

Low-impact pelvic fractures in the emergency department

Greg Dodge, MD; Rob Brison, MD, MPH

ABSTRACT

Objective: We examined the records of patients presenting to the emergency department (ED) with low-impact pelvic fractures. We describe frequency, demographics, management and patient outcomes in terms of ambulatory ability, living independence and mortality.

Methods: Patients treated for a pelvic fracture over a 2-year period in Kingston, Ont., were identified. We performed a retrospective hospital record review to distinguish high- versus low-impact injury mechanisms, and to characterize the injury event, ED management and outcomes for patients with low-impact fractures.

Results: Of 132 pelvic fractures identified, 77 were low-impact fractures. Patients were predominantly women (82%) with a mean age of 81 years; 96% had some pre-existing medical comorbidity. The pubic rami were most commonly involved (86%). The median length of stay in the ED was 9.4 hours. Twenty-five patients (32%) were admitted to hospital. Ten patients had surgical stabilization, mostly of the acetabulum. Five patients died in hospital, 4 from pneumonia and 1 from myocardial infarction. Eight additional patients died within 1 year of injury. At discharge, only 18% lived independently and 16% walked without aids versus 42% and 38%, respectively, before injury.

Conclusion: Low-impact pelvic fractures affect predominantly elderly women with pre-existing comorbidities. A substantial amount of time and resources in the ED are used during the workup of these patients and while awaiting their disposition from the ED. These injuries are important because they affect independence and seem associated with an increased risk of death.

Keywords: pelvic fracture, low-impact trauma, outcomes, falls in elderly, morbidity, mortality

RÉSUMÉ

Objectif : Nous avons analysé les dossiers de patients s'étant présentés à l'urgence avec une fracture du bassin à faible impact. Nous décrivons la fréquence, les données démo-

graphiques, la prise en charge et le devenir des patients en termes de capacité ambulatoire, d'autonomie et de mortalité.

Méthodes : Nous avons repéré les patients traités pour une fracture du bassin sur une période de 2 ans à Kingston, en Ontario. Nous avons effectué une analyse rétrospective des dossiers médicaux pour faire la distinction entre les mécanismes de blessure à faible impact et à haut impact et caractériser l'incident à l'origine de la fracture, la prise en charge à l'urgence et le devenir des patients présentant une fracture à faible impact.

Résultats : Parmi les 132 fractures du bassin repérées, 77 étaient des fractures à faible impact. Les patients étaient majoritairement des femmes (82 %) et l'âge moyen, de 81 ans; 96 % avaient une comorbidité médicale préexistante. Les branches pubiennes étaient le foyer de fracture le plus courant (86 %). La durée médiane de séjour à l'urgence était de 9,4 heures. Vingt-cinq patients (32 %) ont été hospitalisés. Dix patients ont subi une stabilisation chirurgicale, principalement de l'acetabulum. Cinq patients sont décédés à l'hôpital, 4 d'une pneumonie et 1 d'un infarctus du myocarde. Huit autres patients sont décédés dans l'année suivant la blessure. À la sortie de l'hôpital, seulement 18 % des patients vivaient de façon autonome et 16 % marchaient sans aide par rapport à 42 % et 38 %, respectivement, avant le traumatisme.

Conclusion : Les fractures du bassin à faible impact touchent principalement les femmes âgées présentant des comorbidités préexistantes. On consacre beaucoup de temps et de ressources à l'urgence pour l'investigation et dans l'attente de l'issue de la consultation. Ces blessures sont importantes, car elles affectent l'autonomie et semblent être associées à un risque accru de décès.

INTRODUCTION

The incidence of low-impact pelvic fractures is rising and continues to be a health burden to the elderly.¹⁻³ The emergency management of pelvic fractures predominantly focuses on the resuscitation and stabilization

From the Department of Emergency Medicine, Queen's University, Kingston, Ont.

