

## Selected Topics: Emergency Radiology



### IMPORTANCE OF PELVIC RADIOGRAPHY FOR INITIAL TRAUMA ASSESSMENT: AN ORTHOPEDIC PERSPECTIVE

Diederik O. Verbeek, MD and Andrew R. Burgess, MD

Department of Orthopedic Surgery, Memorial Hermann Hospital, University of Texas, Houston, Texas  
Reprint Address: Diederik O. Verbeek, MD, Orthopedic Trauma Service, Hospital for Special Surgery, 535 East 70<sup>th</sup> Street,  
New York, NY 10021

**Abstract—Background:** Many institutions have abandoned the routine for selective pelvic x-ray (PXR) for initial imaging in blunt trauma patients undergoing computed tomography (CT) scanning. **Objective:** Our aim was to examine the association between selective use of PXR and time to diagnosis of (major) pelvic fractures, as well as prioritization of key immediate interventions (including hip reduction and pelvic arterial embolization). **Methods:** We conducted a 1-year review of early management of pelvic fracture patients undergoing pelvic CT scanning. Time interval and sequence of initial imaging and key immediate interventions were recorded. **Results:** Of 218 pelvic fracture patients, 79 (36%) had no initial PXR, and instead had an initial CT scan. Time to first pelvic imaging in those patients was 48 min (standard deviation [SD] = 47 min vs. 2 min [SD = 6 min] with PXR;  $p < 0.001$ ). Of 40 hip dislocations, 15 (38%) were detected first on CT scan. Overall, 22 (55%) required a second CT scan after reduction in the emergency department. No initial PXR was performed in 42 of 120 (35%) pelvic ring fracture patients and in 16 of 61 (26%) unstable pelvic ring fractures. Time to pelvic arterial embolization was longer in 4 patients without initial PXR than in 14 patients with PXR (296 min [SD = 206 min] vs. 170 min [SD = 76 min], respectively,  $p = 0.038$ ). **Conclusions:** Selective PXR was associated with a significant delay in recognition of (major) pelvic fractures, including those with associated hip dislocations and (potential) pelvic bleeding. PXR remains a useful screening tool to rapidly determine the need for immediate interventions and to allow early planning before CT scanning. © 2016 Elsevier Inc. All rights reserved.

**Keywords—**pelvic fracture; acetabular fracture; pelvic radiography; computed tomography

#### INTRODUCTION

Pelvic x-ray (PXR) has traditionally been an essential component of the initial assessment of blunt trauma patients (1). With the advent and growing use of high-speed multi-detector computed tomography (CT) in trauma patients, the added value of PXR is increasingly being called into question (2–5).

It is generally agreed upon that in hemodynamically unstable blunt trauma patients, an initial PXR is required to rapidly rule out a potential pelvic source of bleeding (6). However, routine use of PXR in hemodynamically stable blunt trauma patients is more controversial. Previous studies have indicated that routine PXR is no longer required in the majority of patients with stable vital signs undergoing abdominopelvic CT scanning as part of their initial assessment (4,5). Abandoning the routine for a more selective use of PXR may appear cost-effective in the general trauma population. However, the effect of this selective imaging strategy on the early treatment of pelvic fracture patients is largely unknown. Previous studies included few patients with a (major) pelvic fracture, and the need for immediate interventions before CT scanning was under-reported (2–5).

Therefore, we reviewed the impact of selective use of PXR on early management of pelvic fracture patients undergoing abdominopelvic CT scanning. In particular, we examined the time to diagnosis of (major) pelvic fractures, as well as the prioritization of key immediate interventions (i.e., hip reduction, pelvic arterial embolization, and placement of a pelvic binder).

## METHODS

From September 1, 2011 to August 31, 2012, all adult patients with a pelvic fracture were identified from our institution's orthopedic trauma registry. The Trauma Institute at our hospital is an American College of Surgeons-accredited Level I trauma center that admits >6,000 trauma patients annually.

