J Shoulder Elbow Surg (2017) ■■, ■■–■■

ELSEVIER

Journal of Shoulder and Elbow Surgery

www.elsevier.com/locate/ymse

ORIGINAL ARTICLE

Epidemiology of glenohumeral dislocation and subsequent instability in an urban population

David W. Shields, MBChB[a], James G. Jefferies, MBChB[a,*], Andrew J. Brooksbank, FRCS Ed[a], Neal Millar, FRCS Ed[b], Paul J. Jenkins, FRCS[a]

[a]*Department of Trauma & Orthopaedic Surgery, Glasgow Royal Infirmary, Glasgow, UK*
[b]*Institute of Infection, Inflammation and Immunology, College of Medicine, Veterinary and Life Sciences, University of Glasgow, Glasgow, UK*

Background: Glenohumeral dislocation is the most commonly encountered adult joint instability. The epidemiology in the United Kingdom and worldwide is unclear and often limited to young, active groups that are not representative of general populations. Information regarding epidemiology and outcome from a first dislocation is useful for trauma service planning and patient counseling. We calculated the incidence of shoulder instability after a first dislocation in our urban population and investigated predictors of recurrent instability.

Methods: A prospectively collected trauma database was retrospectively examined to identify patients with a first-time dislocation. Demographics, subsequent dislocation, and instability details were collected from electronic patient records.

Results: In a 38-month study period, 329 first dislocations occurred in a population of 475,147 with mean follow-up 28.5 months (range, 10-50 months). The overall incidence for first-time dislocations in this population was 21.9 per 100,000 population, of which 7.9% sustained a redislocation and 6.1% had further symptomatic instability. There were 18.8% with associated greater tuberosity fractures, 8.8% sustained a nerve injury, and 2.7% were posterior dislocations. A bimodal distribution was observed for males (peak incidence per 100,000 of 42.1 and 50.9 in 15-24 and ≥85 age groups, respectively), and unimodal for females (peak 45.7 in the 65-74 age group).

Conclusion: We demonstrate a previously unreported burden of dislocation in older age groups and suggest a rate of recurrence lower than previously reported in the United Kingdom. The group aged 15 to 19 years was at the highest risk of recurrent dislocation and instability. Gender was not a significant predictor of instability.

Level of evidence: Level II; Retrospective Design; Prognosis Study

Keywords: epidemiology; glenohumeral dislocation; instability; urban population; outcome; service planning

Glenohumeral joint (GHJ) dislocation, frequently referred to as shoulder dislocation, is common due to limited anatomic constraints that allow large range of motion but result in vulnerability in sporting activities. The reported incidence varies greatly in the published literature, depending on populations studied, but is estimated to be between 11 and

This study did not require Research Ethics Committee approval because there was no contact with patients, allocation or concealment of treatment, and only routine outcome metrics, such as demographics and recurrence, were collected.

*Reprint requests: James G. Jefferies, MBChB, Department of Trauma & Orthopaedic Surgery, Glasgow Royal Infirmary, 84 Castle St, Glasgow G4 0ET, UK.

E-mail address: jamesgjefferies@btinternet.com (J.G. Jefferies).

1058-2746/$ - see front matter Crown Copyright © 2017 All rights reserved.
https://doi.org/10.1016/j.jse.2017.09.006

51 per 100,000 population.[1,4,10,15,16,25] The rate is significantly higher in military and athletic groups.[16,17] The epidemiology in the United Kingdom (UK) population is derived from 1 urban population based study.[4] The natural history of GHJ dislocation is described in 2 further studies.[7,18]

There is the potential for neurovascular injury, repeat dislocations, instability, arthrosis, and rotator cuff and labral pathology after a first GHJ dislocation. The reported frequency of instability after a primary dislocation depends on age and sex, with an inverse relationship between age and stability.[18] The same study concluded that a 15-year-old boy in their population had an 86% chance of developing instability within 2 years of the primary dislocation, and it is not until beyond age 27 that a man will have a less than 50% chance of developing instability.[18] These estimates may influence the decision to undertake primary stabilization procedures as a prophylaxis against recurrent instability.

This study examined the current epidemiology of a first GHJ dislocation in a population of UK patients. Further to this, we report the incidence of recurrence with investigation of predictors of recurrent dislocation and instability.

Materials and methods

A retrospective data collection was performed on prospectively collected information at 2 adjacent UK-based metropolitan university teaching hospitals in Glasgow. These hospitals provide orthopedic services for 2 emergency departments and a minor injuries unit.

