

Posterior Approach in Transverse Sacral Fracture: A Case Report**Tugay Atalay^{1*}, Hakan Ak¹, Fatih Karaaslan², Sinan Karacabey³, Fatma Gündoğdu⁴**¹Bozok University, School of Medicine, Department of Neurosurgery, Yozgat/TURKEY²Bozok University, School of Medicine, Department of Orthopedics, Yozgat/TURKEY³Bozok University, School of Medicine, Department of Emergency Medicine, Yozgat/TURKEY⁴Bozok University, School of Medicine, Department of Radiology, Yozgat/TURKEY***Corresponding author**

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Abstract: Traumatic sacral fracture is rare complication in trauma patients but it is a major cause of death and disability in these patients. Their management is still under debate. Different modalities include conservative management, initial conservative treatment followed by surgical treatment after failure of conservative treatment, and primary surgical treatment. We are presenting a case with transverse sacral fracture treated with posterior approach in the early period of trauma. We suggest that early surgical decompression and stabilization should be performed in such cases.**Keywords:** sacrum, transverse fracture, surgery, laminectomy, stabilization

INTRODUCTION

Traumatic sacral fracture is rare complication in trauma patients but it is a major cause of death and disability in these patients [1,2]. Most of the sacral fractures are the longitudinal fracture however transverse sacral fractures constitutes less than 1% of all spinal fractures [3]. Transverse fractures (suicide jumper's fracture) usually occur following falling a fall from height [4]. Underlying mechanism in the development of these fractures is the combination of flexion and shearing forces and the forces propagated through the weakest point of sacrum, the foramina [3].

Neurological deficit and disturbance are quite common in transverse sacral fractures. However, their management is still under debate. Different modalities include conservative management, initial conservative treatment followed by surgical treatment after failure of conservative treatment, and primary surgical treatment.

In this report, we are presenting a case with transverse sacral fracture treated with posterior approach in the early period of trauma.

CASE REPORT

A 52 year-old woman referred from an outstanding clinic with the suspicion of spinal trauma. It

was learned that the patient fell from about 3 meters high. She was mental retarded. Physical and neurological examination was suboptimal because of mental retardation. Patient was agitated and was complaining from severe back pain. There was a urinary catheter which was inserted in the outstanding clinic. Sensory examination could not be performed but we detected the presence of lower limb movements.

Radiological examination of the patient revealed a transverse sacral fracture at S1-S2 level (Figure 1a,b,c). After that a surgical decompression and stabilization was planned. In the prone position, a lumbosacral incision was performed. Paravertebral muscles were stripped with blunt dissection. After that, S1 and S2 laminectomy were performed. We saw that dura mater was torn and some sacral rootlets were outside of the dura. These rootlets were put in place and dura tear was repaired. After that stabilization (L4,L5, two points of iliac wings) was performed (Figure 2a,b,c,d).

Muscle strength was 5/5 in the lower extremity in the postoperative period. Urinary catheter was taken five days after operation and she was aware of urinary control. Moreover, bowel control was intact. Patient remains under clinical surveillance.



Fig-1: Preoperative CT image of lumbosacral spine in sagittal plane, axial, and coronal showing displacement at S1-S2 level.



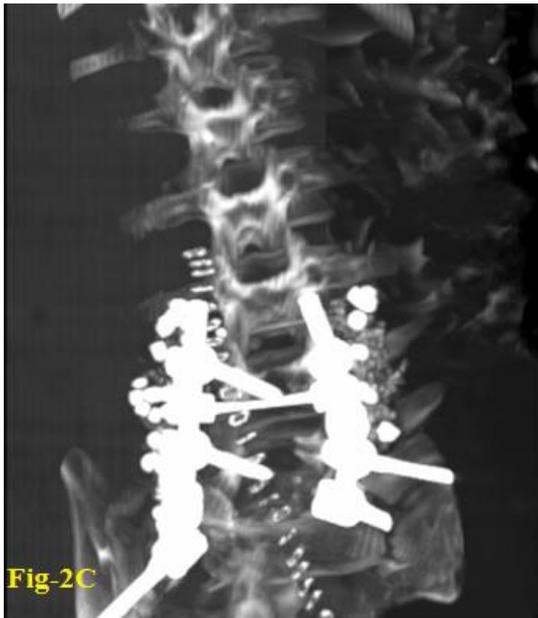


Fig-2: Postoperative direct X-rays and CT images showing the posterior decompression and stabilization.

DISCUSSION

The best known classification system regarding sacrum fractures was proposed by Denis *et al.*[5]. This system was based on the theanatomic location of fractures as follows: zone I involves thealar region; zone II fracture occurs at the sacral foraminalarea; and zone III involves the central canal.This classification also indicates the risk of a neurological deficit. Zone-1 fractures involve deficits of the L4/L5 nerve root and sciatic nerve in 6% of cases. Zone-2 fractures involve deficits of the L5, S1 and S2 nerve roots in 28% of cases. Zone- 3 fractures contribute to 60% of neurological deficits and commonly give rise to bladder, bowel and sexual dysfunction [5,6]. According to this classification system, the fracture of our case correlates with Zone-3 fracture. Roy-Camilleclassified transverse sacral fracture into three types. Type I injury is angulated butnot translated; type II is angulated and translated; type IIIshows complete translational displacement of the cephaladand caudal parts of the sacrum [4]. According to this definition, our case represents a type III Roy-Camille fracture.

