

Treatment for U-Shaped Fractures of the Sacrum

Cats may be able to land on their feet when dropped from the second story of a building but humans are usually not so lucky. The force of the impact up through the spinal cord can kill a person. If the legs are bent and the person hits first on the sacrum -- well that's another story.

In this report, two cases of such injuries with sacral fractures are reported. The sacrum is a wedge- or pie-shaped bone that sits between the two pelvic bones. Above the sacrum is the lumbar spine.

The last lumbar vertebra (L5) has two extensions of bone sticking out (one from each side) called the transverse process. These bony wings actually form part of the sacrum and attach L5 and the sacrum to the ilium (upper portion of the pelvic bones). The narrow tip of the sacrum ends where it attaches to the tailbone or coccyx.

The force of the impact caused a U-shaped fracture. In the first case, the break occurred where the transverse process comes out from the fifth lumbar vertebrae. The fracture formed a vertical (up and down) line partway down the sacrum (labeled S2. Although the sacrum is one fused bone, there are five parts (S1-S5).

What makes this a U-shaped fracture is the horizontal (side-to-side) fracture connecting the two vertical fracture lines at the bottom of each fracture line. The second patient also had a U-shaped fracture but only affecting the left L5 transverse process with the connecting vertical fracture down lower at the S3 level.

Both patients reported low back/sacral pain, numbness in the legs, decreased muscle strength in the lower legs, and loss of reflexes. The force of the impact shifted the fractured bone into the spinal nerves that exit through tiny holes in the sacral bone.

There was tearing of the nerve roots and rupture of the dural sac (thin protective membrane around the nerves). In one case, there was further damage to the sacral nerves as the bone fracture fragments pushed into the dural sac cutting into the nerves. The damage set up an inflammatory response with bleeding, swelling, and eventual scar tissue formation from S2 to S4.

The nerves that come down the spinal canal end at the sacrum in a group called the cauda equina (literally "horse's tail" because that's what they look like). These are the nerves that help control bowel and bladder function as well as sensation and motor function of the groin and legs.

U-shaped sacral fractures like these two are rare. Optimal treatment choices are unknown because there are so few studies done comparing the results of one treatment to another. The goals of treatment are to move the bone off the nerves (a procedure called decompression) and nerve recovery.

It is agreed by everyone that the earlier surgery can be done, the better the results may be. Treatment within the first two weeks following the injury is ideal. There are fewer negative long-term effects with early decompression.

Besides moving the bone off the cauda equina, the surgeon can remove blood and bone fragments that might otherwise form a large callus (bump of bone) as the body tries to heal itself.

There are many different ways to approach a problem like this one. For both cases, the authors did not think screws would be enough to hold the transverse process in place. The skin is very thin over the sacrum so

size of hardware used must be taken into consideration. They opted for an internal titanium plate to stabilize the sacral fracture.

This approach worked as both patients recovered with good bone union and no major complications. There were a few problems with regaining bowel function for one and bladder function for the other.

It was seven weeks before one patient could urinate (empty her bladder) by herself and six months before she was fully recovered. She had the higher-level (S2) U-shaped fracture. The patient with the S3 fracture experienced a longer course of bowel and bladder recovery but regained full function by the end of one year.

Patients and surgeons were pleased with the final outcomes. There was good bone fusion, no fracture displacement, and no need for additional surgery. The authors offer their experience with these rare U-shaped sacral fractures with cauda equina injury in hopes of guiding others who may treat this rare problem.

Reference: Hong-wei Chen, et al. Isolated U-Shaped Sacral Fracture with Cauda Equina Injury. In *Orthopedics*. April 2011. Vol. 14. No. 4. Pp. E81562 (1-5).