising restriction. Bone densitometry results indicated that his spine density as below average, and mean spinal T-score was -3.67. Plain radiographs showed severe degenerative change and spondylosis, but bilateral pedicle fracture was not clearly depicted. However, computed tomographic scans revealed a bilateral pedicle fracture accompanying spondylolysis through L4 (Fig. 1). Magnetic resonance imaging also revealed osteoporotic compression fractures at the L4 and L5 levels (Fig. 2). The patient underwent surgery through a posterior approach. After removing the posterior segment and L4-L5 discectomy, interbody fusion using peek cages packed with autologous local bone chips to provide anterior column support was performed (Fig. 3).

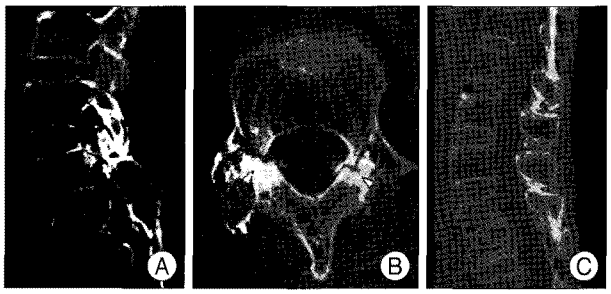


**Fig. 1.** Sagittal and axial computed tomographic scans show bilateral pedicle fracture. A and B : Computed tomographic scans reveal a bilateral L4 pedicle fracture (arrow) accompanying spondylolysis with sclerosis (arrowheads). C : Sagittal computed tomographic scan show ankylosed spine at posterior element.

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**Fig. 2.** T1 weighted magnetic resonance image show osteoporotic compression fracture at L4 and L5.

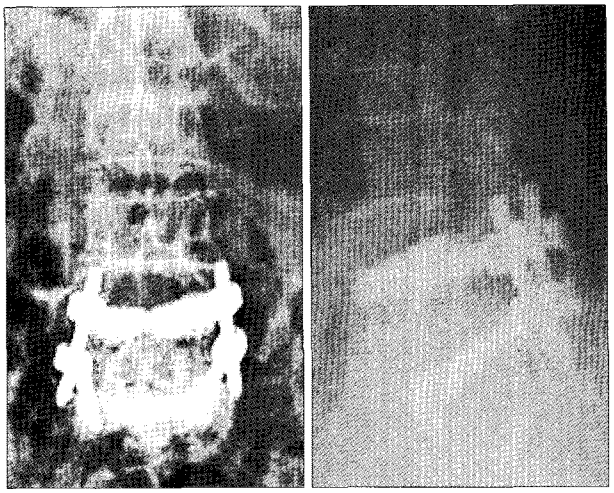

**Fig. 3.** Postoperative simple radiographs show bone cement augmented interbody fusion at L4-L5 level.

## DISCUSSION

Repetitive mechanical stress fractures in the vertebral neural arch are usually located in the pars interarticularis or to a substantially lesser extent in the pedicle[6]. The pedicle has greater intrinsic strength and a shorter moment arm from the vertebral body, and therefore, can resist greater cyclic shear forces[4]. Contralateral spondylolysis and unilateral pedicle stress fractures have been clearly described in the literature[1,4,5]. However, bilateral stress fractures of the pedicle in the spine are rarely encountered. Most bilateral pedicle stress fractures are associated with underlying causative factors, such as, previous spine surgery or stress-related activities[6,9,10,12], and to the best of our knowledge, no case of bilateral pedicle fracture has been previously reported in a patient with AS.

AS is a progressive inflammatory disease that primarily affects axial joints. Spinal involvement in AS is characterized by enthesopathy or inflammation, and ossifications of ligaments, intervertebral discs, endplates, and of apophyseal structures[3,13]. Osteoporosis is a well-known complication of AS, and bone loss is the result of changes in the material and structural properties of bone, which leads to an increased risk of stress fracture. Furthermore, the ankylosed spine is prone to fracture after minor trauma due to these changes in its biomechanical properties, and the risk of spinal compression fractures in such cases may be 7-fold that of healthy individuals[3]. Normal bones are strong, yet light and flexible, and resistant to fracture, but because of the brittle nature of the spine in AS, stress fractures can develop after minor trauma or even in the absence of a specific trauma history[2,8,14]. The precise cause of the neural arch stress fracture in our patient was not established. However, we believe that it was the result of cantilever motion, namely, motion in the anterior segment with respect to the posterior segment. In our patient, the pedicle fractures appeared to be old given evidence of sclerosis at fracture margins along with pseudoarthrosis. Thus, we speculate that continuous fatiguing stresses were applied to the pars interarticularis and osteoporotic pedicles, and that the latter subsequently failed and caused the microfractures. It would tend to concentrate stress and deformation at the sites of fracture, and once a fracture had occurred, the long rigid lever arm represented by the ankylosed spine may have subsequently contributed to the formation of pseudoarthrosis, which healed spontaneously and was gradually remodeled. Antiresorptive treatment is recommended for osteoporotic patients with AS. Our patient presented with bilateral pedicle fractures accompanying spondylolysis and an osteoporotic compression fracture of the L4 and L5 vertebral body without a traumatic episode, and was treated with bone cement augmented interbody fusion.

## CONCLUSION

Continuous fatiguing stresses in AS can cause bilateral pedicle stress fracture in the absence of major trauma, previous spine surgery, or stress related activity.

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