Surgical management of pelvic fractures

B. Meij
Department of Clinical Sciences of Companion Animals
Faculty of Veterinary Medicine, Utrecht University
Yalelaan 108, 3508 TD, Utrecht, The Netherlands
Corresponding author: b.p.meij@uu.nl

Introduction
Pelvic fractures are common in dogs and cats and constitute 40 to 50 percent of all fractures in veterinary practices. Conservative treatment is possible in some pelvic fractures but proper surgical intervention is indicated in most pelvic fractures.

Pelvic fractures
Structurally the pelvis forms a rectangular box and is made up of the ilium, ischium and pubis, sacrum and first coccygeal vertebrae. Fractures of the pelvis are always multiple in nature and, if displacement is present, at least three or more bones are assumed to be fractured.

Because of the degree of trauma necessary to fracture the pelvis, adjacent tissue and surrounding organ systems must be carefully evaluated. Traumatic lung syndrome, pneumothorax, rupture of the bladder or urethra, fractures of the spine, fractures of femoral head and neck, hip luxation, and neurological deficits are common co-injuries in pelvic fractures. Neurological examination of the rear limbs should include observation of voluntary leg movement while supporting the trunk, spinal reflexes, and deep pain perception. Radiographs should include ventrodorsal and lateral views and in complicated fractures of the acetabulum, CT scans are indicated to get full 3D insight in the fracture. CT reconstructions help with pre-operative planning and the choice for implant shape and size.

In regard to treatment, pelvic fractures may be divided into two groups – nonsurgical and surgical.

Nonsurgical treatment
Pelvic fractures with little or no displacement of the fracture segments, an intact acetabulum, and continuity of the pelvic ring are ideal candidates for conservative treatment. The pelvic musculature serves very effectively in immobilizing the fracture segments. Perfect anatomical alignment of fractures involving the bones of the pelvis (other than articular surfaces) is not necessary for healing or function. Management of the patient usually consists of cage rest, limitation of activity, and measures to ensure urination and defecation. Pelvic fractures are painful and adequate analgesia is necessary to manage these patients. A well-padded, clean kennel is mandatory for those patients who are temporarily non-ambulatory. Many patients are able to stand up and move around within a day or two or, in case of multiple fractures in a week or two. Fractures of pelvic bones heal in about 6 to 8 weeks. Animal physiotherapy and hydrotherapy may be very effective in supporting these patients in their recovery of normal locomotion.

Surgical treatment
Surgical intervention should be considered in the following cases:
1. The size of the pelvic canal is markedly decreased.
2. Fracture of the cranial 2/3 of the acetabulum (= the main weight bearing part of the acetabulum) with displacement of the articular surface (Figure 1). Non-displaced fractures of the caudal 1/3 of the acetabulum (less weight bearing part of the articular surface) may be treated conservatively.
3. Fracture of the ilium with instability of the hip.
4. Sacroiliac fracture and dislocation.
5. Bilateral instability, particularly when accompanied by coxofemoral luxation or other limb fractures.

Most pelvic fractures are accompanied by extensive muscle trauma, hemorrhage and soft tissue injury. Reduction and fixation are accomplished more easily and accurately if undertaken within the first four days of injury. Each day’s delay may limit or prevent surgical repair. The chief advantages of early reduction and fixation are minimal hospitalization time, early ambulation, and reduced risk for fracture disease (= fibrosis of muscles close to stifle or elbow joints leading to reduced range of motion).

The various means of fixation of pelvic fractures include bone (locking) plates, bone screws, cerclage wires, Kirschner (K-) wires (pins) and less common intramedullary pins and external fixators. Clinical data indicate that the best results are obtained with bone plates and screws.

For surgical treatment of pelvic fractures, major emphasis is placed on the sacroiliac joint, ilium, and acetabulum. If these areas are properly reduced and fixed, the other areas (ischium, pubis) as a rule fall into place and usually do not need surgical treatment. The most practical order to proceed is the sacroiliac joint, ilium, and acetabulum if all three are fractured. If the ilium and acetabulum are
involved, reduction and fixation of the ilium first give stability to a portion of the acetabulum which then gives a stable segment to build on the reduction and fixation of the remaining portion. To facilitate reduction of acetabular fractures it is helpful to place a bone reduction forceps on the ischiadic table through a small caudal incision. Animal physiotherapy and hydrotherapy may be very effective in supporting these pelvic fracture patients in their recovery of normal locomotion.

Figure 1 Ventrodorsal (left) and lateral (right) radiographs of right-sided intra-articular acetabular fracture with medial coxofemoral luxation (top). The fracture was repaired with a 2.7 DCP plate with 8 screws (bottom). The plate starts on the ilium and runs along the dorsal rim of the acetabulum to the ischium. For the approach to the acetabulum an osteotomy of the trochanter major of the femur was required that is repaired with a tension band pin-wire fixation.