

Acute Traumatic Pubic Ramus Fractures

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Abstract

Aims

Pubic rami fractures, common in the older person from low energy trauma, significantly impact morbidity through pain, reduced mobility, and increased injury risk. Effective management in the emergency department (ED) is essential for this population, but the lack of standardised guidelines can lead to inconsistent and potentially suboptimal care. This service evaluation aimed to review current management practices for isolated pubic rami fractures in our ED, identifying areas for improvement and guiding future protocol development.

Methods

We retrospectively reviewed electronic patient records. Over a twelve-month period (01/03/2023 - 29/02/2024), pelvic X-rays taken in the ED were screened for isolated pubic rami fractures, excluding duplicates and patients under 60. Cases were analysed for presentation, length of stay, management, discharge, and complications.

Results

From 1,135 pelvic X-rays, 42 (3.70%) patients with isolated fractures were included; 35 (83%) were female. Most injuries 37 (88.1%) resulted from falls under 2 metres. Of the patients, 29 (69%) were admitted, 11 (26%) were discharged from the ED (2 of whom were referred to the Silver Trauma outpatient clinic), and 2 (5%) were transferred directly to a rehabilitation unit. Of those admitted, 7 were subsequently transferred to rehabilitation facilities. The median ED length of stay was 12 hours 20 minutes (IQR 10:11-17:44). 4 (13.79%) of the admitted patients died.

Conclusion

Management was largely conservative, yet key outcomes including prolonged ED length of stay, high frailty burden and in-hospital mortality were identified. Standardised guidelines

based on these findings could enhance care consistency and improve outcomes for older patients with pubic rami fractures.

Introduction

Pubic rami fractures are a common consequence of low-energy trauma in older adults, particularly following falls from standing height (<2 metres), which account for the majority of major orthopaedic injuries in this population in the UK and Ireland^{1–3}. These injuries are associated with significant morbidity, including prolonged pain, loss of independence and increased risk of institutionalisation^{4–7}. One-year mortality rates following pubic rami fractures in older patients are consistently higher than age-matched controls, with estimates ranging from 16% to 25%. Long-term outcomes are poor, with many patients experiencing persistent reductions in mobility and quality of life and a substantial proportion requiring increased levels of care^{4,5,7}.

Despite their frequency and clinical impact, the management of isolated pubic rami fractures remains variable, with most cases treated conservatively and a lack of standardised rehabilitation protocols unlike patients who suffer neck of femur fractures. There is limited evidence to guide optimal rehabilitation strategies and no national consensus guidelines exist for the management of these injuries in the UK or Ireland^{8–10}.

This service evaluation aimed to examine the current management and outcomes of patients presenting with isolated pubic rami fractures in a tertiary hospital, characterising patient demographics, treatment approaches and clinical trajectories.

Methods

This was a health record review of all patients seen in the emergency department (ED) of a tertiary university hospital with an annual attendance of 80, 000 patients. This study was approved by the Clinical Effectiveness and Audit Committee as part of a service evaluation of care of patients with isolated pubic rami fractures. The Mater Misericordiae University Hospital ED has a frailty intervention team (FIT) that operates from 8-6pm and reviews patients over the age of 65 years. They undertake geriatric comprehensive assessment and liaise with the clinical team to enhance care for patients¹¹. This service started in 2017.

Patients over 60 years of age with isolated pubic rami fracture identified on X-ray were included between March 2023 and February 2024. Patients with polytrauma, under the age of 60 years and transferred from another institution or having their pubic rami fracture while in hospital were excluded. The age threshold of 60 years was selected to capture a broader

older adult population presenting to the ED; the hospital's FIT team operates for patients aged 65 and over, but a lower threshold was used to avoid excluding a clinically relevant cohort of younger older adults who may similarly benefit from frailty-informed care.

Patients were identified through screening of X-rays and CT scans of the pelvis done in the ED with identification of pubic rami fracture during the study period. This was done using the National Integrated Medical Imaging System (NIMIS) radiology viewer.

A standardised data reporting form was used for retrieving data from the online ED and hospital records (Patient Centre) by trained data abstractors. The form was compiled based on consensus and review of relevant literature prior to study commencement. Data was entered into an anonymised, password-protected Excel spreadsheet. Basic demographic data such as age, gender and clinical frailty scale (CFS) were collected¹². Other variables collated included baseline mobility, mechanism of injury, FIT assessment and analgesia received (included prehospital analgesia if arrived by ambulance). Outcomes such as need for intervention (radiological or surgical), further imaging (CT pelvis beyond X-ray pelvis or CT angiography), disposition (admission, discharge or rehabilitation transfer from ED) and ED/hospital length of stay were also collected.

