

Sacral Fracture with Neurodeficit - Is Laid-Back Approach a Passe?

Shreevijay A Phadke¹, Himanshu G Kulkarni², Sidheshwar S Thosar², Rajendra Sakhrekar³

Abstract

Management of sacral fractures with neurological deficits has been a topic of debate. Literature is divided between conservative and operative management. We report a case of a 32-year-old male with post-traumatic unstable complex transverse sacrum fracture and associated stable pelvic ring fractures with loss of bowel and bladder control. He had a fall from the second floor over the buttocks. Plain lateral radiography showed a transverse sacral fracture located between S2 and S3 with kyphosis at the fracture site. MRI showed a compromised canal due to a large retro pulsed fragment pressing over the anterior aspect of sacral roots. Thorough decompression of cauda equina and sacral roots was performed, and sacral ala fracture was fixed with two percutaneous 6.5 mm cannulated cancellous Ilio-sacral screws and two 3.5 mm recon locking plates were applied for the sacrum. The patient regained his bladder control 3 months after the surgery and bowel control 4 months after the surgery. At the end of 1 year, the patient has persistent saddle anaesthesia but good bowel and bladder control. Early decompression and stabilization of unstable complex sacrum fractures with neurological compromise can facilitate optimum neurological improvement and favourable clinical outcomes in terms of early mobilization and pain relief.

Keywords: Fracture, Sacrum, Decompression surgery

Introduction

Fractures of the sacrum are a heterogeneous group of fractures occurring in young people following falls from height and road accidents [1] or due to osteoporosis in the elderly following trivial trauma. The incidence of sacrum fractures is less than 2% of all spinal fractures.[2] Transverse sacral fractures (TSF) are even rare and constitute 2-5 % of all sacrum fractures.[3] Fractures of the pelvic ring are commonly associated with sacrum fractures which make treatment difficult.[4] 25% of all sacral fractures are associated with a neurologic injury.[1] Management of sacral fractures with neurological deficits has been controversial. Literature is divided between conservative and operative management. We present a case of a 32-year-old male patient with unstable complex transverse sacrum fracture with bilateral L5 transverse process fractures, Right superior and inferior pubic rami fractures with loss of bladder and bowel control.

Case History

32-year-old male, a manual labourer by occupation presented with severe low back and gluteal pain for 4 hours. He had fallen from about 20 feet height from the second floor directly over the buttocks.

There was no history of loss of consciousness or vomiting. He was able to stand with great difficulty due to pain but could not walk due to severe gluteal pain.

On examination, his vital signs were normal. The patient had severe tenderness over the sacrum and coccyx. Skin condition was normal; there were no large abrasions/ecchymosis over the sacral region. Hip joint movements were free. Power and sensations were normal in all upper and lower limb joints. The patient had saddle anaesthesia and minimal anal tone. To evaluate bladder control, a bolus of saline solution was administered intravenously and since the patient was not able to void his bladder and instead had urinary retention, the bladder was catheterized. Plain lateral radiography showed a transverse sacral fracture located between S2 and S3 (Figure -1).

CT scan revealed B/L transverse process fractures of L5, B/L sacral ala fractures, transverse fracture through S2 and S3, and right superior and inferior pubic rami fractures (Figure - 2).

There was a significant narrowing of the sacral canal. MRI showed a large retro pulsed fragment pressing over the anterior aspect of sacral roots (Figure - 3). We did MRI whole spine screening to rule out occult injuries.

¹Department of Spine Surgery, Chirayu Hospital, Ratnagiri, Maharashtra, India.

²Department of Spine Surgery, Shraddha Surgical and Accident Hospital, Sangli, Maharashtra, India.

³Department of Spine Surgery, Schoen Klinik Neustadt Holestine, Germany.

Address of Correspondence

Dr. Sidheshwar S Thosar,

Fellow Spine Surgery, Shraddha Surgical and accident Hospital, Sangli, Maharashtra, India.

