CASE REPORT

Minimally Invasive Approach to Treat Sacral Nonunion: A Case Report

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ABSTRACT

The authors report a minimally invasive technique performed by two iliac screws connected by a transverse rod to treat sacral nonunion that is characterized by being rapid, easy, and safe, which provides a reasonable stability almost without the need of bone graft.

Key words: Minimally invasive spine surgery, non-consolidation of the sacrum, pelvic instability, sacral fractures

INTRODUCTION

Nonunion of a sacral fracture is a rare and serious clinical condition which causes chronic pain, sitting discomfort, gait disturbances, neurological problems, and inability to work. Often is underdiagnosed due to the difficulty of visualizing the fracture site in standard radiography;[1,2] therefore, computed tomography scan (CT scan) of the pelvis is recommended to confirm the diagnosis.

Pelvic nonunion is usually treated by open reduction, internal fixation, excision of scar tissue, and bone grafting.[3-5] However, little has been written concerning the approach of the pseudarthrosis by minimally invasive without broad exposure of the focus.[3-7]

We report a case of sacral fracture nonunion after nonoperative initial treatment, successfully treated through minimally invasive treatment using two iliac screws connected by a percutaneous transverse rod without bone graft.[8]

CASE REPORT

A 47-year-old woman involved in a motor vehicle accident 5 months ago, sustained a fracture of the right hemisacrum in Zone II (according to the Denis classification)[9] treated by conservative method.

The patient was referred to our institution because she was having pain in the low back/sacral region, worse with sitting, and prolonged walking. Standard X-ray [Figure 1a] and CT [Figure 1b] confirm nonunion of the right hemipelvis passing through the sacral holes of S1 and S2. The electromyogram showed the right S1 radiculopathy.

We decided to treat this sacral nonunion using polyaxial iliac screw spinal instrumentation connected to a transverse rod to stabilize the sacral nonunion without bone graft.

Surgical Technique

After induction of general anesthesia in the operating room, the patient was positioned in prone position and the posterior superior iliac spines (PSIS) are individuated bilaterally by palpation, and two incisions (about 1.2 in each) are performed just lateral to them. After exposure to the PSIS two titanium, polyaxial iliac screws, 60 mm long and 7.3 mm diameter were inserted on each iliac bone, directed toward each ipsilateral greater trochanter with fluoroscopic aid [Figure 2]. A subcutaneous tunnel, deep to the paravertebral muscles, was created to connect a rod with two polyaxial screw heads.

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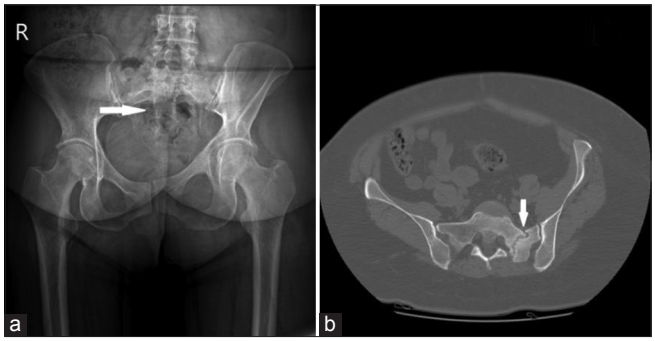

Figure 1: Anteroposterior radiograph (a) and computed tomography images (b) of the pelvis at 5 months after injury. Arrows show the nonunion site

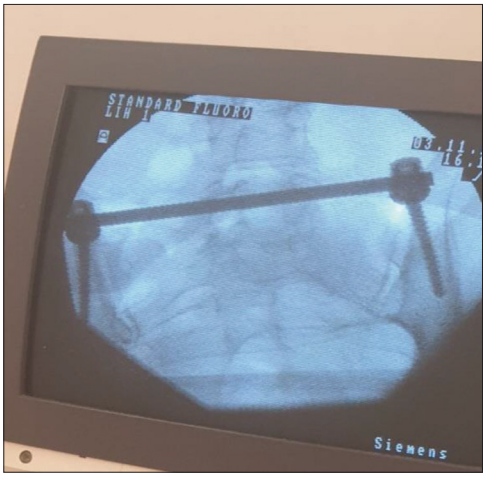

Figure 2: Correct position of the screws and bar is confirmed with the C-arm fluoroscope image

Operative time was 45 min and blood loss was <60 cc. Anteroposterior radiograph image taken after operation showed correct position of the screws and bar [Figure 3]. No perioperative complications were reported and the patient was discharged from the hospital 2 days post-operative. Partial weight-bearing was permitted 6 weeks postoperatively with crutches and full weight-bearing was permitted months postoperatively.