Descriptive statistics were used to summarise the data with categorical variables described as proportions and percentages, while continuous variables were reported as median and interquartile range (IQR). Analysis was performed using IBM statistical package for social sciences (SPSS) version 23.

Results

Over the study period a comprehensive review of 1,135 pelvic X-rays was undertaken. The majority (n=811) were excluded as they had no fractures on pelvic X-ray. Others were excluded due to incomplete data, polytrauma patients and age <60 years. This is displayed in Figure 1.

A total of 42 patients with acute traumatic, pubic rami fractures were included in the study, of which 35 (83.3%) were female and 7 (16.7%) were male. The median age was 83 [IQR 73.5-88]. Baseline characteristics are assessed in Table 1. Most injuries were sustained from a fall less than 2m (n=37, 88.1%).

Of the 42 patients, 27 (64.3%) had a Comprehensive Geriatric Assessment (CGA) performed by our FIT. A CFS was calculated in 37 patients (88%) with the median being a pre-injury CFS of 5 [IQR 3-6]. Analgesia was prescribed and documented in 31 patients. In 13 cases (41.9%), simple analgesia in the form of paracetamol (oral [PO] or intravenous [IV]) with or without a

non-steroidal anti-inflammatory (NSAID) (PO or IV) was the maximum analgesic requirement. Complex analgesia (i.e. PO or IV opiates, inhaled methoxyflurane) was required in 13 (41.9%) patients. 5 patients (16.1%) received regional nerve blocks. These regional nerve blocks were documented as pericapsular nerve group (PENG) blocks performed by a trained ultrasound fellow available in the department at the time. 11 of the 42 patients did not have any documented analgesia in the ED.

Among the 42 patients, 21 (50%) underwent a CT Pelvis. Both patients who underwent a CT Angiogram (n=2, 4.8%), had reported pelvic haematomas. No patients required surgical or radiological intervention for the management of their pubic rami fractures. As available from documentation, 27 (64.3%) of patients were already on bone protection at the time of admission with a further 3 (7.1%) prescribed bone protection for the first time in hospital or ED.

The median length-of-stay (LOS) in the ED was 12 hours and 20 minutes [IQR 10 hours and 11 minutes - 17 hours and 44 minutes]. Breaking down this time period is shown in Table 2. 29 (69%) were admitted, 11 (26%) were discharged from the ED (2 of whom were referred to the Silver Trauma outpatient clinic), and 2 (5%) were transferred directly to a rehabilitation unit. Of the 29 (72.50%) patients referred for admission, most (n=27, 93.1%) were referred for admission under general medicine, while the remaining two were under orthopaedics (n=1, 3.4%) and general surgery (n=1, 3.4%). Among these patients, 20 (67%) were subsequently transferred to the ward while others were discharged home or to an offsite rehabilitation facility as organised by the FIT team the following morning during working hours. Specifically, some patients (n=3, 10%) were admitted under the FIT team while awaiting transfer to a bed in off-site rehabilitation the following day.

Final disposition for all admitted showed 8 of the 29 patients (27.6%) discharged directly home, while 16 patients (55.2%) were transferred to a local rehabilitation facility. Of the 29 admitted patients, 4 patients (13.8%) died in the hospital. One patient had no disposition outcome recorded.

Discussion

This study provides new insights into the management and outcomes of older adults presenting with isolated pubic rami fractures in an Irish tertiary hospital. It gives more of an understanding of the flow of these patients through the hospital including potential outcomes. The study gives findings that are consistent with the broader rationale for FIT, including the potential to facilitate early rehabilitation transfer.

The study cohort consisted primarily of older patients, with a median age of 83 years, reflecting the current demographic shift towards an ageing population. The high proportion of females (83.3%) aligns with existing literature, which indicates that older women are at greater risk of fragility fractures, likely due to lower bone density^{13,14}. Notably, a substantial majority of injuries (88.1%) were sustained from falls of less than 2 metres, which echoes recent national and international trauma data emphasising that even minor falls can result in significant morbidity for patients in this vulnerable population². The FIT in the ED is a well-recognised, important service in identifying frailty in patients and facilitating efficient flow and appropriate management of the older patient¹⁵. Of the 42 patients, 27 (64.3%) had comprehensive geriatric assessments (CGAs) performed by FIT. The CGA is crucial in guiding individualised treatment plans which can be beneficial in both the in-patient setting and also to offsite rehab centres. This is supported by the SOLAR trial (2024) carried out in an Irish setting suggesting that FIT can reduce ED LOS in the older person¹⁶. Furthermore, the median Clinical Frailty Score (CFS) of 5 [IQR 3-6] in this cohort indicates a mild to moderate level of frailty among the patient population, though over 40% had a CFS of > 5. This indicates a high burden of frailty in our population. Of note 11% had no documentation of CFS which highlights a need to improve education and awareness around assessing frailty in this cohort.