E-mail: dr.sidheshwarthosar@gmail.com

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Figure - 1 Plain lateral radiograph showing a transverse sacral fracture between S2 and S3 with kyphosis

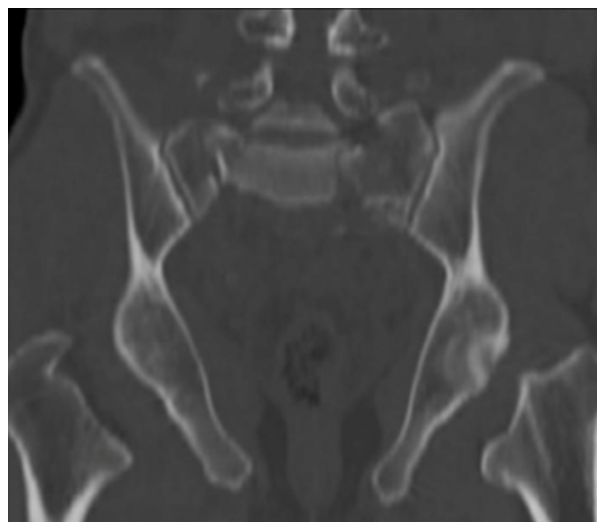


Figure - 4A Axial CT cut showing fractures of the bilateral sacral ala

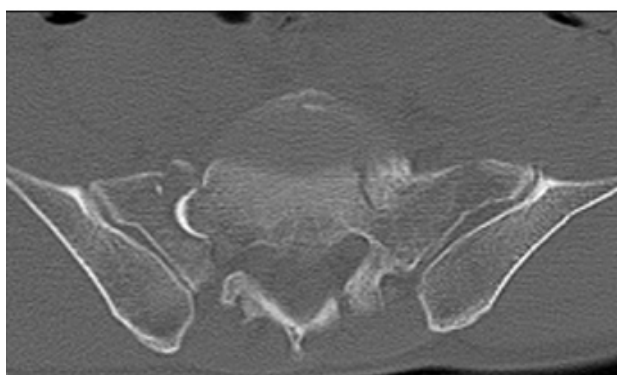


Figure - 4B Coronal CT cut showing fractures of the bilateral sacral ala

It was a U type of sacrum fracture with a transverse component of U that was through S2-S3 and two vertical components of U were through B/L sacral ala (Figures - 4A and 4B).

Fracture Classification

According to Denis classification, it was through zone 3 type 2, as fracture has kyphotic angulation with the anterior translation of the

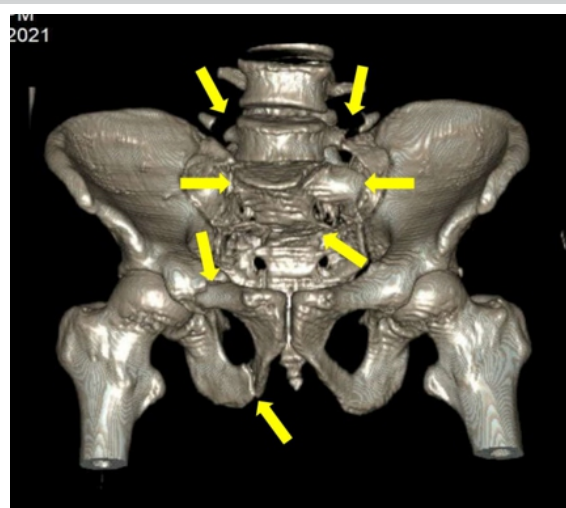


Figure - 2 - 3D CT Reconstruction of the pelvis showing B/L transverse process fractures of L5, B/L sacral ala fractures, transverse fracture through S2 and S3, right superior and inferior pubic rami fractures



Figure - 3 MRI- T2 sagittal cut showing large retro pulsed fragment pressing over the anterior aspect of sacral roots

distal sacrum.[4]

According to AO classification, it was displaced U type sacral fracture (C3) with cauda equina Injury (N3) and the modifier was anterior pelvic ring injury (M3), so collectively it was C3; N3, M3.[5]

Type 2 injury according to classification by Roy-Camille et al and Strange-Vognsen and Lebech as the fracture was angulated and translated.[6]

Surgery

By looking at the degree of compression and canal narrowing, unstable nature of fracture and loss of bladder bowel control we decided on decompression of the sacral nerve roots and fixation of fractures after taking preoperative fitness from a physician. At first, two percutaneous 6.5 mm cannulated cancellous iliosacral screws were inserted from either side under fluoroscopic guidance to fix sacral ala fragments. Excessive compression was avoided keeping the comminuted nature of fracture in mind. Since the skin condition was

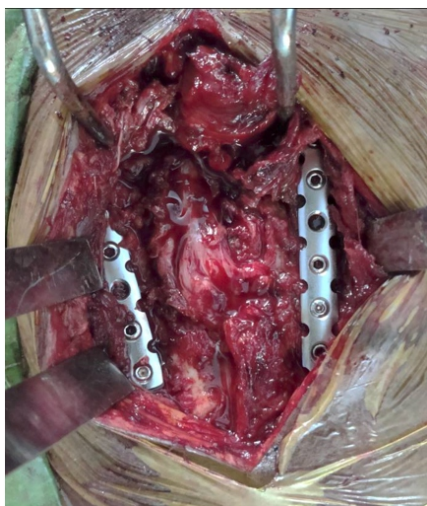


Figure - 5 Clinical picture showing thorough decompression of cauda equina and sacral roots and fixation of the transverse fracture with two 3.5 mm recon locking plates