RESULTS

Four months after the operation, the patient referred absence of pain during walking, absence of hardware failure, and maintenance of reduction. X-rays and three-dimensional CT scan show healing of nonunion site [Figure 4].

DISCUSSION

Sacral fracture is classified according to the Dennis system[9] which divides sacral fractures into three zones: Alar (Zone 1), foraminal (Zone 2), and central (Zone 3).

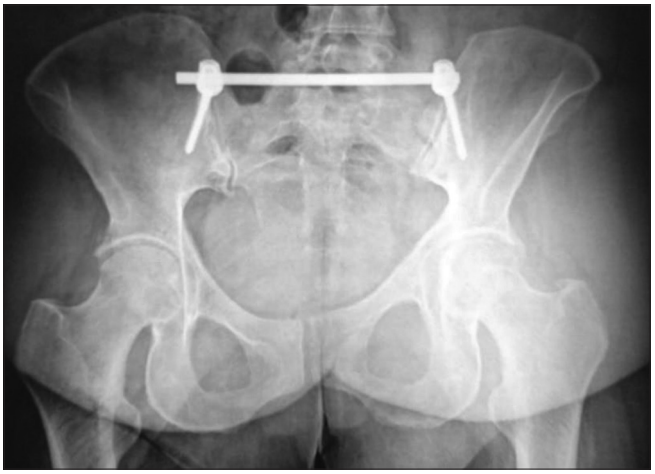

Figure 3: Post-operative anteroposterior radiograph

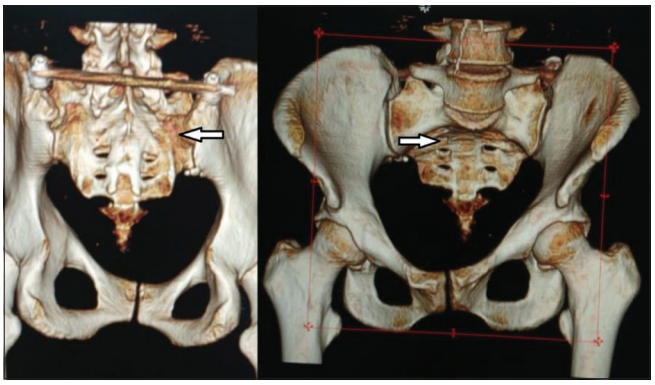

Figure 4: Three-dimensional computed tomography images taken 4 months after operation demonstrate the healing of nonunion of the right sacrum bone (arrows)

Vertically unstable sacral fractures are the most difficult to treat. Following anatomic reduction, there are different types of fixation techniques for vertically unstable sacral fractures including iliosacral screws, transiliac bars, transiliac plates, local small plates, and spinal instruments.[10]

Four basic ilioiliac techniques are used to treat vertically unstable sacral fractures: Extraosseous transiliac/sacral bars, intraosseous sacral bars, ilioiliac plate osteosynthesis, and transiliac internal fixator.[10]

Nonunion of a sacral fracture is a rare but serious clinical condition which can cause severe chronic pain, discomfort while sitting, gait abnormalities, and significant restriction of the level of activities.

Nonoperative treatments of unstable sacral fractures such as bed rest, traction, and pelvic slings have been reported to be the most common initial treatment modalities leading to fracture nonunions.

Pelvic nonunion is usually treated with open reduction and internal fixation, excision of scar tissue, and autologous bone grafting.[4,9] The combination of internal fixation and bone grafting has been the preferred method for the treatment of pelvic nonunion at the majority of cases.[11,12]

However, little has been written concerning the approach of the sacral fracture nonunion by a minimally invasive posterior approach using two iliac screws connected by transverse rod/rods without bone graft which offers reduction and stabilization without broad exposure of the focus.

We described a case of sacral fracture nonunion that resulted from nonoperative initial treatment, which was treated successfully through a minimally invasive posterior approach without bone graft and two iliac screws connected by a transverse rod.

CONCLUSIONS

This minimally invasive technique is a very fast and safe allowing to use the screws as joysticks to manipulate the fracture by distraction or compression along the rod.

However, further biomechanical and clinical studies are required for further evaluation of the technique on a larger number of patients and for a longer follow-up period.

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