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Case Report

Multi-Level, Bilateral Pedicle Fractures: Case Report

Çok Seviyeli, İki Taraflı Pedikül Kırıkları: Olgu Sunumu

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ABSTRACT

Bilateral pedicle fracture is an extremely rare entity and few cases have been reported in literature. A case of bilateral multi-level pedicle fractures involving four lumbar vertebrae is being presented. Bilateral pedicle stress fracture at L1 - L4 was observed in a 61-year-old woman presented with low back pain. There was no any predisposing factor like trauma, spinal surgery, smoking or alcohol consumption except mild osteoporosis and bisphosphonate usage in the patient's medical history. We are unable to determine whether the fractures are related to osteoporosis or bisphosphonate therapy but these are the only remaining suspected reasons in the present case. Further studies are required to define the effect of bisphosphonates usage on vertebral segments.

KEYWORDS: Bilateral pedicle fractures, Multi-level, Osteoporosis, Bisphosphonates usage

ÖZ

Bilateral pedikül kırığı oldukça nadir bir klinik tablodur. Bel ağrısı şikayeti ile başvuran 61 yaşındaki kadın hastada L1- L4 düzeyinde bilateral pedikül kırığı izlendi. Klinik öyküde osteoporoz ve bifosfonat kullanımı dışında herhangi bir predispozan faktör yoktu. Bifosfonat kullanımının vertebralar üzerine olan etkisinin tanımlanabilmesi için daha fazla sayıda çalışmaya ihtiyaç vardır.

ANAHTAR SÖZCÜKLER: İki taraflı pedikül kırığı, Çok-seviyeli, Osteoporoz, Bifosfonat kullanımı

INTRODUCTION

Bilateral multi-level pedicle fracture is an extremely rare condition and is generally associated with previous spine surgery or stress-related activities (2, 6, 7). We report a case of bilateral multi-level (four levels) pedicle fracture that was not associated with any obvious risk factors except bisphosphonate usage for osteoporosis. No such case has been previously reported in the literature.

CASE REPORT

A 61-year-old woman was admitted to our outpatient clinic with low back pain two years ago. Lumbo-sacral vertebral direct radiographies and computed tomography (CT) (Figure 1A-E) scan, obtained two years ago, showed grade 1 compression fractures on the end plates that could be associated with osteoporosis but no fracture line was seen at the pedicles. Conservative therapy (analgesic medications and resting) was suggested by the physician for the patient's complaints. After two-years, the patient was re-admitted to our clinic because of the worsening of her low back pain. There was no trauma, spinal surgery, smoking or alcohol consumption in her medical history but there was usage of bisphosphonate (70 mg once a week) and vitamin D for postmenopausal osteoporosis (dual-energy x-ray absorptiometry results indicated decreased bone density compatible with osteoporosis; the mean T-score of the lumbar spine was -3,0 at the start of treatment) for the last four years. Physical examination showed mild reduction in all back movements and tenderness on the spinous process at the lumbar region. Computed tomographic scans (Figure 2A-E; 3A, B) revealed the presence of a bilateral pedicle stress fracture of the lumbar vertebrae with pseudoarthrosis (at L1-L4 levels) and incomplete fracture at the upper side of the right L5 vertebra pedicle. There were also grade 1 compression fractures on the end plates due to mild osteoporosis but we could not find any other bone abnormalities in the vertebrae (such as lytic lesion or anything else).

Surgical treatment (posterior spinal fusion) was suggested to the patient. However she declined surgical intervention and underwent a physical therapy program.

DISCUSSION

Stress fractures occur in normal or abnormal bone when repetitive mechanical load exceeds the biological capacity of the bone. Fatigue fracture is a type of stress fracture, and is due to abnormal stresses on normal bone, while insufficiency fractures occur when normal physiological stress is applied to bone with deficient elastic resistance or mineral content (14). Vertebral pedicles are a component of the neural arch like the pars interarticularis and are vulnerable to cyclic loads. However, pedicle stress fractures are much less common than pars interarticularis fractures in the spine. In a study of the matter, Cyron et al. reported five pedincular stress fractures compared to 55 pars interarticularis fractures subjected to cyclic shear loads (1). A study by Robertson et al. can clarify that condition; they stated that the pedicle has greater intrinsic strength and a shorter moment arm from the