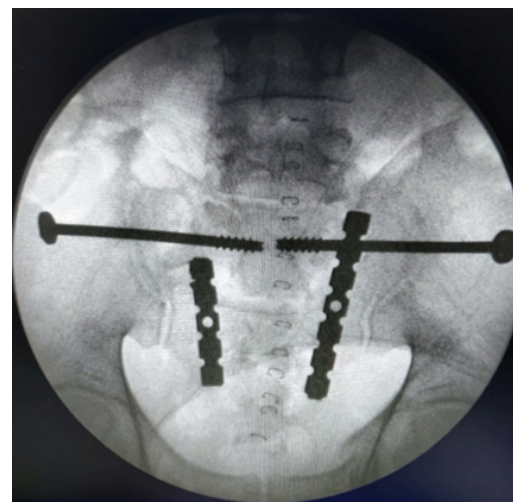


Figure - 6A Postoperative anteroposterior intra-operative radiograph showing fixation of the fracture with two 3.5 mm reconstruction locking plates and two 6.5mm cannulated cancellous screws.

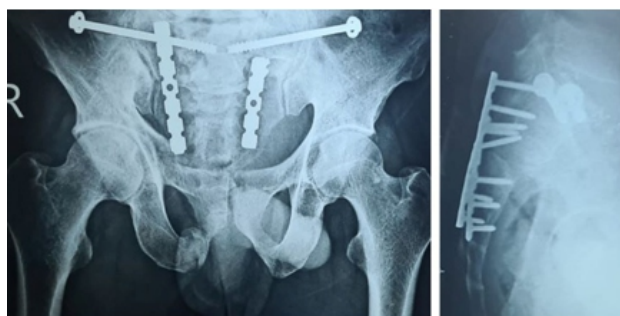


Figure 7 – X-ray at the end of 1 year showing stable fixation.

good, the patient underwent surgery 16 hours after sustaining the injury. A midline longitudinal incision was taken, and thorough decompression of cauda equina and sacral roots were performed (Figure - 5).

A large retro pulsed fragment was pushed anteriorly and kyphosis at the fracture site was reduced with a bone spike which made the dural sac significantly free. The nerve roots around the fracture were edematous and hyperemic, whereas the dura was not torn. The reduced fracture was fixed with two 3.5 mm reconstruction locking plates under fluoroscopic guidance and anatomical stable reduction was achieved (Figures - 6A and Figure - 6B). Fractures of the pubic rami were left alone as the pelvic ring was stable.

Postoperative Course

From postoperative day 1, propped up sitting at 45 degrees on a coccyx pillow was started. Bedside sitting was started after 3 weeks and standing and walking were started 6 weeks after the surgery. The patient was discharged on the 6th postoperative day. The wound healed well and the sutures were removed on day 15.

The patient regained his bladder control 3 months after the surgery and bowel control 4 months after the surgery. At the end of 1 year, He has persistent saddle anaesthesia but good bowel and bladder control and radiograph showing stable fixation (Figure 7).

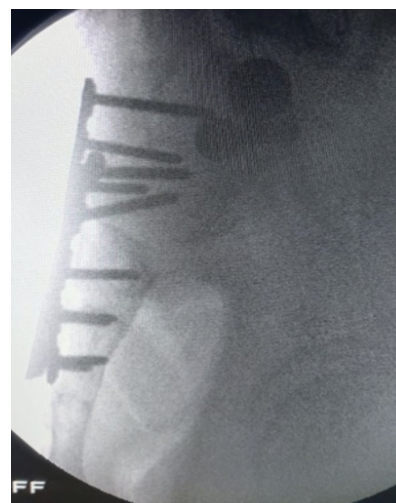


Figure - 6B – Showing complete correction of Kyphotic angulation after fixation.

