

Sacral insufficiency fracture, a rare complication of posterior spinal instrumentation

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Abstract

Sacral insufficiency fracture is a rare complication of the lumbar spinal surgery. It is normally reported as a late complication of the multi-segment spinal fixation in females with osteoporotic bone. We present the case of an elderly gentleman who suffered this complication spontaneously on the second postoperative day. To the best of our knowledge this has never been reported in Pakistan. Sacral alae are directly in line with weight bearing while walking and should be kept in mind when mobilising a postoperative patient whose previous history indicates such risk factors. Once injury is suspected, CT scan is recommended as x-rays may not always reveal the injury. In literature, these fractures have almost always been treated conservatively.¹ Conservative management was not tolerated well in our case and we proceeded with surgical management using S2 sacral alar iliac screws (S2 AI screws) to extend the previous lumbosacral fusion construct. S2 AI screws are a novel technique used for bone lumbosacral fusion and studies have shown to have lower rate of screw breakage under stress and need for revision surgery with their use.²

Keywords: Sacral insufficiency, sacral fractures, spinal instrumentation complications.

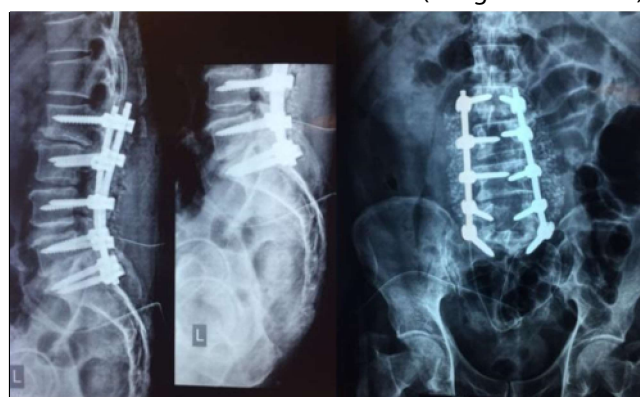
Introduction

Sacral insufficiency fracture is a type of stress fracture that results from normal stresses such as a patient's body weight acting on a weak bone. It seems to occur due to increased stress to the sacrum by a long moment arm in lumbar multi-segmental fixation.³ Typically, patients suffering from this complication tend to be elderly females with a mean age of 66.4 years.⁴ This is known to be a late complication, but in our case, it occurred quite early during postoperative period and we present the case of such a spontaneous fracture in an elderly gentleman. Males with such fractures have only been reported twice in literature.⁵ These fractures cause considerable pain and difficulty in

mobility, resulting in a loss of independence.⁶ In majority of these cases, the fractures respond well to a conservative treatment. In our case however, we had to resort to surgery using S2 sacral alar iliac screws to extend the initial spinal fixation after an unsuccessful short trial of conservative management. A complication of the lumbosacral fusion surgery has never been reported in Pakistan.

Case Report

In July 2017, a seventy-three-year old male patient with a known case of hypertension, presented with a complaint of lower back pain, radiating to his right leg, at the outpatient department of the Ziauddin University Hospital Clifton, Karachi. His pain was associated with numbness and after examination the clinical features were found to be consistent with severe spinal stenosis. He underwent posterior spinal instrumentation from second lumbar vertebrae to first sacral vertebra with decompression and fusion of L2 to S1 levels (images 1a 1b). His first post-op day was unremarkable experiencing pain only at the incision site, which is expected and he was mobilised comfortably. However, on the second post-operative day, he suddenly developed severe pain in lower back radiating to the left buttock, and he was unable to put weight on his left leg. X-rays were inconclusive and a work up was initiated for a possible sacral fracture which was confirmed on a CT scan. A sacral insufficiency fracture was found just below the level of instrumentation (Images 2a and 2b).



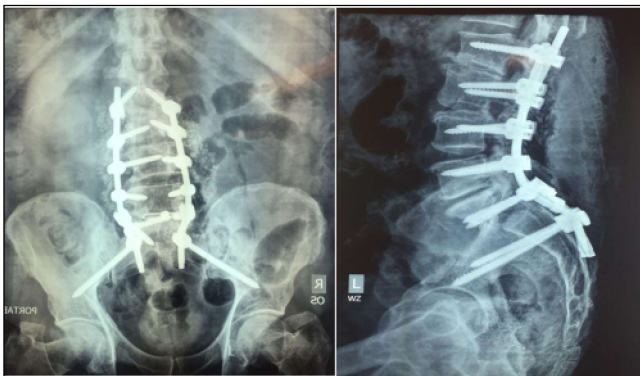
Images 1a 1b: Initial post-operative images.

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Images 2a 2b: CT showing sacral insufficiency fracture.



Images 3a 3b: Final post-operative images.

Standard conservative treatment was initiated with bed rest, but was not tolerated well by the patient. On the 6th post-operative day, surgery was performed upon the patient to rectify the sacral insufficiency fracture by extending the initial fixation by using S2 sacral alar iliac screws (Images 3a & 3b). Postoperatively the patient experienced immediate relief from his symptoms and he was allowed to mobilise in accordance with the standard spinal surgery rehabilitation. He remained pain free and mobile at 2-week, 6-week and 3 month follow-up visits. This case is being reported with the patient's informed consent.

