

Initial Evaluation and Management of Patients with Pelvic Fractures

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When people think of orthopedic trauma, oftentimes they think of athletic injuries. In reality, as those of us who care for these patients know, athletic injuries can be relatively minor compared to the injuries we see from automobile accidents, falls from a height, or industrial accidents. Among the most severe of these injuries are disruptions to the pelvic ring. The force required to sustain the least severe type of the pelvic fracture we see is between 10 and 20 times what causes an athlete to rupture his ACL. These are truly life threatening injuries and these patients have a mortality of 10 percent.

The primary cause of mortality for these patients is hemorrhage, and our initial management focuses on treating this. The pelvis is a very vascular structure and contains many large blood vessels. There are multiple factors that can make it difficult to control internal bleeding with pelvic ring disruptions. Many of these fractures are unstable, which means that there is continued bony motion when a patient is moved or transported. This can prevent or disrupt clot formation and cause continued bleeding. Another problem is that many of these fractures increase the volume of the pelvis. This expanding volume allows continued hemorrhage rather than tamponade.

These patients often sustain a multitude of injuries due to the mechanism of injury that it takes to cause a pelvic fracture. Other injuries that can be directly related to pelvic fractures include bladder or urologic injuries, bowel injuries, and neurologic injuries. These are high priority injuries but are not as immediately life-threatening as hemorrhage.

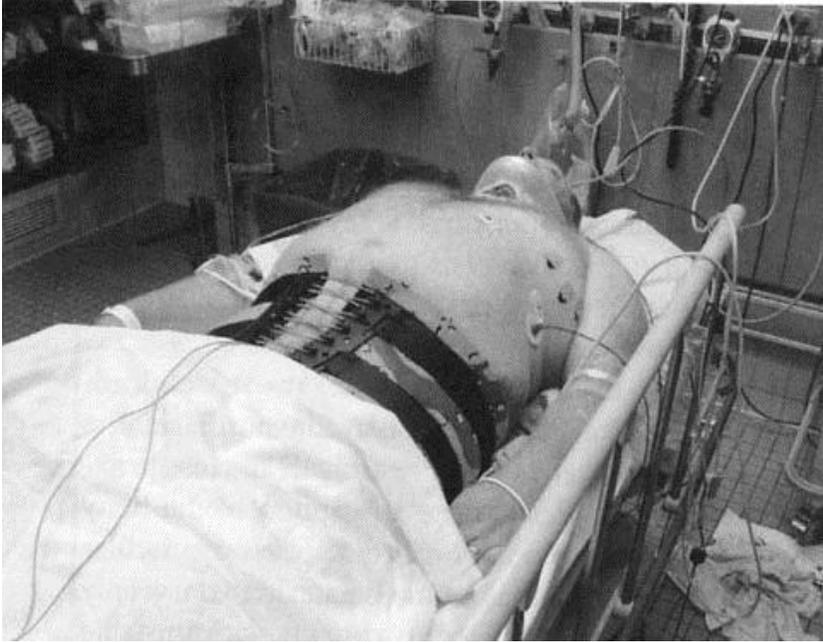
Pelvic fractures can be clinically suspected based upon different history and exam findings. Any patient who sustains a high energy trauma mechanism can potentially sustain a pelvic fracture. A pelvis radiograph is a part of ATLS protocol for these patients because they are a potential cause of hypotension and hemorrhagic shock. In addition, they may have crepitus or instability that can be appreciated on exam or when moving the patient. Swelling and ecchymosis of the flank, groin, or genitalia is common and can be severe. Occasionally they are associated with external bleeding related to open wounds to the skin, rectum, or vagina. With more severe injuries they may have shortening or malrotation of the lower extremities.

Once a patient has presented to the hospital and a pelvic fracture is suspected they are typically evaluated with an AP pelvis X-ray as part of ATLS protocol. If they are found to have a pelvic fracture then they are evaluated with additional x-rays and oftentimes a CT scan. At this time, if they are found to have a significant pelvic injury, they will oftentimes be transferred to a trauma center with the capability to treat these injuries. This typically involves an orthopedic trauma surgeon with training in pelvic trauma in addition to a multidisciplinary team to care for their associated injuries. Depending upon the specific injury this can require trauma surgeons, intensivists, urologists, gynecologists, interventional radiologists, anesthesiologists, spine surgeons, and plastic surgeons with the ability to care for associated injuries.