It is noted that 50% of the patients (n=21) underwent a CT Pelvis which is unexpectedly high for this population. However, it does indicate an increase in availability of access for cross-sectional imaging. In some cases, X-rays that may have been equivocal but not definitive may have progressed to CT to establish the diagnosis. The two patients who underwent a CT Angiogram had a documented episode of hypotension.

Characteristically, these patients did not require surgical or radiological intervention. However, adequate analgesia remains important in their management. Most patients received simple analgesia while in the ED, while a number received opiates and regional nerve blocks under a trained ultrasound fellow. Regional anaesthesia in the form of pericapsular nerve group (PENG) blocks have been shown in small case reports to provide effective analgesia for these patients while sparing the motor function^{17,18}. Some guidelines also support its use in patients presenting to the ED with pubic rami fractures¹⁹.

The median length of stay in the ED was over 12 hours. HSE current standards recommend that patients must be seen, managed and have a disposition within 6 hours²⁰. Patients with isolated pubic rami fractures had a significantly longer time within ED than this standard (>12 hours). This is in stark contrast to the current drive to achieve a four-hour target to the ward from ED for patients with neck of femur (NOF) fractures^{21,22}. The breakdown of the time intervals from registration to triage and subsequent specialty review reveals the greatest delay from time of ED review to medical specialty review. This could be in relation to a high clinical workload for accepting specialties and also suggests a need for a dedicated pathway.

There is currently an absence of local and national consensus guidelines for the management of isolated pubic rami fractures is evident from this evaluation. Establishing standardised protocols could mitigate practice variations, ensuring that all patients receive optimal and consistent care. The development of clear guidelines, tailored to the specific needs of older adults with isolated pubic rami fractures, is essential for improving patient outcomes. Similar guidelines have been implemented for isolated NOF have led to improved outcomes in that cohort²³.

This was a single centre experience on the assessment and management of patients with isolated pubic rami fracture. As such our findings may not be externally applicable. Our sample size was also small and data retrospectively collected which could lead to type 2 error. However, studies looking at isolated pubic rami fractures are often subject to small sample sizes due to infrequency of occurrence. Retrospective studies are subject to missing data, therefore emphasising the need for large multicenter studies to evaluate this important patient cohort.

In summary, the majority of patients with isolated pubic rami fractures in our cohort were females with prolonged ED length of stay and variation in management. In-hospital mortality was noted at 13.8%. Future research should focus on prospective multicenter studies to evaluate the care of these patients and generate evidence-based consensus guidelines for management.

Declarations of Conflicts of Interest:

None declared.

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References:

1. Irish Department of Health. *Health in Ireland: Key Trends 2023*. (2024).
2. Brent, L. *et al. Major Trauma Audit Report Focused on Older Adults 2017-2021*. (2024).