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of fractures resulting from high-energy trauma.⁴ Few studies have explicitly examined low-impact pelvic fractures, even though simple falls have been shown to be the leading cause of pelvic fractures in the elderly.^{5,6}

The treatment of low-impact pelvic fractures in elderly patients presents distinct challenges for physicians in the emergency department (ED). The frail elderly have unique physiologic, medical and social needs that must be considered.⁷ In a study on pelvic insufficiency fractures, 83% of patients had at least 2 additional medical disorders.⁸ Although this patient group uses substantial health care resources in the hospital and in the community,⁹ few reports consider its impact on the ED.

This study examines the patterns of occurrence of low-impact pelvic fractures over 2 years at our health sciences centre. We sought to assess current management, to track the flow of patients through the ED and to examine outcomes for these patients in terms of ambulatory status, living arrangements and mortality.

METHODS

This study was conducted at the 2 EDs in Kingston, Ont., which serve a population of 150 000. This study was reviewed and approved by the Queen's University Health Sciences and Affiliated Teaching Hospitals Research Ethics Board. Cases occurring between Jan. 1, 2005, and Dec. 31, 2006, were identified from the ED discharge database based on ICD-10 codes (all types of pelvic fracture). Chart review of ED records, inpatient records and other hospital-based medical records was used to confirm a pelvic fracture and to determine the mechanism of injury. A standardized paper data abstraction form was used.

Motor vehicle collisions, falls from a height above 1 m and crush injuries were categorized as high-impact injuries. Low-impact pelvic fracture cases were defined as simple falls from a height less than 1 m or fractures occurring in the absence of known trauma.¹⁰ Falls involving stairs but less than 1 m height were included in the low-impact group.

Charts of patients with low-impact injuries were reviewed for information on demographics, comorbidities, ambulatory status, living arrangement, usual medications, mode of arrival to the ED, investigations, treatment, time in the ED and discharge status, as well as outcomes in terms of ambulatory ability, living independence and mortality. Hospital medical records were reviewed for 1 year after discharge to examine for hospital

readmissions and recording of deaths. Information regarding ambulatory ability and living independence after the injury was recorded when available. Return visits to the ED within 3 months of discharge from the ED or hospital were reviewed to monitor for return visits related to the pelvic fracture. Descriptive statistics were used to analyze the data.

RESULTS

A total of 132 patients with pelvic fractures were identified during the 2-year period. Fifty-five patients with pelvic fractures were excluded because of a high-impact mechanism, including motor vehicle collision (62%), falls from a height above 1 m (29%) and crush injuries (9%). The remaining 77 cases met our case definition of low-impact fractures. The high- and low-impact groups differed in terms of demographics. The high-impact group was predominantly male (71%) and younger (mean age 44 yr, range 6–89 yr), whereas the low-impact group was predominantly female (82%) with a mean age of 81 years (range 57–103 yr).

Characteristics of the patients with low-impact fractures are noted in Table 1. In this group, a fall was the mechanism of injury in 94% of the cases, of which 82% were a simple fall from standing. Only 3 patients with low-impact fractures had no pre-existing comorbidity noted; 44% of patients were taking medication to treat or prevent osteoporosis at the time of their fracture.

The pubic rami were the most common anatomic fracture site (Table 1), with 45 of 77 having isolated pubic rami fractures. The fractures were described as displaced or impacted in 35% of cases. Concurrent injuries were usually minor, but 6 patients had fractures beyond the pelvis (4 wrist, 1 metacarpal, 1 lumbar spine), and 1 patient had a minor head injury. In all, 46% underwent CT and/or magnetic resonance imaging of the pelvis.

Pain medications were administered in the ED to 86% of patients, with 79% receiving narcotics. Non-steroidal anti-inflammatory drugs were used in 13% of cases. Consults in the ED included orthopedics (43%), internal medicine (8%), and social work or home care (33%). Other ED consults included physiotherapy (12%), occupational therapy (3%), geriatric emergency nursing (12%) and psychiatry (3%).