Discussion

Following the increase of lumbar spinal surgery in recent years, an increase in their complications has also followed suit. One of the well-known, but rare complications of long segment lumbar spinal fixation is sacral insufficiency fracture. It is more often seen in patients with risk factors such as osteopenia/osteoporosis, increased body mass index, old age, female gender and degenerative scoliosis that has undergone correction. To the best of our knowledge, this is the first reported case in Pakistan. Only 37 sacral fractures have been found in a literature review

of the last fifteen years. And only 3.1% of these have occurred after long segment lumbar fusions.⁷ The definition of pelvic insufficiency fracture suggests that the abnormal bone has weakened and fractured under normal physiological loads.⁸ Bone loss of the trabeculae and supportive structure causes stiffness in the elderly population, and structural support in the form of long instrumental construct in the alternative. Studies show that in osteoporotic patients the lowest calcium density is in the medial and anterior portion of the sacral ala which becomes cancellous and therefore inherently weaker.⁹ Sacral alae are in line with weight bearing and this should be kept in mind when mobilising a postoperative patient predisposed to risk factors of weak bones. Once injury is suspected, x-rays of the anteroposterior pelvis and lumbar spine should be obtained. These may not reveal the injury and therefore more advanced imaging techniques should be undertaken. The limitations of x-ray and the need for advanced imaging in diagnosing insufficiency fractures are well illustrated in a study by Grasland, showing that out of 16 patients with sacral insufficiency fractures, only 8 could be identified in x-rays.¹⁰ If initial x-rays are negative while under high suspicion, a bone scan, magnetic resonance imaging (MRI) or computed tomography (CT) scan should follow.

In literature, the treatment of these fractures have been found to be overwhelmingly conservative.¹¹ However, conservative management was not tolerated well in our case and we proceeded with surgical management to extend the spinal instrumentation construct using S2 AI screws. The S2 AI screws are a relatively new technique in bone lumbosacral fusion. Studies have shown lower rates of screw breakage and the need for revision surgery using these screws when compared to traditional iliac bolts.¹¹ This report illustrates that the possibility of a sacral insufficiency fracture should always be considered in patients with lower back pain and when their history suggests the known risk factors.

Conclusion

Although sacral insufficiency stress fractures have previously been rare, the possibility should be considered in patients who present lower back pain and when their history suggests the known risk factors for weak bones. Typically, it is described as a late occurrence, but if the patient presents severe back pain or groin pain during

the immediate post-operative period, sacral insufficiency fracture should be high on a list of possible differentials.

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Conflict of Interest: None to declare.

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References

1. Vavken P, Krepler P. Sacral fractures after multi-segmental lumbosacral fusion: a series of four cases and systematic review of literature. *Eur Spine J* 2008; 17: 285-90.
2. Andrade NS, Okafor L, Neuman BJ. Novel Technique for Sacral Alar-Iliac (S2AI) Fixation. *Clin Spine Surg* 2018; 31:373-6
3. Scemama C, D'astorg H, Guigui P. Sacral stress fracture after lumbar and lumbosacral fusion. How to manage it? A proposition based on three cases and literature review. *Orthop Traumatol Surg Res* 2016; 102: 261-2.
4. Bustamante-Vidales JC, Kleriga-Grossgere E, Zambito-Brondo GF, Higuera-Calleja J. [Sacral insufficiency, unexpected clinical entity as a cause of low back pain. Report of two cases]. *Cir Cir* 2012; 80: 556-61.
5. Seo Y, Kim Y, Kim J. Clinical Features and Outcomes of Pelvic Insufficiency Fractures. *J Korean Fract Soc* 2017; 30: 186-91.
6. Cobar-Bustamante A, Lemus MAC, Bregni-Duraes M, et al. Sacral insufficiency fractures. *J Ortho Rehab Surg* 2016; 1: 1-6
7. Scemama C, D'astorg H, Guigui P. Sacral stress fracture after lumbar and lumbosacral fusion. How to manage it? A proposition based on three cases and literature review. *Orthop Traumatol Surg Res* 2016; 102: 261-8.
8. O'Connor T, Cole P. Pelvic Insufficiency Fractures. *Geriatric Orthop Surg Rehab* 2014; 5: 178-90.
9. Richards AM, Coleman NW, Knight TA, Belkoff SM, Mears SC. Bone Density and Cortical Thickness in Normal, Osteopenic, and Osteoporotic Sacra. *J Osteoporosis* 2010; 2010: 1-5.
10. Grasland A, Pouchot J, Mathieu A, Paycha F, Vinceneux P. Sacral insufficiency fractures: an easily overlooked cause of back pain in elderly women. *Arch Intern Med* 1996; 156: 668-74.
11. Zhou L, Shi C, Chen Z, Liu H, Zeng W, Wu J, et al. A comparative study of three approaches for the treatment of lumbosacral tuberculosis. *Acta Orthopædica Belgica* 2017; 83: 330-9.