The Cotrel–Dubousset instrumentation for unstable sacral fractures

Report of 3 patients

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We present a new operative procedure using the Cotrel–Dubousset (C–D) instrumentation in unstable sacral fractures, where the vertebral column is dissociated from the pelvis. This technique is based on screw fixation in the ileum and in the first sacral and the fifth lumbar vertebrae or the fifth and fourth lumbar vertebrae, with help of interconnecting rods. 3 patients were successfully treated.

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Submitted 93-06-19. Accepted 93-11-11

The primary problem in unstable sacral fractures is the loss of integrity between the vertebral column and the pelvic ring (Figure 1). This instability is difficult to manage by external fixation devices, which apply their action on the anterior part of the pelvic ring, and previous internal fixation techniques are unstable, not allowing immediate weight bearing. We describe a new method to create stable integrity between the vertebral column and the ileum, using the Cotrel–Dubousset (C–D) instrumentation (Cotrel et al. 1988).

Technique

The fracture is exposed through a medial posterior incision and reduction performed by leverarm technique and distracting forceps. The principle of fixation is based on a combination of the iliac fixation from the Galveston technique (Allen and Ferguson 1982) and the pedicular screw technique (Figures 2 and 3). The pelvic fixation is obtained by placing iliac screws on both sides through the posterior iliac column, the upper screw in a lateral direction and the lower screw directed more anteriorly in the transverse bar of the ileum. Fixation of the vertebral column is based on pedicular screws on both sides, engaging the first sacral and the fifth lumbar vertebrae. In case of severe sacral comminution, the fifth and the fourth lumbar vertebrae can be used, as we did in 1 patient. Stability is established by 2 bent C–D rods, one on each side fixed to the screws. The rods can be interconnected to

Figure 1. CT scan of the sacrum through the first sacral vertebra. The vertebra is dissociated from the sacrum, creating discontinuity between the vertebral column and the pelvis.

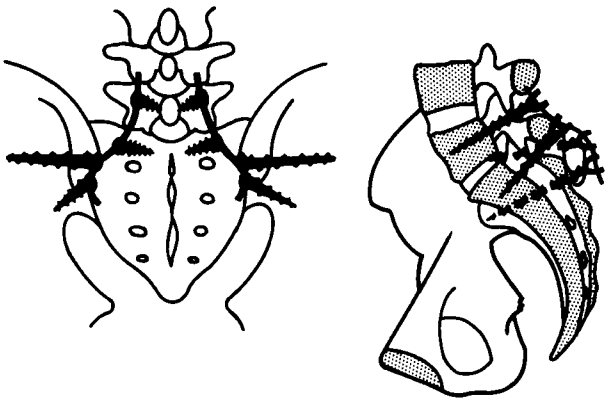

Figure 2. The C–D instrumentation. The bars interconnecting the rods are not shown.

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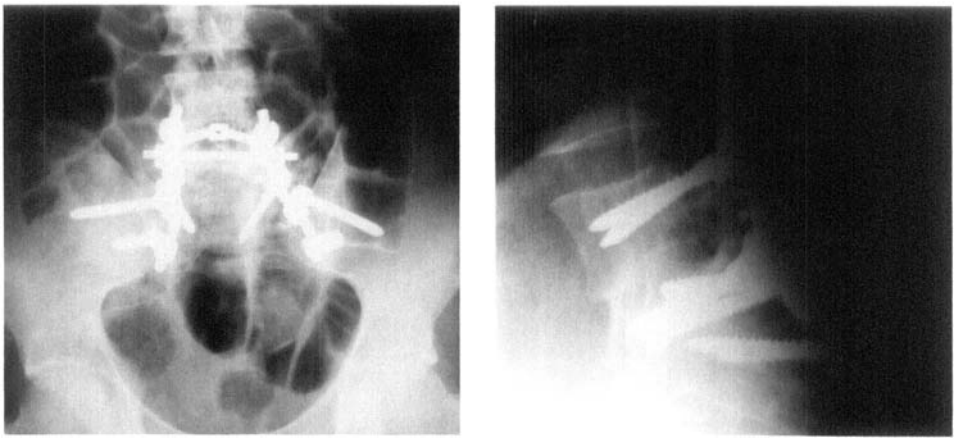

Figure 3. Postoperative radiographs showing the C–D instrumentation according to Figure 2.

improve stability. The osteosynthesis allows immediate weight bearing, but this can be postponed because of other lesions. Pressure over the sacral area should be avoided in the postoperative period due to the risk of tissue damage in the area. Following fracture healing, the implants should be removed since the sacroiliac joint is immobilized.

Discussion

Conservative treatment of unstable sacral fracture necessitates bed-rest during the time of fracture healing, and reduction of the fracture by traction is virtually impossible. In the operative treatment the versatility of the C–D instrumentation improves the possibilities of solid repair and gives an advantage compared to ordinary lumbosacral and lumboiliac plates. Harrington rods supported by a transverse bi-iliac bar are not designed for use in the lumbar area and give poor stability in the sagittal plane. These previously proposed operative techniques are not stable (Roy-Camille et al. 1985). The decribed method makes immediate weight bearing possible. One of our patients had no other fractures, was allowed to mobilize in a wheelchair after the drains were removed and was walking with support after a few weeks. The question whether or not a laminectomy of the sacrum and the fractured lumbar vertebrae should be performed is controversial. In the case of a well defined fracture line, laminectomy gives full view of the dorsal fracture, facilitating anatomic reduction, it will make nerve suture possible and decompress the sacral canal, if the canal is intact. Due to the high energy trauma in our three cases, the sacrum was severely comminuted. Anatomic reduction and nerve suture were found impossible and decompression probably unneccessary, therefore laminectomy was not performed considering the risk of adding further damage to the injured tissue. We found no complications related to the C–D instrumentation. The 3 patients were all suicidal jumpers and ended up with neurological sequelae, i.e., sphincter paralysis, but 2 were walking and one mobilized in a wheelchair.

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