Discussion

Treatment of Sacral fractures remains a topic of controversy in the literature. The chances of persistent neurological deficit when a patient is treated conservatively in presence of obvious severe compression prompt the proponents of operative management. On the other hand, surgical wound dehiscence and wound complications in the sacral and perineal areas can be devastating. A review of the literature shows that most of these injuries are caused by falls from height and the remaining as a result of road traffic accidents. Roy- Camille found in his 13 patients with Transverse sacral fractures (TSF) that 84% of these fractures were caused by falls from height and called them 'suicidal jumpers fracture'. [6] Roy-Camille et al and Strange-Vognsen and Lebech described transverse sacral fractures as a subtype of Denis zone 3 fractures and further classified them into four types. [7] Transverse sacral fractures can be high or low. High TSFs result from severe traumatic flexion of the upper body on the fixed pelvis. [8] Low transverse sacral fractures often occur at the apex of normal sacral kyphosis which is located at

the S2–3 level because the first two segments of the sacrum are stabilised by the sacroiliac joint, and the coccyx may act as a lever arm.[9] Our case had a history of falling from a height directly on the buttocks which explains a hard blow to the coccyx which in itself acted as a lever to cause transverse fracture with a kyphotic curve at the S2-S3 level. Initial diagnosis of transverse sacral fractures is usually very difficult on plain radiographs and often missed. Even they can be missed on computer tomography scans as the transverse fractures are parallel to the axial cuts and thus may not be well appreciated and require sagittal or 3D reconstruction. The most predictable investigation of visualization for these particular types of sacral fractures seems to be magnetic resonance imaging which adds information on neural elements also.[10]

Sacral fractures can result in neurological deficits either due to isolated root injuries or injury to cauda equina. The deficit can be due to isolated root or cauda stretching, contusion, laceration or complete cut. Chances of neurological recovery are more with stretched or contused injuries rather than lacerated or torn.[11] In our case roots and cauda equina were intact but contused due to a large retro pulsed fragment caudal to the fracture site, which explains the neurological recovery after bumpectomy. Kim MY et al studied 7 cases of TSFs and concluded that stabilisation is not necessary for low TSFs because the involved portion of the sacrum is not part of the weight transmission from the lower limbs to the spine. [12] In our case, we decided on decompression and stabilisation because of bilateral sacral ala fractures, local kyphosis and the retro pulsed fragment which caused the neurological deficit. Gibbons et al. reported neurological recovery in 11 out of 15 patients treated conservatively compared with 7 out of 8 patients managed operatively.[13] Dussa CU et al in 2008 did a review of the literature on 60 cases of TSFs and found that the sensory-motor improvement in 70% of the conservatively managed and 84% of the surgically treated cases.[14] In the same review improvement of bladder and bowel function was found in about 77% of the conservatively treated and 72% of the surgically treated cases showing no statistical evidence of an advantage of surgical treatment over a non-operative treatment in terms of improvement of bladder and bowel function thus making management debatable. Samir Mehta et al studied

sacral fractures and suggested when soft tissues permit; early surgical decompression should be considered in a stable patient when foraminal or central canal compromise and neurological deficit are present. Late identification and inadequate treatment may, however, lead to painful deformity and neurologic dysfunction.[1]

A post-surgery wound complication is another major concern when it comes to planning for surgical management. König MA et al carried out a systemic review of surgical management of U-shaped sacral fractures and Sixty-three cases were found in 12 articles. They noticed that Wound healing problems were encountered in ten patients of which eight required wound debridement and intravenous antibiotics. 5 of them had a pre-operative suboptimal skin condition. Two others healed with antibiotics only.[15] Carlo Bellabarba et al in their series of 19 sacral fractures reported wound infection in 3 patients, although 2 of them had pre-existing Morel Lavalles lesions. All 3 lesions healed well after primary surgical debridement and IV antibiotics.[16] So the pre-operative skin condition or presence of degloving injury due to high-velocity trauma are major factors to be taken into consideration when it comes to choosing the option of operative management. We were fortunate to have an optimal pre-operative skin condition and the absence of lesions like the Morel Lavalles lesion. In a study of 10 patients with coccyx excision, Kulkarni et al used a Z plasty for primary closure of the incision and had excellent results with no wound dehiscence due to reduced tension over the suture line.[17] This approach can be implicated while doing closure of surgical wounds of sacral fractures too but needs large prospective studies to authenticate the same.

Conclusion

There is no concrete consensus about the treatment of transverse sacral fractures. In our case, we have reported clinical results in displaced transverse sacral fracture compromising the sacral canal with neurological deficit. Early decompression and stabilization of unstable complex sacrum fractures can facilitate optimum neurological improvement and favourable clinical outcomes in terms of early mobilization and pain relief.

Declaration of patient consent : The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his/her consent for his/her images and other clinical information to be reported in the Journal. The patient understands that his/her name and initials will not be published, and due efforts will be made to conceal his/her identity, but anonymity cannot be guaranteed.

Conflict of Interest: None; **Source of Support:** None

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