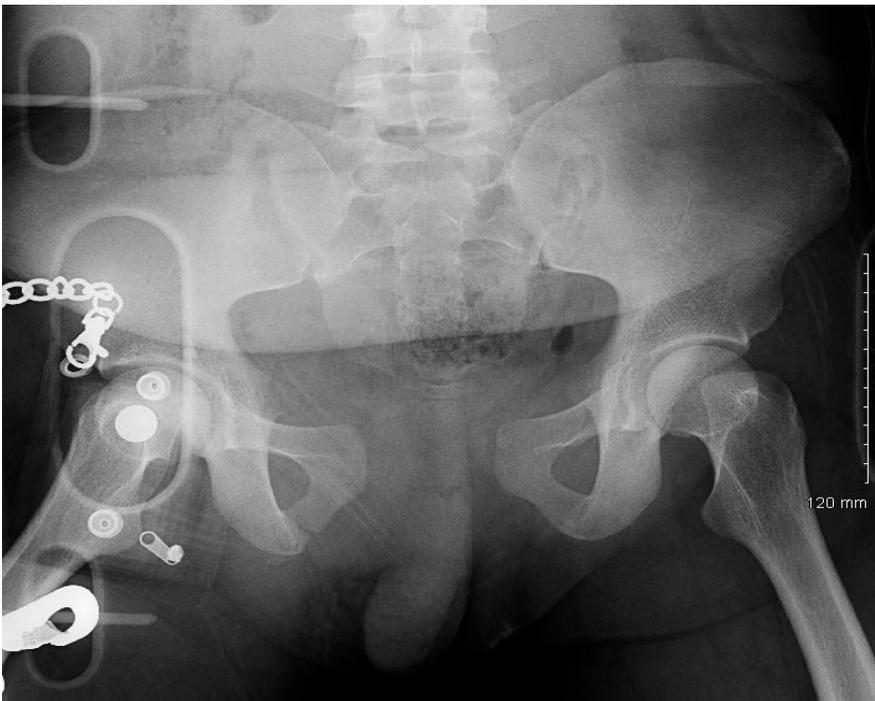
Now that we have reviewed how patients with pelvic fractures present, we will discuss the goals of treatment. As stated above, the initial management of these patients focuses on controlling hemorrhage and treating hemorrhagic shock. These patients should have IV access and begin fluid resuscitation. Application of a pelvic binder or a circumferential sheet is a simple and effective way to stabilize the pelvis. This can help with patient comfort, but it also helps to prevent ongoing internal hemorrhage. This will stabilize the pelvic bones to allow clot formation and can control the pelvic volume as well (see images). The binder should be centered over the greater trochanters (hip region, see images). A common error is to apply the binder too high and constrict the abdomen.



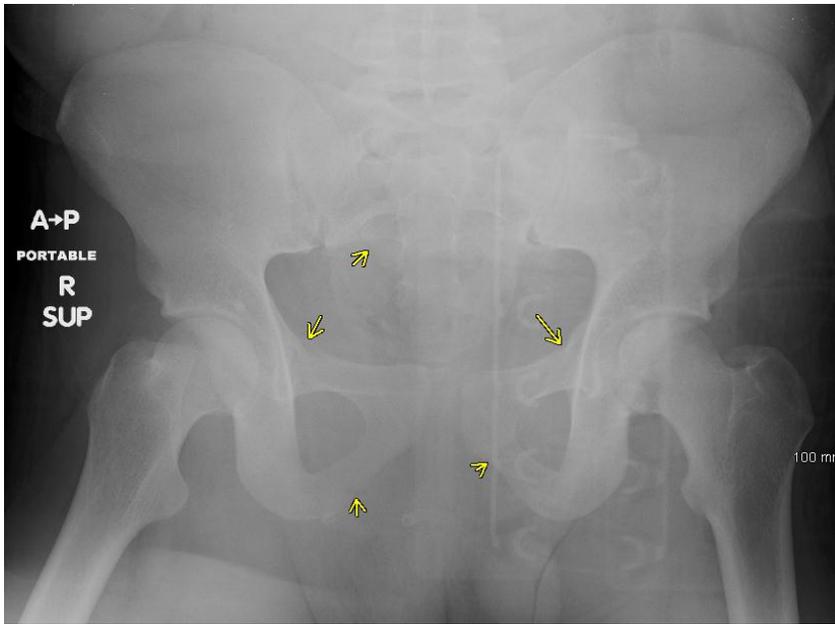
Example of using a sheet to stabilize the pelvis



