

# CASE REPORT

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## Early Stress Fracture of the Pelvic Ring Following Proximal Extension of an Instrumented Lumbosacral Fusion to Treat Junctional Kyphosis

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We report a case of early stress fracture of the pelvic ring following an extension of a multilevel instrumented lumbosacral fusion in an osteopenic female. Surgeons should be aware of possibilities of pelvic complications in osteopenic patients with lumbosacral arthrodesis and should take care when harvesting iliac bone graft.

**KEY WORDS :** Early stress fracture · Pelvic ring · Long instrumented fusion · Adult deformity.

### Introduction

Stress fracture of the pelvic ring is a rare complication of instrumented lumbosacral fusion<sup>1,3,4</sup>. The fracture is attributed to distal transmission of stress following multi-segmental fusion<sup>9</sup>. Typically, the stress fractures occur late in osteoporotic patients after a multisegmental lumbosacral fusion<sup>7,8</sup>. Atraumatic early (within 4weeks) fractures of the pelvic ring are more uncommon than the delayed fractures and are considered to be related to bone graft procuring<sup>6</sup>.

Literature reviews show that all the reported early fractures of the pelvis occurred in osteoporotic patients shortly after a lumbosacral or lower lumbar fusion on the side of iliac graft harvesting<sup>6,7</sup>.

Authors recently experienced an early pelvic ring fracture on the right graft donor side in a patient who underwent proximal extension of fusion for junctional kyphosis that developed 6months after a lengthy instrumented fusion to the sacrum. The fracture involved the iliac wing and both the superior and inferior pubic rami of the right pelvic bone. To authors' knowledge, there were no prior reports of early pelvic ring stress fracture in Korea, occurring in a patient after a multisegmental lumbosacral fusion. This article is to report the case.

### Case Report

A 60-year-old female patient presented with back pain and severe sagittal imbalance that slowly progressed since 15years ago. She did not have any significant trauma history. Radiographic studies demonstrated severe sagittal imbalance with compression fracture of L3 and instability at L4-5 and L5-S1.

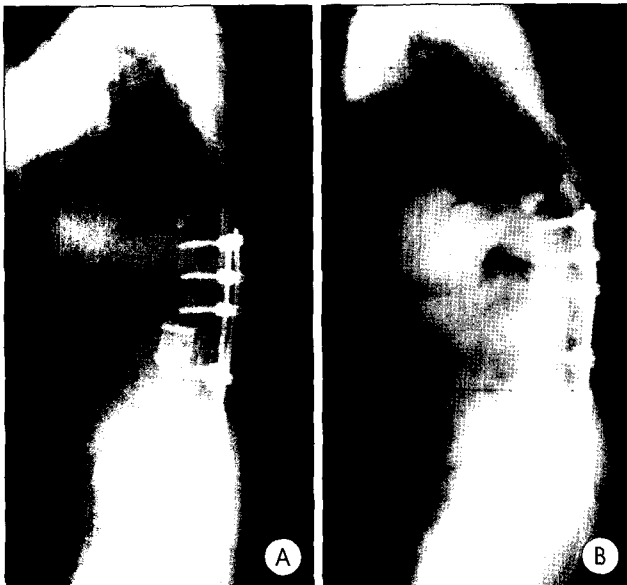


**Fig. 1.** A : A 60-year-old woman with severe sagittal imbalance. B : She has compression fracture of L3 and instability at L4-5 and L5-S1.

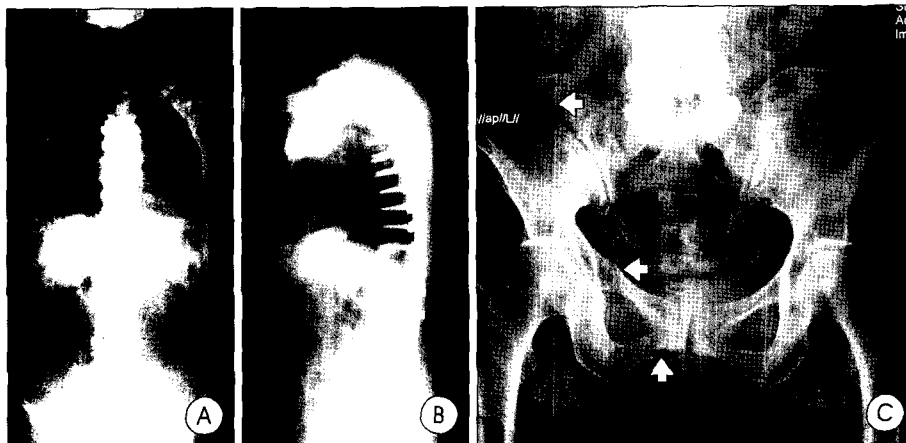
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at L4-5 and L5-S1 (Fig. 1A, B). Her bone mineral density by DEXA showed T score of -2.1 for lumbar spine and -3.0 for the hips. Due to severe imbalance causing severe functional disability, she was subjected to a corrective surgery that consisted of anterior midline L3 corpectomy, L2-S1 anterior fusion followed by second stage T12-S1 posterior fusion with segmental pedicle screw fixation and preventive T11 vertebroplasty. Fusion was performed using mixture of local bone and commercial allograft. At postoperative 6 months routine follow up aggravation of junctional kyphosis was noted (Fig. 2A, B). A junctional revision was performed by extension of the posterior fusion to T5 with autograft from the right iliac crest (Fig. 3A, B). The postoperative course was uneventful



**Fig. 2.** A : Lateral plain X-ray obtained four weeks after deformity correction with L3 corpectomy, L2-S1 anterior fusion, T12-S1 posterior fusion and T11 preventive vertebroplasty. B : Follow-up X-ray at five months after corrective surgery demonstrating the junctional kyphosis with recurrence of stooping.