The median length of stay in the ED was 9.4 hours (range 1.8–156 h). Of the 52 (68%) discharged from the ED, 24 patients returned to their independent residence with or without home care and 28 (36%) went to a supported environment (rehabilitation hospital, nursing

home or retirement home) as returning or new clients. Twenty-five patients (32%) were admitted to hospital (orthopedics 20, internal medicine 5) and experienced an in-hospital length of stay ranging from 4 to 197 days (median 13 d).

Ten of the 20 patients admitted to orthopedics underwent surgery. Seven of these surgeries were for injuries involving the acetabulum.

Five patients died in hospital. Four deaths were attributed to pneumonia and 1 to myocardial infarction. From review of hospital charts alone it was noted that at least 8 additional patients died within 1 year of injury; 6 of these had been discharged from the ED at the index visit. This provides a lower bound for the 1-year mortality of 17%. Overall, 10 of 45 patients with isolated

pubic rami fractures died, and 2 of 17 patients with acetabular fractures died.

Ambulatory status deteriorated substantially immediately following these injuries. Before the event, 38% of patients walked without a gait aid compared with only 16% afterwards. More than half (56%) of patients with acetabular fractures required a gait aid up to 1 year after discharge. Only 18% lived independently after the injury versus 42% before the injury. Half of this patient group required admission to a nursing or retirement home.

Of the 77 patients with low-impact injury, 20 (26%) returned to the ED within 3 months of discharge, 11 of whom returned with a similar complaint. Six patients returned with issues related to the same fracture (increasing pain and/or failure to cope) and 5 returned because of a subsequent fall and/or new fracture. Comparing discharged to admitted patients, 33% of patients discharged from the ED returned within 3 months of discharge versus 12% of patients admitted to hospital.

DISCUSSION

Low-impact pelvic fractures are frequent in elderly women, especially fractures of the pubic rami. The mean age of patients in our study resembles that reported by Taillandier and colleagues⁸ for pelvic insufficiency fractures (83 yr) in patients admitted to a geriatrics service. These patients often harbour comorbidities that must be re-evaluated in the context of their new injury and decreased mobility. Pre-existing disease in this patient population has been shown to contribute to deterioration in ambulatory status and to mortality.^{5,6} The modest rate of osteoporosis treatment on presentation in this group suggests an opportunity for prevention. Others have suggested that there continues to be inadequate treatment of osteoporosis even following fractures.¹¹

Patients with low-impact pelvic fractures spend substantial time in the ED awaiting disposition regardless of whether increased home support or admission to hospital are necessary. Nearly half of these patients undergo further imaging beyond plain radiography. The substantial use of health care resources noted by Koval and colleagues⁹ in the hospital and community also seems evident in the ED.

Only one-third of this patient group was admitted to hospital. This number is substantially less than reported in previous studies that included all-cause pelvic fractures in the elderly.^{5,9,12} We explicitly excluded high-impact injuries. There was a substantial number of

Table 1. Characteristics of 77 patients with low-impact pelvic fractures

Characteristic	No. (%) of patients*
Female sex	63 (82)
Mean (range) age, yr	81 (57–103)
Mechanism of injury	
Fall on steps < 1 m in height	4 (5)
Fall from standing	63 (82)
Fall from sitting	5 (6)
No trauma witnessed	5 (6)
Common comorbidities from ED chart	
Hypertension	40 (52)
Cardiovascular disease or arrhythmia	32 (42)
Osteoporosis	26 (33)
Arthritis	24 (31)
Previous fracture	21 (27)
Respiratory disease	16 (21)
History of cancer	15 (19)
Diabetes	13 (17)
Previous stroke or transient ischemic attack	13 (17)
Dementia	12 (16)
Fracture site	
Pubic ramus	66 (86)
Sacrum	19 (25)
Acetabulum	17 (22)
Ilium	3 (4)
Ischium	1 (1)
Multiple sites in pelvis	21 (27)
Additional imaging to plain radiography	
CT	30 (39)
MRI	10 (13)
CT and MRI	5 (6)
ED disposition	
Discharged	52 (68)
Admitted to hospital	25 (32)

ED = emergency department; MRI = magnetic resonance imaging.
*Unless otherwise indicated.

return visits to the ED in our study, at least in part related to pain management and subsequent falls.