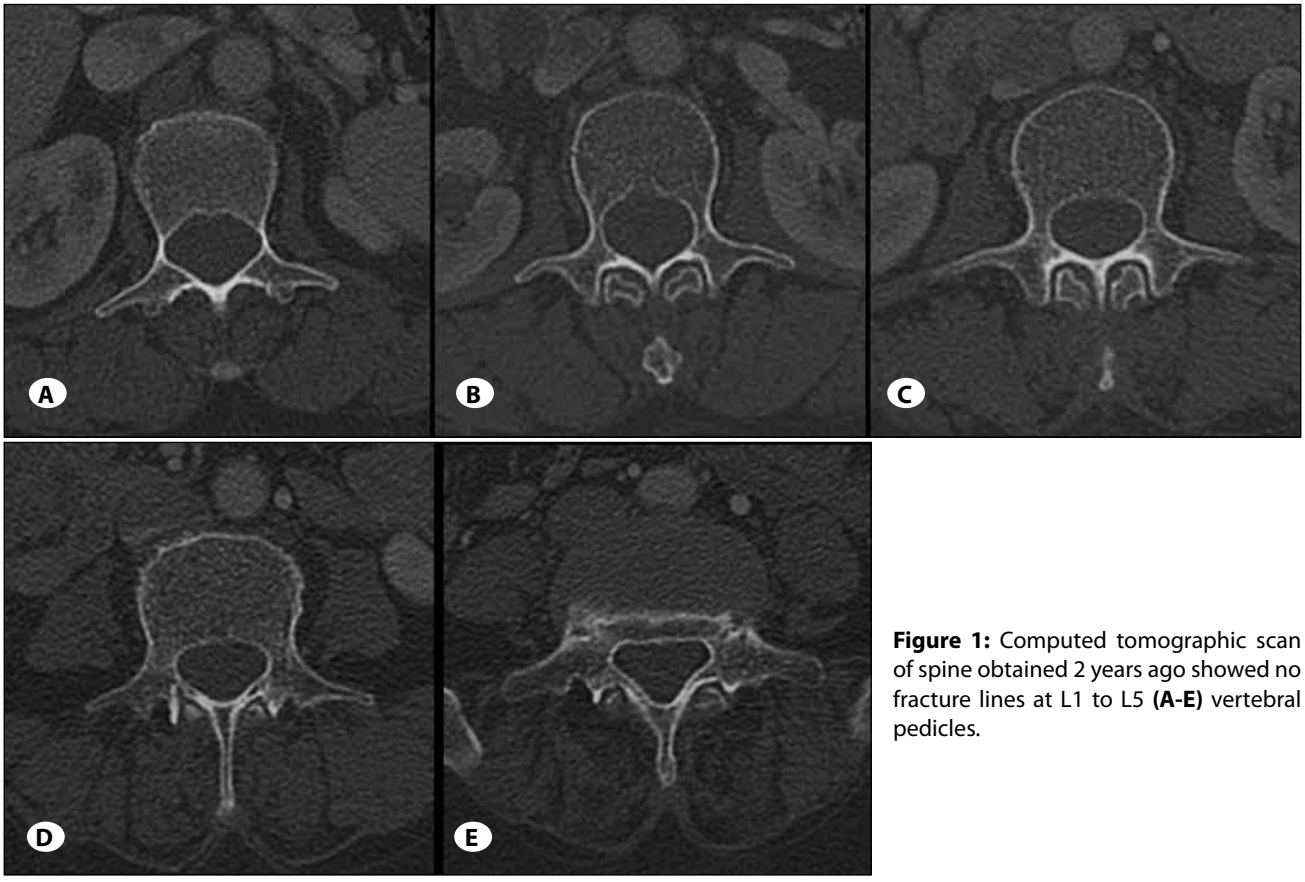

Figure 1: Computed tomographic scan of spine obtained 2 years ago showed no fracture lines at L1 to L5 **(A-E)** vertebral pedicles.