**Fig. 3.** A, B : Plain X-rays taken two weeks after extension of fusion to T5 with right posterior iliac graft. C : Pelvis X-ray showing stress fractures of the pelvic ring involving the right posterior iliac crest and both pubic rami without displacement (arrows).

and patient was discharged from the hospital 5 days after the surgery. Two weeks after the surgery, the patient returned to the clinic with severe pain on the right groin and hip that developed the day before. Radiographic examination revealed a fracture of the right iliac wing, right superior and inferior pubic rami (Fig. 3C). Under the diagnosis of a stress fracture, she was managed conservatively with restriction of activities and occasional analgesics for 6 weeks. Her pain reduced with time and was completely pain free at 4 months after the surgery. Radiographic study revealed well-maintained fracture without displacement, suggesting clinical union (Fig. 4).



**Fig. 4.** Anteroposterior pelvis X-ray at three months after the development of stress fracture. There is no displacement suggesting pelvic instability. The patient is free of pelvic pain, suggesting achievement of clinical union.

## Discussion

Stress fracture of the pelvic ring following an instrumented fusion of the lower lumbar spine is a rare complication occurring mostly in osteopenic females. There are two types of stress fractures described—delayed and early. Delayed stress fractures, which are more common, are associated with alteration of the lumbosacral biomechanics following a multisegmental fusion and may occur without iliac bone graft harvest from the ipsilateral side<sup>8</sup>. On the other hand,

the less common early stress fractures of the pelvic ring are attributed to the weakening of the pelvic ring following iliac graft harvest and may occur even in a short level lumbosacral fusion and in patients with prior lumbosacral fusion<sup>5,9</sup>. The early stress fractures are attributed to overzealous removal of the iliac cortical bone during the iliac graft harvest like our case. With fracture of the posterior iliac crest, the fractures often propagate to involve the pubic rami or pubic symphysis resulting in pelvic instability that

needs prolonged abstinence of ambulation or additional surgical treatment<sup>2)</sup>.

With increasing longevity of the general population, increasing number of elderly, osteopenic patients are subjected to spinal reconstructive surgery involving the lumbosacral joint and iliac bone graft harvest. The exact incidence of pelvic ring stress fractures and pelvic instability in osteopenic patients undergoing lumbosacral arthrodesis still remains unknown, but the numbers are expected to rise due to the increasing number of surgeries. To prevent pelvic complications, iliac graft harvest should be done with utmost care, with preservation of the iliac cortex in these patients. Using allograft or bone graft substitutes instead of taking iliac graft should also be given a serious consideration for the high-risk patients subjected to multilevel lumbosacral arthrodesis.

## Conclusion

**E**arly stress fracture of the pelvic ring following a multilevel lumbosacral arthrodesis is a rare complication re-

lated to iliac graft harvest. We report a case of pelvic ring stress fracture that occurred shortly after start of ambulation.

## References

1. Bose B : Fracture of S1-2 after L4-S1 Decompression and fusion. Case report and review of the literature. *J Neurosurg (Spine 3)* 99 : 310-312, 2003
2. Coventry MB, Tapper EM : Pelvic instability: a consequence of removing iliac bone for grafting. *J Bone Joint Surg* 54A : 83-101, 1972
3. Elias WJ, Shaffrey ME, Whitehill R : Sacral stress fracture following lumbosacral arthrodesis. Case illustration. *J Neurosurg (Spine 1)* 96 : 135, 2002
4. Fournay DR, Prabhu SS, Cohen ZR, Gokaslan ZL, Rhines LD : Early sacral fracture after reduction of spondylolisthesis and lumbosacral fixation. Case illustration. *Neurosurgery* 51 : 1507-1511, 2002
5. Hu RW, Bohlman HH : Fracture at the iliac bone graft harvest site after fusion of the spine. *Clin Orthop* : 208-213, 1994
6. Mathews V, McCance SE, O'Leary PF : Early fracture of the sacrum or pelvis: an unusual complication after multilevel instrumented lumbosacral fusion. *Spine* 26 : E571-E575, 2001
7. Mills RR, Bernhardt M : Accuracy of fluoroscopic-guided pedicle screw placement in the lumbosacral spine. *Orthop Trans* 17 : 108-109, 1993
8. Wood KB, Geissele AE, Ogilvie JW : Pelvic fractures after long lumbosacral spine fusions. *Spine* 21 : 1357-1362, 1996
9. Wood KB, Schendel MJ, Ogilvie JW, Braun J, Major MC, Malcom JR : Effect of sacral and iliac instrumentation on strains in the pelvis. A biomechanical study. *Spine* 21 : 1185-1191, 1996