

## Sacral Insufficiency Fracture: Case Report

### Sakral Yetersizlik Fraktürü: Olgı Sunumu

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#### Summary

Sacral insufficiency fracture (SIF) is a type of stress fracture that occurs primarily in elderly women. SIFs generally present as non-specific pelvic or low back pain and are often overlooked. SIFs are secondary to a number of conditions including postmenopausal osteoporosis, steroid-induced osteoporosis and radiation therapy. SIFs generally occur in patients who have sustained minimal or no trauma. SIF should be considered in elderly women with low back pain. We presented here an old woman with SIF who was treated with salmon calcitonin and physical therapy procedures successfully. *Turk J Phys Med Rehab 2006;52:129-31*

**Key Words:** Osteoporosis, sacral insufficiency fractures, elder

#### Özet

Sakral yetersizlik fraktürü (SYF) sıkılıkla yaşlı kadınlarda görülen bir çeşit stres fraktürüdür. Postmenopozal osteoporoz, kortikosteroid kullanımına bağlı gelişen osteoporoz ve radyoterapi gibi durumlara sekonder olarak gelişebilir. Genellikle nonspesifik pelvik ağrı veya bel ağrısı ile karakterizedir. SYF sıkılıkla travma olmaksızın ya da minimal travma ile gelişir. Bel ağrısı ile klinik bulgu veren hastalarda SYF'nin mevcut olabileceği akılda tutulmalıdır. Bu yazımızda salmon kalsitonin ve fiziksel tedavi yöntemleri ile başarılı bir şekilde tedavi edilmiş olan SYF'li yaşlı bir kadın hasta bildirilmiştir. *Türk Fiz Tıp Rehab Derg 2006;52:129-31*

**Anahtar Kelimeler:** Osteoporoz, sakral yetersizlik fraktürleri, yaşlı

#### Introduction

Sacral insufficiency fracture (SIF) is a type of stress fracture characterized by severe incapacitating hip, groin, pelvic, buttock and low back pain. SIFs occur when normal or physiological stresses are placed on weakened bone that has a low elastic resistance (1-3). Conditions that reduce the elastic resistance of bone and increase the risk for insufficiency fractures include osteoporosis, osteopenia, rheumatoid arthritis, corticosteroid use, radiation therapy, Paget's disease and hyperparathyroidism (2,3). SIFs occur primarily in elderly women who have a history of little or no trauma.

SIF, first described by Lourie (4) in 1982 as a "spontaneous osteoporotic fracture of the sacrum" is frequently overlooked. In a study by Weber et al. (5) carried out in 20 patients admitted to a rheumatology division, SIFs were present in 1.8% of female patients older than 55 years. Gotis-Graham et al. (6) reported 110 patients with SIF in the English literature in 1994.

SIFs can be difficult to detect using plain radiograph and are

often misdiagnosed as other causes of low back pain. Differential diagnoses include spinal stenosis, lumbar spondylosis or neoplasm (3-7).

We present a case of SIF to illustrate the clinical presentation, diagnosis and management of such a disorder. In particular, we highlight the use of salmon calcitonin for the management of pain and the promotion of early mobilisation in this patient.

#### Case Report

An 84-year-old woman was admitted to our outpatient unit with severe low back pain of four days' duration. The patient was unable to stand and pain increased when she was seated on a hard surface. There was no history of trauma. The patient had experienced left groin pain one month preceding admission. The patient had systemic hypertension and was receiving losartan 50 mg/day + hydrochlorothiazide 12.5 mg/day. Otherwise, she was disease free. A physical examination revealed sacral tenderness to palpation. A neurological examination showed a negative straight leg raise, however, the strength of the right extensor

hallucis longus was diminished. Initial routine laboratory tests and radiographic studies were negative (Figure 1).