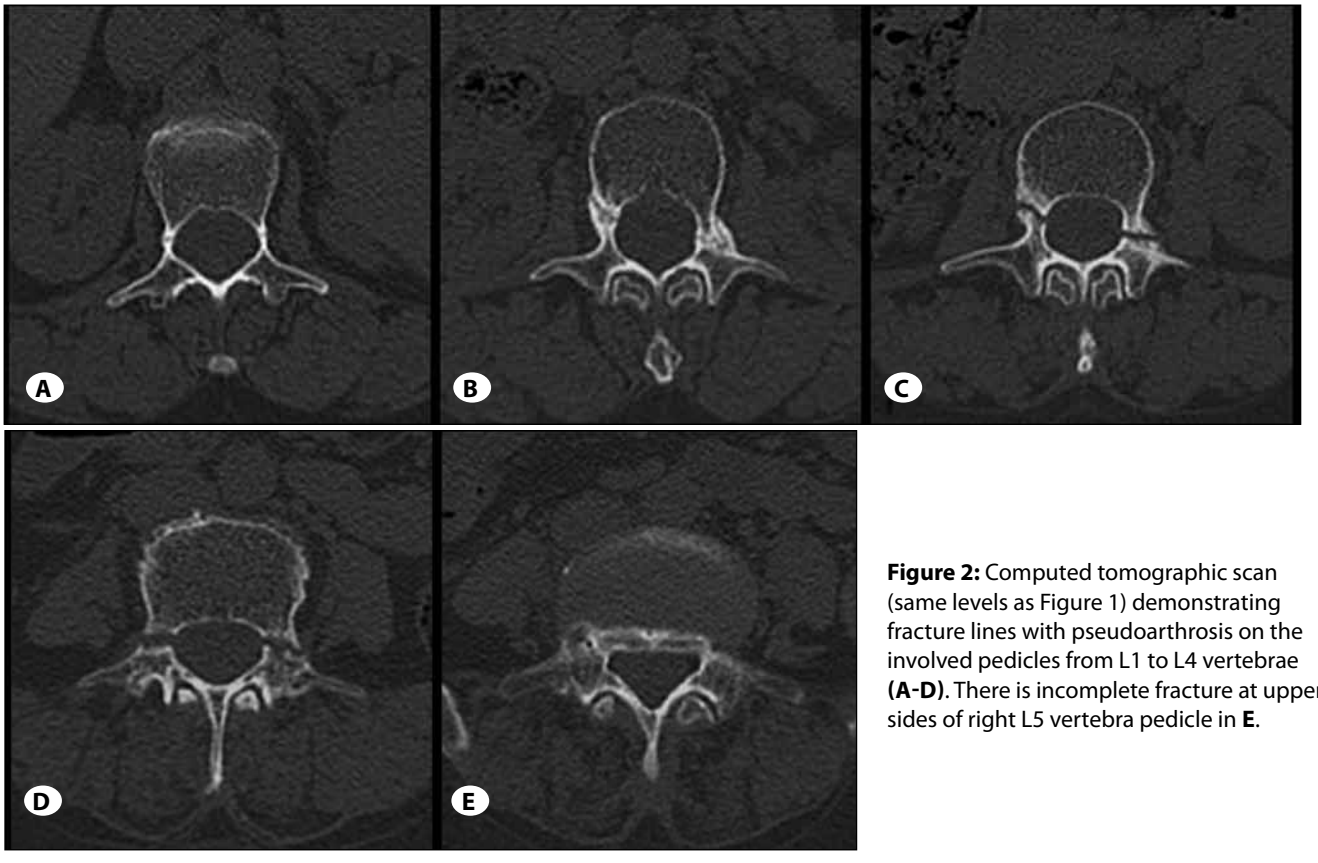

Figure 2: Computed tomographic scan (same levels as Figure 1) demonstrating fracture lines with pseudoarthrosis on the involved pedicles from L1 to L4 vertebrae **(A-D)**. There is incomplete fracture at upper sides of right L5 vertebra pedicle in **E**.

