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Skip and save: utility of pelvic x-rays in the initial evaluation of blunt trauma patients

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Abstract

BACKGROUND: The cost of medical care is an area of major emphasis in the current healthcare environment. Medical providers have a significant role in reducing costs. One way to achieve this goal is to eliminate practices that add little value to patient care. The pelvic x-ray (PXR) obtained during the initial evaluation of blunt trauma may be an example. The objective of this study was to explore the utility of the pelvic x-ray in the initial evaluation of blunt trauma patients.

METHODS: Blunt trauma patients with pelvic fractures of any type admitted to our urban trauma center from January 2012 to December 2013 were reviewed. Demographics including age, sex, race, mechanism of injury, and outcomes were collected. Findings on PXR and computed tomography (CT) were compared for correlation. Patients requiring surgery for their pelvic fractures were identified.

RESULTS: Of the 3,217 trauma admissions over the 2-year period, 153 patients sustained a pelvic fracture. Mean age was 50 years (15 to 97), male 54%, and Caucasian 46%, Hispanic 31%, African American 22%, and Asian 1%. The average injury severity score was 12.9. The main mechanism of injury was motor vehicle collisions 45%, followed by fall from standing 22% and auto and/or pedestrian accidents 12%. There were 22 patients that did not have both CT and pelvic imaging for comparison. Of the 131 patients with both CT and pelvic films, findings were the same in 43 (33%). CT identified one or more additional pelvic fractures in 88 (67%) patients compared with the PXR. In 29 patients (22%), pelvic fractures were not evident on PXR with fractures only identified by CT. The most common missed fractures on PXR were sacral and iliac injuries. Of the 153 patients with pelvic fractures, 24% required surgery for their pelvic injuries. Mortality was 4% for nonpelvic fracture-related causes. The PXR findings did not change management provided by trauma team in the emergency department.

CONCLUSIONS: As expected, CT is more sensitive in identifying pelvic fractures compared with PXR. Most blunt trauma patients are undergoing further evaluation with CT. We therefore propose that in patients that are normotensive with no pelvic instability or hip dislocation on physical examination who are to undergo further imaging with CT, the pelvic film should be avoided as it adds little value to patient management. The Advanced Trauma Life Support (ATLS) guidelines should be revised to reflect a diminishing role of the PXR in blunt trauma patients.

The cost of healthcare continues to be an area of major emphasis and increasingly since the passing of the Affordable Health Care Act. Despite the restraint in the rate of growth of healthcare spending in the United States (US)

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over recent years, the US still leads in spending among industrialized countries.[1] In the current cost containment environment, there is increased scrutiny of clinical processes in an attempt to decrease costs. One potential area of savings is to eliminate practices that provide little value to patient care. The investigators propose that the pelvic plain film (PXR) obtained in the evaluation of blunt trauma patients is one example. According to the Advance Trauma Life Support (ATLS), the PXR should be used as an adjunct in blunt trauma patients to quickly identify pelvic pathology. It has been noted, however, that in the normotensive blunt trauma patient with a negative physical examination, the PXR obtained in the trauma bay rarely changes management.[2,3] In addition, oftentimes patients are undergoing further work-up with computed tomography (CT), which is known to be more sensitive, and thus provide more detailed information.[3]

Previous studies on this subject have demonstrated a diminishing role for the PXR in blunt trauma patients.[2–4] The authors wanted to revisit this subject to determine if previous observations with regards to the PXR remained valid today. The purpose of this study was therefore to evaluate the utility of PXR in blunt trauma patients at our urban trauma center. More specifically, we wanted to determine if CT was indeed more sensitive in identifying pelvic fractures and whether findings on PXR changed the care provided by the trauma team in the emergency department. In addition, we wanted to identify the types of pelvic fractures most commonly encountered, and if operative intervention is usually required for those fractures. At last, mortality in this patient cohort was determined, and the causes reviewed.

Methods

Patients with pelvic fractures admitted to our urban trauma center from January 2012 to December 2013 were identified. A retrospective chart review was conducted to collect mechanism of injury, outcomes, and patient demographics including age, sex, and race. Radiographic readings from PXR and CT were studied to determine the types of pelvic fractures and whether CT identified more findings compared with plain films. Notes by the trauma and orthopedic team, including any operative reports, were reviewed. From this, we determined if pelvic plain films altered management in the trauma bay and how many patients needed operative intervention for their pelvic fractures by the orthopedic team.

Results

There were 3,217 trauma admissions to our trauma center from January 2012 to December 2013 of which 2,824 (87.5) were classified as blunt trauma. Of these, 153 patients sustained a pelvic fracture. Mean age was 50 years with a range between 15 and 97. Most of the patients (54%) were male. The breakdown of patient race was Caucasian 46%, Hispanic 31%, African American 22%, and Asian 1% (Table 1). The main mechanism of injury was motor vehicle collisions (45%), followed by fall from standing (22%), and auto and/or pedestrian accidents (12%; Table 2). The average injury severity score was 12.9. There were 22 patients in the data set that did not have both imaging modalities (CT and plain film) for comparison. Among this group, 14 patients underwent CT with no pelvic film, and 8 had a plain film taken with no CT. Of those with only a pelvic plain film 4 presented with hypotension and may explain the omission of CT. Of the 131 patients with both CT and PXR, findings were the same in 43 (33%). CT identified one or more additional pelvic fractures in 88 (67%) patients compared with the PXR (Fig. 1). In 29 patients (22%), pelvic fractures were not evident on PXR with fractures only identified by CT. The most common missed fractures on PXR were sacral and iliac injuries. On review of the trauma team's notes, it was noted that the results of the PXR did not change patient management in the trauma bay. In this particular set of patients, there were no open-book fractures requiring urgent pelvic stabilization by the orthopedic team. The average length of stay was 4 days (range 0 to 67).

Of the 153 patients with pelvic fractures, 37 (24%) required surgery for their pelvic injuries (Table 3). Operative intervention by the orthopedic team usually involved fixation of sacrum or sacroiliac joint as well as open reduction internal fixation of acetabular and some pubic rami fractures, placement of traction pins, and one placement of external fixation nonemergently. In this particular cohort of patients, no emergent external fixation of pelvic fractures was performed to reduce pelvic volume. A significant proportion of fractures (33%) involved stable superior and inferior pubic rami fractures not typically requiring an operation. Others included acetabular, sacral and coccyx, ischium, and iliac bone fractures.

The mortality in this patient cohort was determined to be 6 (4%; Table 3). All of these patients required surgical

Table 1 Number of trauma patients and demographics

Characteristic	N	%
Number of trauma patients	3,217	
Number of traumas with blunt trauma	2,824	87.5
Number of blunt traumas with pelvic fractures	153	5.4
Age		
Median, years (range)	50 (15–97)	
Gender		
Male	83	53.9
Female	71	46.1
Race		
Caucasian	70	45.6
Hispanic	47	30.7
African American	34	22.2
Asian	2	1.3