Bone scintigraphy with technetium-99m (99mTc) methylene diphosphonate on the fifth day of symptoms showed increased activity in each sacral ala, with an H-shaped (Honda sign) uptake pattern observed. Activity was also increased in the left pubic ramus (Figure 2). Magnetic resonance imaging (MRI) revealed medullary oedema (Figures 3a and 3b). There was disc degeneration at the L5/S1 level.

Osteoporosis was demonstrated by bone mineral density (BMD) on dual-energy x-ray absorptiometry. BMD at the lumbar spine (L2-L4 anteroposterior) and the femoral neck were 0.841 and 0.548 g/cm<sup>2</sup>, respectively. BMD T-scores were -2.8 and -3.4, respectively. A lateral thoracolumbar radiograph revealed vertebral fractures. There was 20% height loss at the anterior, middle and posterior columns of T12 and L5, compared with the upper vertebrae. Similarly, there was 20% height loss at the anterior and middle columns of T7 and T8, compared with posterior column height, and 20% height loss at the middle column of L2, compared with posterior column height.

The patient was admitted to the inpatient rehabilitation unit with a diagnosis of SIF on the tenth day of symptoms, and was treated with subcutaneous salmon calcitonin (Tonocalcin®) 100



Figure 1. Plain anteroposterior radiograph of the pelvis with no obvious fracture line.

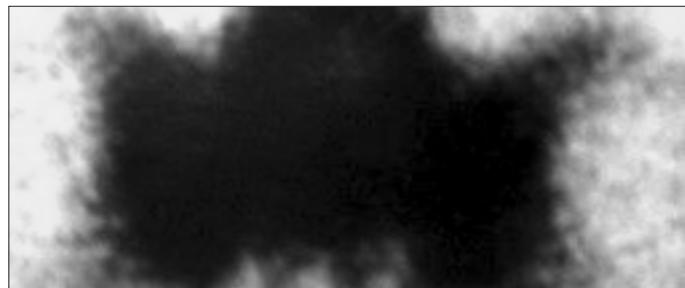


Figure 2. Bone scintigraphy with 99mTc reveals the characteristic H-shaped pattern of uptake in each sacral ala, consistent with sacral insufficiency fracture.

IU/day for a period of 20 days. Thereafter, she received nasal salmon calcitonin 200 IU/day for a period of six months. The patient additionally received paracetamol 1500 mg/day for the treatment of pain, and calcium carbonate 500 mg/day and Vitamin D3 400 IU/day daily for the treatment of osteoporosis. Transcutaneous electrical nerve stimulation (TENS) was applied to the painful area. Pain control was achieved during the second week of treatment with subcutaneous salmon calcitonin, at which time the patient became mobile with a walker. She was able to walk with a cane on the control visit at the sixth month. BMD measurements were scheduled for one year after the SIF diagnosis.

## Discussion

While osteoporotic fractures occur mostly in the distal forearm, spine and hip, they may also present as an insufficiency fracture. In a study investigating metatarsal insufficiency fractures in 21 previously undiagnosed male and female osteoporosis patients, Tomczak et al. (8) reported that 95% of patients had osteopenia or osteoporosis. Osteoporosis is the main risk factor for SIF. The symptoms of SIF are non-specific and many cases probably remain undiagnosed.

SIF is characterised by significant sacral tenderness to palpation. Neurological examination, however, is generally normal, with 5.5% incidence of neurological deficit with SIF (6).

A number of imaging techniques can be used to diagnose SIF. Plain radiographic studies may be appropriate as an initial screening tool but they are usually negative for fracture. Moreover, radiograph imaging is not highly sensitive and may be limited by poor visualisation of the sacrum due to overlying bowel gas and stool, osteopenia and sacral curvature (3).

Although it has a low specificity, bone scintigraphy is a very sensitive method of determining the pathology and location of a SIF. The characteristic H-shaped or butterfly-shaped uptake pattern, which indicates bilateral vertical sacral fractures associated with a transverse fracture denoting a sacral insufficiency fracture, is seen generally within 72 h of onset of symptoms (9).