Patients with a pelvic ring or acetabular fracture who underwent abdominopelvic CT scanning as part of their initial assessment were considered for inclusion in the study. Patients who were transferred to our institution and patients with a penetrating injury were excluded.

During the study period, there was no imaging protocol in place for the initial management of blunt trauma patients. In general, high-energy blunt trauma patients who were considered hemodynamically stable underwent abdominopelvic CT scanning after initial (chest) radiography and focused assessment with sonography in trauma in the trauma resuscitation room. Whether patients required an initial PXR before CT scanning was determined on presentation by the trauma team leader (an emergency physician or trauma surgeon). The hemodynamic status of the patient and findings on physical examination are factors that were considered in the decision-making process.

Data were collected on patient demographic characteristics, the imaging performed, and the need for operative fixation of the pelvic fracture. Also, key immediate interventions and their sequential timing in relation to initial pelvic imaging were recorded. These key immediate interventions included reduction of a hip dislocation, pelvic arterial embolization, and placement of a pelvic binder. The diagnostic interval was calculated as the time from first imaging (typically chest radiography) to first pelvic imaging (PXR or CT scan). The time to intervention in patients who needed pelvic arterial embolization was calculated from first imaging to first pelvic angiography images.

Pelvic ring fractures were classified using Young and Burgess classification, with unstable pelvic ring fractures defined as lateral compression types II and III, anteroposterior compression types II and III, vertical shear, and combined mechanism (7,8). Acetabular fractures were classified using the Letournel classification system (9).

Combined fractures were included in the acetabular fracture group.

## Statistical Analysis

Continuous variables are presented as mean values with standard deviations (SD) and compared with the independent *t*-test. Categorical values were calculated as percentage of frequency of occurrence. Statistical significance was declared at the 0.05 level. All management and statistical analyses were performed using the Statistical Package for the Social Sciences software, version 20.0 (IBM Corp, Armonk, NY).

## RESULTS

During the 1-year study period, 314 adult patients with a pelvic ring or acetabular fracture were reviewed (Figure 1). Of those, 96 patients were excluded from the study; 47 patients did not have an abdominopelvic CT scan, 46 patients were transferred from outside facilities, and 3 patients had a penetrating injury.

In total, 218 (69%) pelvic fracture patients were included in the study. Mean age was 39 years (SD = 17 years) and 63% were men. Seventy-nine patients (36%) did not have an initial PXR and 139 patients (64%) had an initial PXR before CT scanning. The diagnostic interval to first pelvic imaging was 48 min (SD = 47 min) and 2 min (SD = 6 min), respectively ( $p < 0.001$ ).

## Acetabular Fractures

There were 98 patients (45%) with an acetabular fracture. Mean age was 39 years (SD = 17 years) and 74% were men. The classification of the acetabular fractures is presented in Table 1. In total, 69 patients (70%) required operative fixation of their acetabular fracture.

Of 98 acetabular fracture patients, 37 patients (38%) did not have an initial PXR and 61 patients (62%) had an initial PXR. The diagnostic interval to first pelvic imaging in these patients was 44 min (SD = 39 min) and 2 min (SD = 7 min), respectively ( $p < 0.001$ ).

A total of 40 (41%) acetabular fracture patients had an associated hip dislocation on initial imaging (Figure 1). In 15 of those patients (38%), the dislocation was detected first on CT scan in the absence of an initial PXR. Of those, 13 patients had subsequent reduction in the emergency department (ED), and 2 patients required reduction in the operating room with or without immediate fixation.

Twenty-five of 40 patients (63%) with a hip dislocation had an initial PXR. In 13 of 40 patients (33%), the hip dislocation was present on initial PXR, but

Download English Version:

<https://daneshyari.com/en/article/3245722>

Download Persian Version:

<https://daneshyari.com/article/3245722>

[Daneshyari.com](https://daneshyari.com)