3. Herron, J. *et al.* The impact of age on major orthopaedic trauma: an analysis of the United Kingdom Trauma Audit Research Network database. *Bone Joint J.* 99-B, 1677–1680 (2017).
4. van Dijk, W. A., Poeze, M., van Helden, S. H., Brink, P. R. G. & Verbruggen, J. P. A. M. Ten-year mortality among hospitalised patients with fractures of the pubic rami. *Injury* 41, 411–414 (2010).
5. Hamilton, C. B., Harnett, J. D., Stone, N. C. & Furey, A. J. Morbidity and mortality following pelvic ramus fractures in an older Atlantic Canadian cohort. *Can. J. Surg.* 62, 270–274 (2019).
6. Studer, P., Suhm, N., Zappe, B., Bless, N. & Jakob, M. Pubic rami fractures in the elderly—a neglected injury? *Swiss Med. Wkly* 143, w13859 (2013).
7. Rommens, P. M. *et al.* Isolated pubic ramus fractures are serious adverse events for elderly persons: An observational study on 138 patients with fragility fractures of the pelvis Type I (FFP Type I). *J. Clin. Med.* 9, 2498 (2020).
8. Sivapathasuntharam, D., Smith, G., Master, M.-A. & Bates, P. Fragility fractures of the pelvis in the older population. *Age Ageing* 51, (2022).
9. Carter, C. *et al.* Rehabilitation after pelvic fragility fracture in older adults: a scoping review. *Osteoporos. Int.* 36, 1143–1154 (2025).
10. National Institute for Health and Care Excellence (NICE). *Hip Fracture: Management*. <https://www.nice.org.uk/guidance/cg124/resources/hip-fracture-management-pdf-35109449902789> (2023).
11. Smyth, H. *et al.* Silver Trauma Review Clinic: a novel model of care to manage non-operative injuries in older patients. *Emerg. Med. J.* 40, 721–725 (2023).
12. Juma, S., Taabazuing, M.-M. & Montero-Odasso, M. Clinical Frailty Scale in an acute medicine unit: A simple tool that predicts length of stay. *Can. Geriatr. J.* 19, 34–39 (2016).
13. Kannus, P., Parkkari, J., Niemi, S. & Sievänen, H. Low-trauma pelvic fractures in elderly Finns in 1970–2013. *Calcif. Tissue Int.* 97, 577–580 (2015).
14. Johnell, O. & Kanis, J. Epidemiology of osteoporotic fractures. *Osteoporos. Int.* 16 Suppl 2, S3–7 (2005).
15. Hogervorst, V. M. *et al.* Emergency department management of older people living with frailty: a guide for emergency practitioners. *Emerg. Med. J.* 38, 724–729 (2021).
16. Leahy, A. *et al.* Frailty screening with comprehensive geriatrician-led multidisciplinary assessment for older adults during emergency hospital attendance in Ireland (SOLAR): a

randomised controlled trial. *Lancet Healthy Longev.* 5, 100642 (2024).

17. Cripps, E., Fahey, A. & Snelling, P. J. Point-of-care ultrasound-guided pericapsular nerve group block for superior pubic ramus fracture in the emergency department: A case report. *Australas. J. Ultrasound Med.* 25, 154–156 (2022).
18. Moorthy, A., Choi, S., Safa, B., McHardy, P. G. & Niazi, A. U. Novel use of continuous pericapsular nerve group (PENG) block technique for traumatic superior and inferior pubic rami fractures: a case report. *Reg. Anesth. Pain Med.* 48, 230–233 (2023).
19. Owens, N. & McDermott, C. *Peri-Capsular Nerve Group (PENG) Block for the Management of Pain in Neck of Femur, Acetabular and Pubic Ramus Fractures.* <https://iaem.ie/professional/clinical-guidelines/> (2023).
20. Clancy, C., Shine, C. & Hennessy, M. *Hospital Performance: An Analysis of HSE Key Performance Indicators.* (2023).
21. British Orthopaedic Association. *The Care of Patients with Fragility Fracture.* <https://www.bgs.org.uk/sites/default/files/content/attachment/2018-05-02/Blue%20Book%20on%20fragility%20fracture%20care.pdf> (2007).
22. Moore, M., Walsh, M. & Hassan, T. *Management of Patients with Suspected Hip Fracture in the Emergency Department.* <https://iaem.ie/wp-content/uploads/2019/04/IAEM-CG-NOF.pdf> (2018).
23. Bandara, S., Lynch, G., Cooke, C., Varghese, P. & Ward, N. Using care bundles to improve surgical outcomes and reduce variation in care for fragility hip fracture patients. *Geriatr. Orthop. Surg. Rehabil.* 8, 104–108 (2017).
24. Rockwood, K. & Theou, O. Using the Clinical Frailty Scale in allocating scarce health care resources. *Can. Geriatr. J.* 23, 210–215 (2020).

Appendix

Table and Figures

Table 1: Patient Demographics and Characteristics (n=42)

Age	Median IQR	83 [73.5-88]
Presentation out of Hours	Between 08:00 - 17:00 Outside 08:00 - 17:00	26 (61.9%) 16 (38.1%)
Gender	Female Male	35 (83.3%) 7 (16.7%)
Mechanism of Injury	Fall from <2m Fall from >2m RTA Unknown	37 (88%) 1 (2.38%) 1 (2.38%) 3 (7.14%)
Clinical Frailty Scale ²⁴	1-3: Non-Frail 4: Vulnerable to Frailty ≥5: Frail Not Documented	15 (35.7%) 4 (9.5%) 18 (42.9%) 5 (11.9%)