MRI is another sensitive method of confirming a SIF diagnosis, and is considered by some to be the examination of choice (3,10). The use of MRI to define a fracture site may be enhanced using fat suppression sequences or a contrast media such as intravenous gadolinium (1,10). Fat suppression sequences can detect medullary oedema, which is suggestive of acute fracture, while intravenous gadolinium may enhance the contrast between pathological and normal tissue.

A computed tomography scan of the pelvis is also a useful tool for the diagnostic imaging of a SIF. This form of imaging may be complementary to bone scintigraphy.

Treatment and rehabilitation of patients with SIF should be initiated as soon as possible. Although much of the literature regarding SIFs advocates bed rest, early mobilisation is also supported (7,9). Because most SIFs are stable and do not require surgical intervention, early mobilisation is not contraindicated (7). Moreover, early mobilisation avoids the complications associated with immobility, which include deep venous thrombosis and pulmonary embolism, muscle atrophy, postural hypotension, urinary calculus formation, decreased appetite, constipation, pressure ulcer formation, increased bone resorption and calcium excretion (7).

Sufficient pain management in the form of oral medication and/or physical therapy should be administered to patients with SIF. Calcitonin, nonsteroidal anti-inflammatory drugs (NSAIDs), paracetamol, heat, gentle massage, and TENS may all be effective in achieving adequate pain relief in patients with a SIF (3,7). Calcitonin is particularly effective in patients with SIF as it provides effective pain relief and increases bone mass (3).

Calcitonin is a 32-amino acid hormone produced in the thyroid gland. It is an antiresorptive agent that is involved in the control of bone and calcium metabolism. Calcitonin was initially used for the treatment of Paget's disease but its beneficial effects on bone pain led to its use in other painful skeletal disorders including malignancy, sympathetic dystrophy and osteoporosis (11). Although calcitonin is available in synthetic human, salmon and eel preparations, salmon calcitonin is more potent than human calcitonin and acts over a longer time period.

Nasal or parenteral calcitonin has been recognised as an effective treatment for pain associated with acute osteoporotic vertebral fractures (12,13). The mechanism of the analgesic effect of calcitonin is unclear and may be the result of a direct receptor-mediated action or an indirect endorphin-mediated effect (14). The analgesic effects of calcitonin may be evident as soon as the second week of treatment (15) and the drug's early effect on pain may promote earlier patient mobility (16). This, in turn, may lead to an improvement in patient quality of life and a decrease in healthcare costs (14). The use of calcitonin is particularly beneficial in elderly patients who are at an increased risk of NSAID-related side effects or who might be susceptible to impaired cognition or respiration suppression resulting from high doses of potent analgesics (11).