The near term decline in ambulatory ability is consistent with previously published data.^{6,13} These prior studies report that a substantial number of patients are able to return to their previous level of ambulation in time.

Leung and colleagues⁶ observed that patients with acetabular involvement had worse ambulatory outcomes. We noted that these patients were more likely to receive surgery, but we did not observe increased mortality in this small group compared with patients with isolated pubic ramus fractures.

Although these injuries are the result of minor trauma, the concept that they are benign should be dispelled. The mortality of pelvic fractures from all causes is substantially increased in patients over 60 years of age (37% v. 8%).¹⁴ Leung and colleagues⁶ found a 1-year mortality rate of 12% for all pelvic fractures in the elderly. Morris and colleagues¹³ reported 27% 1-year mortality in patients with pelvic fracture admitted to a geriatric service. Fractures of the pubic rami are reported to have 1-year mortality rates of between 9.5% and 13.3%, and a 5-year mortality rate of 54.4%.^{9,15} Our 1-year mortality estimate of 17% is likely an underestimate given we ascertained death after discharge using only hospital records. These high mortality rates underline the frailty of a patient with pelvic fracture caused by a low-impact mechanism. Outcomes in older patients who sustained a pelvic fracture are worse than those of younger patients, whose injuries are usually more severe.¹⁶

The disposition of patients with low-impact pelvic fractures from the ED can be difficult. These fractures have a substantial effect on ambulation and independence, and impair daily living activities for weeks to months.^{6,8} Patients who have fallen previously are more likely to have subsequent falls, which highlights the importance of planning postdischarge care and subsequent fall prevention.^{17,18} Studies have examined factors for safe discharge from hospital, but not specifically in patients who are able to be discharged directly from the ED. Since this study was completed, our study hospitals have developed a collaborative care plan for patients with low-impact pelvic fractures to help guide decisions on management, appropriate consultations and discharge planning.

A large number of the patients we studied returned to the ED within 3 months of discharge from either the ED or hospital, which is consistent with a previous report of elderly patients discharged from the ED for all causes.¹⁹ This demonstrates the vulnerability of this

patient group. Studies such as the Prevention of Falls in the Elderly Trial have demonstrated that an interdisciplinary approach to the elderly can decrease future injuries and functional impairment.²⁰ Applying such an approach to patients with low-impact pelvic fractures may be useful in reducing their present and future morbidity.²¹

Limitations

It is possible that not all pelvic fractures during the study period were coded correctly in the hospital discharge database or captured in our data search. However, multiple diagnostic code variables were included in our search. We were limited to information recorded in the hospital medical record, which might have affected data on injury mechanism, community living supports, ambulatory status and postdischarge morbidity and mortality. We may also have misclassified some high- and low-impact cases where information on impact force was limited. For example, injury from a low-velocity motor vehicle collision may have been coded as high impact. We did not capture return visits to other EDs outside our geographic catchment. This study was limited to a tertiary care, academic centre and may not relate to practice patterns elsewhere.

CONCLUSION

Low-impact pelvic fractures are distinct from high-impact injuries, but they are not benign. They are frequent, and they affect an elderly, female population with pre-existing comorbidity. Low-impact pelvic fractures represent a unique injury pattern and result in substantial disability and mortality. More than half of patients will require a supported living environment after discharge. A substantial amount of time and resources in the ED are used in the care of this patient group. In this study, 1 in 6 patients with a low-impact pelvic fracture died within 1 year of injury. Collaborative care plans to guide the management of the in-hospital and postdischarge needs of these patients should be developed and evaluated.

Competing interests: None declared.

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Correspondence to: Dr. Rob Brison, Kingston General Hospital, 76 Stuart St., Kingston ON K7L 2V7; brisonr@kgh.kari.net

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