Radiographic diagnosis of sacral injuries is usually quite difficult. Sacral fractures can often be difficult to visualize on an anteroposterior (AP) radiograph because of the inclination angle of the sacrum. Improved visualization can be obtained with inlet and outlet radiographs [7]. Plain AP and even lateral radiographs of either the pelvis or sacrum are often not helpful in visualizing fractures of the sacrum. Because, the detail is often overlaid by soft tissue shadows and bowel gas, and in addition, the lumbar lordosis and kyphotic sagittal contour of the sacrum make the fracture lines oblique to the plane of the radiograph. Plain radiographs show only 30 percent of

sacral fractures in most series. In all patients in whom a sacral fracture is suspected, however, a lateral view of the sacrum as well as an inlet view (35 to 40° of caudal tilt of the radiographic tube) and an outlet view (45° of cranial tilt of the tube) should be obtained [8]

Thin cut CT with coronal and sagittal reconstructions has become the standard for evaluation of both pelvic and sacral fractures [8, 9, 10]. It provides better visualization of especially difficult fractures lateral to the sacral ala [11]. Transverse sacral fractures are difficult to delineate because they are parallel to the coronal plane of the primary CT scan and require sagittal and coronal reconstructions for demonstration. The role of the various measurements that can be made directly from the CT scan is unclear, but standardization should be a goal in describing these fractures [8].

MRI can be helpful in delineating both the areas of neural compression in the sacrum and displacement of the fracture fragments. It is now the study of choice for acute sacral injuries with deficit. It assesses the area of compression and gives clear images of the displacement because the information is gathered primarily in both the axial and sagittal planes without reformatting. Some authors believe that MRI is sensitive but nonspecific and suggest confirmation with CT, but recently it has been shown that the finding of fluid within the fracture seems to be helpful in confirming the diagnosis [12, 13]. However, we couldn't take MRI in our patient because of the lack of technical support of our hospital and the mental status of the patient.

There is no clear consensus about the management of transverse sacral fracture. Each type of

fracture requires its own treatment. The main problem in the treatment of fresh fracture is to control the instability between the lumbar spine and sacrum [4]. Various treatment modalities have been proposed. They may be listed as conservative management, initial conservative treatment followed by surgical treatment after failure of conservative treatment, and primary surgical treatment. Conservative treatment consists of bed rest with or without traction for 3 to 8 weeks [3]. In the conservative management, reduction of displacement can be achieved by a heavy two pole traction. It is very important to protect the skin when performing this traction. Roy-Camille stated that this procedure is more theoretical than practical, since they never achieved reduction of displacement in their cases [4].

Roy-Camille et al proposed indications of treatment according to the type of the fracture. In the management of fractures without any displacement, they advised a simple 60 days bed rest in cases without neurologic deficit. In type 1 (anterior flexion fracture) fractures, the decision of conservative or surgical treatment is depends on the presence of neurologic deficit. In type 2 (anterior flexion fracture with horizontal posterior displacement) fracture cases, constant neurologic deficit and the magnitude of the displacement that advocate the surgery. In type 3 (extension fracture with neurologic anterior displacement) fractures, traction may be helpful, but if the neurologic deficit persists, surgery is indicated [4]. In summary, surgical treatment is indicated for significant displacement, neurological deficit, instability or deterioration after nonoperative treatment and surgical options include decompression with laminectomy, laminectomy and stabilization, or stabilization alone [3]. In the stabilization procedure, Harrington, Luque, plating, lumbosacral pedicle screws extending to S2, percutaneous sacroiliac screws, and lumbopelvic constructs may be used according to the availability of these systems and the experience of the surgical team [3]. In our case, we performed the surgery in the early period of trauma. Our surgical approach included the laminectomy and posterior stabilization with pedicle screws.

In conclusion, we suggest that early surgical decompression and stabilization should be performed in such cases.

REFERENCES

1. Lindahl J ; Sacral fractures. Suomen Ortopedia ja Traumatologia. 2013; 36(1): 83-87.
2. Anderson S, Gill P, Lippincot L, Somerville M, Shields S, Balfour RJ, Wilson E; Surgical Case report: Sacral fracture. Southern California Veterinary Medical Association's Official Magazine. 2002; 15-18.
3. Tiew SK, Tay T; Transverse sacral fracture-dislocation with anterior displacement: a case report. Malaysian Orthopaedic Journal. 2012; 6(3): 63-65.
4. Roy Camille R, Saillant G, Gagna G, Mazel C; Transverse fracture of the upper sacrum. Suicidal jumper's fracture. Spine. 1985; 10: 838-845.
5. Denis F, Davis S, Comfort T; Sacral fractures: an important problem. Retrospective analysis of 236 cases. Clin Orthop. 1988; 227: 67-81.
6. Aresti N, Murugachandran G, Shetty R; Cauda equina syndrome following sacral fractures: a report of three cases. Journal of Orthopaedic Surgery. 2012; 20(2):250-253.
7. Routt ML Jr, Simonian PT, Swiontkowski MF; Stabilization of pelvic ring disruptions. Orthop Clin North Am. 1997; 28(3):369-388.
8. Kuklo TR, Potter BK, Ludwig SC; Radiographic measurement techniques for sacral fractures consensus statement of the Spine Trauma Study Group. Spine. 2006; 31:1047-1055.
9. Kaehr DM, Anderson PA, Mayo K; Classification of sacral features based on CT imaging. J Orthop Trauma 1989; 3:163.
10. Urzúa A, Marré B, Martínez C, Ballesteros V, Ilabaca F, Fleiderman J, Zamorano JJ, Yurac R, Lecaros M, Munjin M, Lahsen P; Isolated transverse sacral fractures. Spine J. 2011; 11(12):1117-1120.
11. Montana MA, Richardson ML, Kilcoyne RF; CT of sacral injury. Radiology. 1986; 161:499-503.
12. Peh WC; Intrafracture fluid: A new diagnostic sign of insufficiency fractures of the sacrum and ilium. Br J Radiol 2000; 73(872):895-898.
13. <http://z0mbie.host.sk/Fractures-of-the-Sacrum.html> /07.09.2015