

Orthopedic Emergencies

A Practical Emergency Department Classification (US-VAGON) in Pelvic Fractures



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KEYWORDS

• Orthopedics • Emergency department • Classification • Pelvic fractures

KEY POINTS

- The traditional classifications of pelvic fractures are summarized to show their poor value for emergency physicians in the initial evaluation and treatment of patients with pelvic fractures in the emergency department (ED).
- The ED classification of pelvic fractures is divided into 2 main types: unstable (U) and stable (S) pelvic fractures. Unstable fractures are evaluated and treated according to Advanced Trauma Life Support guidelines.
- Once pelvic fractures are stabilized, they are further classified into 5 categories based on the risks of potential severe complications, including hemorrhagic/vascular (Va), genitourinary or gastrointestinal (G), orthopedic (O), neurologic (N), and uncomplicated pelvic fractures. Therefore, this ED classification refers to them as the US-VAGON classification.

Trauma is one of the leading causes of death before the age of 40 years and approximately 5% of patients with trauma who require hospital admission have pelvic fractures.^{1–3} Among all patients with pelvic fractures, about 60% result from vehicular trauma (eg, automobile, motorcycle, bicycle); 30% from falls; and 10% from crush injuries, athletic injuries, or penetrating trauma.^{4,5} Although the mortality of trauma victims with pelvic fractures has decreased significantly in the past 10 years, it is still the third most commonly seen injury in fatalities caused by motor vehicle accidents, with a 5% to 16% mortality.^{6–8} However, these rates have increased to 25% to 45% in patients with a pelvic fracture who present hemodynamically unstable to the emergency department (ED).^{9,10} In addition, pelvic fractures pose a complex challenge to

Disclosures: None.

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Emerg Med Clin N Am 33 (2015) 451–473
<http://dx.doi.org/10.1016/j.emc.2015.01.001>

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emergency physicians (EPs) because they are often associated with life-threatening hemorrhage, deformity, and associated internal injuries.

TRADITIONAL CLASSIFICATIONS OF PELVIC FRACTURES

Pelvic fractures include pelvic ring disruptions and sacral, acetabular, and avulsion fractures. Pelvic fractures are usually divided into 2 major types based on the amount of energy impacted. Injuries with low-energy mechanisms can result in isolated fractures of individual bones, avulsion fractures, and acetabular fractures in the elderly. However, injuries with high-energy mechanisms can result in pelvic ring disruptions, sacral fractures, and acetabular fractures in younger patients. These patients can quickly become hemodynamically unstable and rapid stabilization and aggressive treatment are required on the patients' arrival in the ED. EPs should be mindful that patients with pelvic fractures have associated multiorgan injuries. Each type of pelvic fracture has a different classification based on the mechanisms, anatomic locations, or other associated injuries to predict the severity, the clinical outcome, or the indications for any surgical intervention. However, these traditional classifications were developed by trauma or orthopedic surgeons and have limited practical value for EPs in the initial evaluation and treatment of patients presenting to the ED with pelvic fractures.

Two most commonly used classifications of pelvic ring fractures are the Tile and Pennal and the Young and Burgess classifications. The Tile and Pennal classification is based on the integrity of the posterior sacroiliac complex, whereas the Young and Burgess classification is based on the mechanism of injury. Although previous studies showed some correlation with the type of pelvic ring fractures and the risk of hemorrhage by using both of these classifications, they have failed to show a consistent correlation between injury type and severity and/or mortality among patients with pelvic fractures.^{11–14}

Sacral fractures are commonly associated with pelvic ring fractures (30%–45%) caused by high-energy mechanisms of injury, but occasionally can be isolated. Approximately 25% to 30% of these sacral fractures are associated with neurologic injury. Patients can initially present as neurologically intact and physicians frequently miss subtle sacral fractures.^{15,16} There are several classification systems for sacral fractures and the most commonly used are the Denis 3-zone classification and Isler lumbosacral junction classification.^{17,18} The Denis classification divides sacral fractures into 3 different zones (lateral to the sacral neural foramina, through the sacral foramina, and medial to the sacral foramina). The Isler classification assesses lumbosacral injury by the location of the pelvic ring fracture relative to the L5-S1 facet joint. These classifications assist physicians predicting neurologic injury and can also affect management if properly used.^{16–19} In addition, the Frankel classification, which identifies spinal cord injury, and the Gibbons classification, which was designed specifically to grade the sacral neurologic injuries in patients with sacral fractures, are also used by spinal surgeons.^{15,20}

Because of the complex acetabular anatomy, various classifications have been suggested. The classification derived by Letournel and Judet is by far the most widely used and accepted by orthopedic surgeons.²¹ Letournel and Judet²¹ classifies acetabular fracture into 10 major fracture patterns consisting of 5 elementary and 5 complex patterns. The Tiles classification is a modification of the Letournel classification and consists of 4 different types based on the involvement of anterior or posterior wall column and its stability.²² These classifications correlate well with the surgical approach and fracture reduction tactics. With the development of advanced computed tomography

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