Figure 1: Flow Sheet of Screening Process

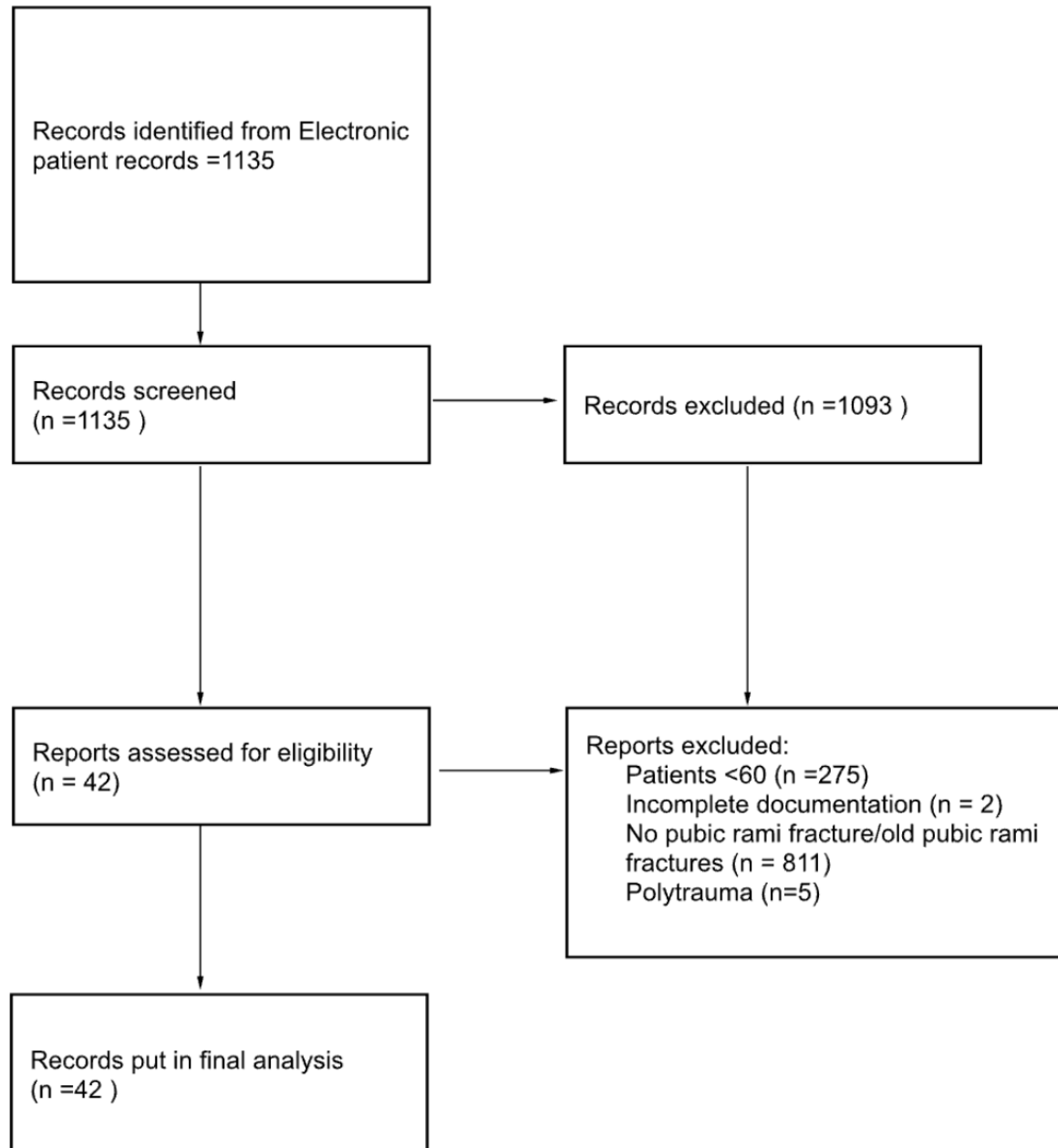


Table 2: Length of Stay and Time Intervals between Reviews in ED

Event	Median Time	Interquartile Range (IQR)
Total Length of Stay	12 hours, 20 minutes	10 hours 11 minutes - 17 hours 44 minutes
Registration to Triage	17 minutes	8 minutes - 42 minutes
Registration to ED Medical Review	1 hour 11 minutes	36 minutes - 3 hours 1 minute
Registration to Specialty Review	5 hours 50 minutes	4 hours 13 minutes - 8 hours 41 minutes
Registration to Ward Transfer (Admitted Patients, n=20)	14 hours 53 minutes	11 hours 56 minutes - 20 hours 13 minutes