After a glenohumeral dislocation, the initial management in the emergency department consisted of assessment of neurologic status and radiologic findings, reduction under conscious sedation, and immobilization in a sling, avoiding external rotation. Patients were subsequently reviewed in an orthopedic trauma or shoulder clinic and assessed for the presence of a rotator cuff tear and any neurologic deficit.

Patients who presented with a shoulder dislocation are referred for follow-up after reduction at these 2 hospitals. All referrals are prospectively recorded in an administrative database and electronic patient record (Bluespier, Worcestershire, UK).

The data set was examined over its 38-month timespan to identify patients, aged 15 and older, who presented with a glenohumeral dislocation. The exclusion criteria were previous glenohumeral dislocation or ipsilateral injury to the upper limb (excluding a greater tuberosity fracture). The electronic patient record was examined to determine the presence of a greater tuberosity fracture or neurologic deficits, such as axillary nerve palsy, or both. The notes were also examined to determine whether, and when, a patient represented with a further episode of actual glenohumeral dislocation (radiologically proven) or instability. Where no further presentations occurred, the national Picture Archiving and Communication System was checked to determine whether the patient had experienced a further episode of dislocation or instability elsewhere in the country.

The definition of a dislocation was radiologic evidence of a glenohumeral dislocation with or without a history of trauma. The x-ray images and clinical and physiotherapist notes of patients who presented with a first-time dislocation were further reviewed to establish a diagnosis of recurrence and ongoing instability. Recurrence was defined as a radiologically confirmed or a history of a second dislocation, with instability being a history of instability symptoms, instability on examination, or stabilization surgery performed or planned. The mean follow-up period was 28.5 months (range, 10-50; standard deviation, 11.11 months).

During the 38-month period, 572 patients presented to both hospitals with suspected shoulder dislocation or instability. Of these, 240 were excluded for the following reasons: 5 were younger than 15 years, 134 presented with recurrent dislocations, and 104 had no evidence of a dislocation. The study group therefore consisted of 329 primary glenohumeral dislocations.

Population incidences were calculated using the midyear population estimates for the combined catchment area of both hospitals. The total adult (≥15 years) population was 475,147. These data were supplied from the Health Board Business Intelligence Department and were divided into 5-year and 10-year age ranges. The incidence was defined as the number of first-time glenohumeral dislocations occurring in a year, divided by the annual eligible population. The formula $\sqrt{(p(1-p)/n)}$ was used to calculate 95% confidence intervals (CI), where p is the incidence (as a decimal proportion) and n is the population size.

This population was also estimated in the population data from Business Intelligence and defined as the "cross-boundary population." The proportion of patients in our data set from outside the catchment area was calculated and compared with the population estimates. Geographic analysis of the origin of these patients revealed that 17% came from outside the described geographic areas, not uncommon with upper limb injuries and "walking wounded." The population denominator is based on an estimation of 14% cross-boundary patients; therefore, our data set may overestimate the incidence slightly. Adjustment for the additional 3% of cross-boundary patients would change the incidence by 0.6/100,000 per year.

The prevalence of recurrent dislocation and instability was calculated as a "raw" prevalence and also using survival methodology (Kaplan-Meier). This methodology takes account of the differing periods of follow-up and the consequential risk of achieving a particular outcome. A multivariate analysis was performed to assess whether any demographic or injury factors were independently associated with recurrent dislocation or instability. A Cox regression method was used, and all variables were entered into the model in 1 step. Those factors with a P value of <.05 were identified as significant predictors of recurrent dislocation. The analysis was performed with IBM SPSS 19 software (IBM, Armonk, NY, USA)[8] and R 3.2.5 software (The R Foundation for Statistical Computing, Vienna, Austria).[22]

Results

The incidence of a primary glenohumeral dislocation was 21.9 per 100,000 population (95% CI, 17.7-26.1). The mean age at presentation was 51 years (range, 15-96; SD, 21.5 years). There were 199 men 130 women, with a bimodal distribution in men and a unimodal distribution in women (Fig. 1). The peak incidence in women was in the group aged 65 to 74 years. The incidence was greater in men than women in the groups aged 15 to 44 years and in the very elderly (≥85 years). The incidence in women exceeded men in the group aged 55 to 74 years. Posterior dislocations occurred in 2.7%. The greater tuberosity was fractured in 18.8% of patients, of