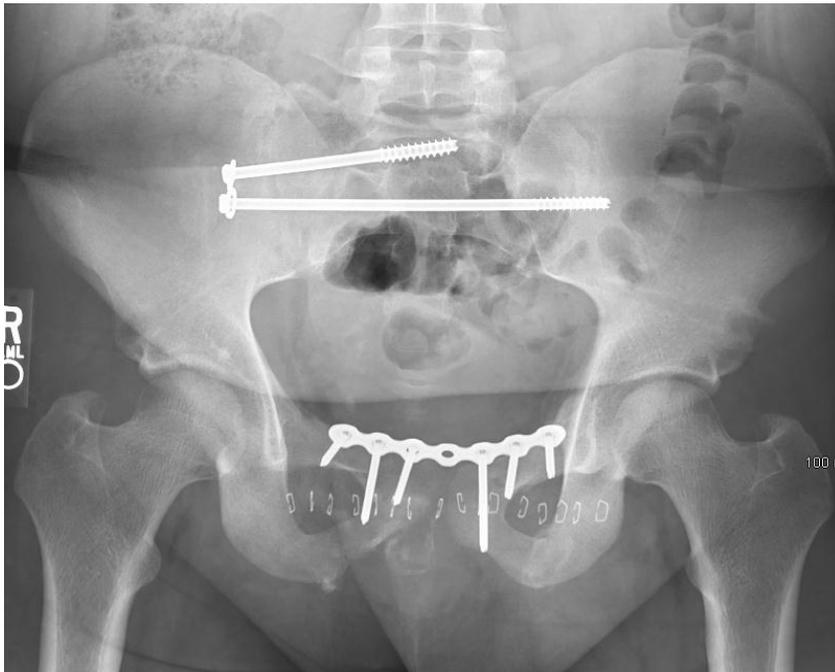
Placement of a commercially available pelvic binder for pelvic stabilization



X-ray of a 20 year-old patient with an unstable pelvic fracture after a motor vehicle collision.



X-ray of the same patient after placement of a pelvic binder. Note the outline of the binder can be seen faintly in the x-ray and is centered over the greater trochanters. Also note the improved position and reduction in pelvic volume after placement of the binder.



X-ray of the same patient after definitive treatment of his injury

Once a patient presents to a trauma center the early management continues to focus on treating hemorrhagic shock. Typically this requires continued resuscitation and stabilization of the pelvis. The pelvic binder or sheet may be applied or left in place to control hemorrhage. Other techniques that can help to stabilize the fractures initially are traction or external fixation, and they may be indicated in some circumstances. If the patient is not improving with bony stabilization and resuscitation, and other sources of hemorrhage are ruled out, then the patient may be taken to angiography for embolization of any major arterial sources of bleeding in the pelvis. Rarely, if all other techniques have failed to control the hemorrhage, they may be taken for emergent packing of the pelvis in the operating room.

Once a patient has been resuscitated and hemorrhage control has been obtained, the definitive treatment for these injuries has different goals. We strive to optimize long term function as much as possible by treating their associated injuries, stabilizing the fractures, and preventing deformity. Many of these injuries can be treated with advanced, minimally invasive techniques. Others are not amenable to the techniques and require more invasive surgery to repair, particularly those that involve the hip socket (acetabulum). Reduction and stabilization of unstable fractures improves patient comfort, prevents deformity and leg length discrepancy, and has been shown to improve long term outcomes. If the acetabulum is involved, a more precise reduction improves long term outcome and will decrease the risk of arthritis. Even with optimal treatment, however, these can be life changing injuries for these patients and give them some degree of long-term functional impairment.

The treatment of patients with pelvic fractures is challenging and oftentimes requires the resources of a multidisciplinary trauma team. Early treatment is focused on hemorrhage control and resuscitation. Definitive treatment strives to stabilize the fractures and prevent deformity. With optimal treatment we can improve the survival and outcome for these patients.

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