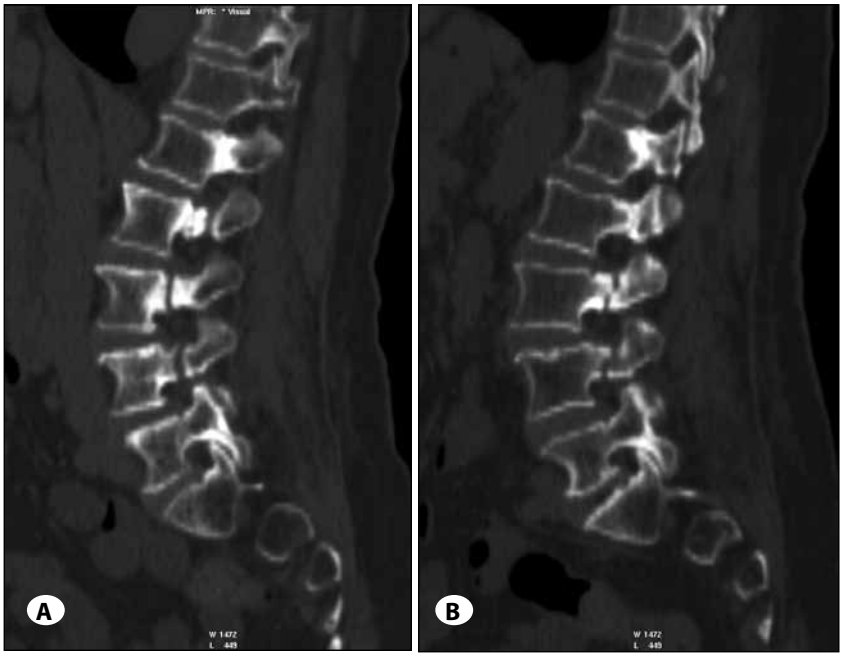

Figure 3: Parasagittal reformatted computed tomography images showing L1-L4 pedicle fractures on **A)** right and **B)** left sides.

vertebral body and therefore can resist greater cyclic shear forces (12). In our patient, the pedicle fractures had sclerotic edges compatible with pseudoarthosis, thus, we guess that continuous fatiguing stresses caused the fractures on the osteoporotic pedicles.

Bilateral pedicle stress fracture is a rare entity and we found that few cases have been reported in literature and underlying causative factors like previous spine surgery, spondylolysis or spondylolisthesis were described in these cases (2, 6-8, 13). The pedicle may be exposed to increased forces after spine surgery, especially after spinal fusion, and the few pedicle stress fracture cases after surgery that occurred at the most proximal level of the fusion have been reported (3, 9, 12). Similarly, only some cases of bilateral pedicle stress fracture have also been reported to be related with only patient's daily living activity (5, 11). Osteoporosis causes mineral and structural changes and leads to an increased risk of stress fractures due to the weaken structure of bones. Stress fracture of the pedicle was reported in an elderly female patient caused axial osteoporosis and producing a spondylolisthesis (15). Kim et al. also reported that a severe osteoporotic patient had bilateral pedicle stress fractures involving two adjacent vertebras together with spondylolisthesis (8). According to our knowledge, there is no previously reported case of multi-level (involving four consecutive vertebrae) bilateral pedicle stress fracture. Our patient did not have any predisposing risk factors for pedicle fractures except osteoporosis and bisphosphonate usage. We can find just one case who had bilateral pedicle fracture at one level associated with bisphosphonate therapy (the patient had been using risedronate for 10 years) in the literature (4). Odvina et al. found nine patients with spontaneous non-pathological fractures that developed during daily living activities (such as walking, standing, etc.) after long-term bisphosphonate use since 2005 (10). They concluded that long-term alendronate treatment causes strong suppression in bone turnover and lead atypical localized fractures, especially femur body fractures but non-spinal. Actually, we could not know whether the fractures were related to osteoporosis or bisphosphonate therapy but these remain as the possible causes in the present case.

CONCLUSION

We report a unique case of multi-level bilateral pedicle stress fractures in consecutive four vertebrae occurring in the absence of major trauma, previous spine surgery, or stress-related activity except bisphosphonate use for osteoporosis. Furthermore, studies are required to define the effect of bisphosphonates usage on vertebral segments.

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