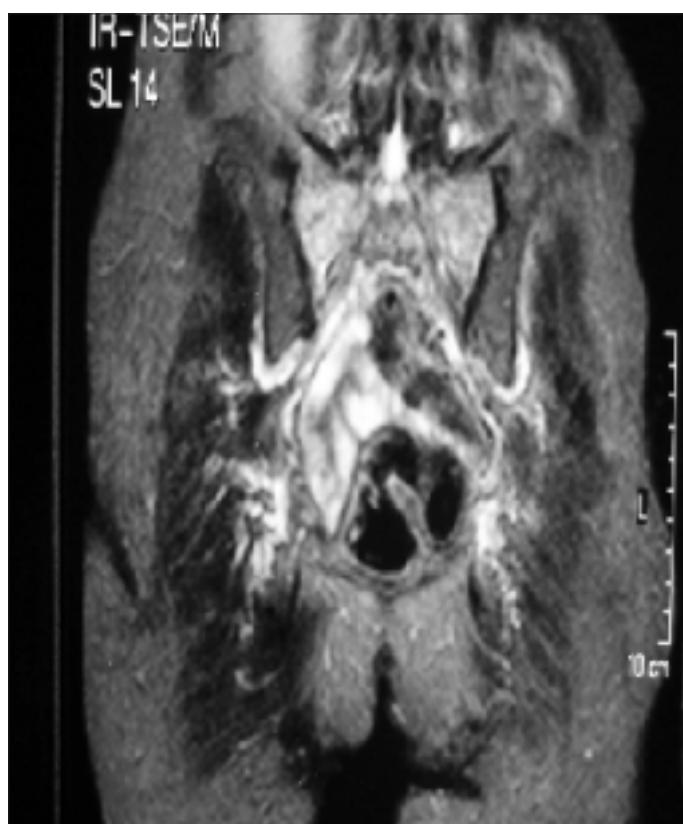


Figure 3. Fat-suppressed coronal (3a) and transverse (3b) T2-weighted MRI of the sacrum shows sacral insufficiency fracture (SIF). There is high signal intensity throughout the sacrum, consistent with medullary oedema and SIF.

In conclusion, SIFs should be considered in elderly female patients with low back pain who report little or no trauma. An increased awareness of these fractures may allow a prompt diagnosis and help avoid unnecessary and possibly invasive procedures. Our case presentation illustrates the clinical presentation, diagnosis and pain management of a patient with SIF. It specifically highlights the effectiveness of subcutaneous salmon calcitonin 100 IU/day in relieving low back pain and promoting early mobilisation.

## References

1. Otte MT, Helms CA, Fritz RC. MR imaging of supra-acetabular insufficiency fractures. *Skeletal Radiol* 1997;26:279-83.
2. Resnick D, Georgen T, Niwayama G. Physical Trauma. In: Resnick D, ed. *Bone and Joint Imaging*. Philadelphia: W. B. Saunders Company; 1992. p. 801-98.
3. Lin JT, Lane JM. Sacral stress fractures. *J Womens Health (Larchmt)* 2003;12:879-88.
4. Lourie H. Spontaneous osteoporotic fracture of the sacrum. An unrecognized syndrome of the elderly. *JAMA* 1982;248:715-7.
5. Weber M, Hasler P, Gerber H. Insufficiency fractures of the sacrum. Twenty cases and review of the literature. *Spine* 1993;18:2507-12.
6. Gotis-Graham I, McGuigan L, Diamond T, Portek I, Quinn R, Sturgess A, et al. Sacral insufficiency fractures in the elderly. *J Bone Joint Surg Br* 1994;76:882-6.
7. Lin J, Lachmann E, Nagler W. Sacral insufficiency fractures: a report of two cases and a review of the literature. *J Womens Health Gend Based Med* 2001;10:699-705.
8. Tomczak RL, VanCourt R. Metatarsal insufficiency fractures in previously undiagnosed osteoporosis patients. *J Foot Ankle Surg* 2000;39:174-83.
9. Babayev M, Lachmann E, Nagler W. The controversy surrounding sacral insufficiency fractures: to ambulate or not to ambulate? *Am J Phys Med Rehabil* 2000;79:404-9.
10. Grangier C, Garcia J, Howarth NR, May M, Rossier P. Role of MRI in the diagnosis of insufficiency fractures of the sacrum and acetabular roof. *Skeletal Radiol* 1997;26:517-24.
11. Maksymowich WP. Managing acute osteoporotic vertebral fractures with calcitonin. *Can Fam Physician* 1998;44:2160-6.
12. Brown JP, Josse RG. 2002 clinical practice guidelines for the diagnosis and management of osteoporosis in Canada. *CMAJ* 2002;167(10 Suppl):S1-34.
13. Blau LA, Hoehns JD. Analgesic efficacy of calcitonin for vertebral fracture pain. *Ann Pharmacother* 2003;37:564-70.
14. Silverman SL, Azria M. The analgesic role of calcitonin following osteoporotic fracture. *Osteoporos Int* 2002;13:858-67.
15. Gennari C. Analgesic effect of calcitonin in osteoporosis. *Bone* 2002;30(5 Suppl):67S-70S.
16. Lyritis GP, Trovas G. Analgesic effects of calcitonin. *Bone* 2002;30 (5 Suppl):71S-74S.

