National Trends in Scapular Fractures in the United States, 2004–2023: A 20-Year Epidemiological Analysis

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INTRODUCTION: Scapular fractures are relatively uncommon, accounting for approximately 1% of all fractures and between 3% and 5% of shoulder girdle injuries. These injuries have classically been associated with high-energy trauma, including motor vehicle collisions, falls from height, and industrial accidents, and are frequently accompanied by additional thoracic and neurovascular injuries. Traditionally, nonoperative management has been the mainstay of treatment for most scapular fractures, based on the assumption that surrounding musculature and joint mobility allow for adequate healing and functional recovery. However, there is increasing recognition that certain fracture patterns may lead to persistent pain, limited range of motion, and poor functional outcomes following conservative treatment. While recent attention has focused on the technical aspects of surgical management and patient-reported outcomes, far less is known about how the epidemiology and causes of scapular fractures have evolved over time. The purpose of this study is to provide a contemporary, nationally representative analysis of scapular fractures across a 20-year period using data from the U.S. Consumer Product Safety Commission's National Electronic Injury Surveillance System (NEISS). Specifically, we aim to evaluate trends in scapular fracture incidence, describe the demographic distribution of affected patients, and offer a detailed characterization of injury mechanisms.

METHODS:

This retrospective epidemiological study utilized data from the US Consumer Product Safety Commission's (CPSC) National Electronic Injury Surveillance System (NEISS) database, a nationally representative sample of 100 hospital emergency departments, to estimate national scapular fracture trends from 2004 to 2023. Twenty years of the NEISS database were initially filtered by selecting specific NEISS diagnosis codes for fracture (57 = Fracture). Natural language processing then was applied to the narrative field to identify scapular fractures by filtering for keywords and common terms related to the scapula including "scapula," "shoulder blade," "acromion," "acromial," "glenoid," "coracoid," "supraspinous," "supraspinatus," "infraspinous," "infraspinatus," "subscapular," "subscapularis," and other common terms as well as their common misspellings or partial stems of the word. Identified cases were manually reviewed to confirm relevance and ensure that a scapular fracture was specifically described in the narrative. The Python programming language was used with the Pandas toolkit for data analysis, applying weighted sampling techniques as per CPSC guidelines. Population estimates from US Census data were used to calculate total estimated fractures and scapular fracture rates per 100,000. Linear regression was done to model population-based fracture rates. Injury Proportion Ratio (IPR), Odds Ratio (OR), and survey-weighted logistic regression models accounting for complex survey design were used to compare demographic and etiological characteristics. Statistical significance was determined by considering confidence intervals that did not include 1.0 and p-values less than 0.05.

Over the 20-year study period, a total of 3,328 scapular fractures were reported, representing a nationally estimated 140,478 scapular fractures (95% CI: 112,409–168,547). The average annual incidence was 2.26 per 100,000 person-years (95% CI: 1.81–2.71). The patient population was 68.9% male and 67.2% white, with a mean age of 50.70 years (95% CI: 49.20–52.20). The most common overall causes of scapular fractures were stairs (14.6%), bicycles (13.7%), and floors (5.8%). The overall fracture rate increased from 1.78 per 100,000 in 2004 to 3.99 per 100,000 in 2023, representing a 124% increase (p < 0.01). Males demonstrated higher fracture rates than females throughout the study period (IPR = 2.22, 95% CI: 1.98–2.45). Adults aged 65 and older showed the greatest rate increase, from 3.83 to 8.39 per 100,000 (p < 0.001). Athletic injuries accounted for 45.7% of all fractures.

RESULTS:

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DISCUSSION AND CONCLUSION:

This 20-year, nationally representative analysis highlights a shift in the epidemiology of scapular fractures, challenging traditional assumptions about their rarity and high-energy etiology. This study demonstrates a significant rise in incidence across all adult age groups, likey due to an aging population prone to low-energy falls and greater sports participation across the lifespan. Our findings reinforce recent international data showing that scapular fractures are no longer confined

to young, polytrauma patients but increasingly affect older adults and females through lower-impact mechanisms. Moreover, with nearly half of injuries in our cohort attributable to sports and recreational activities, targeted injury prevention efforts may be warranted. Clinically, these evolving patterns may suggest heightened diagnostic vigilance in older patients who present with shoulder pain after falls and the need for more individualized treatment algorithms that balance fracture complexity, functional demand, and patient-specific risk. Continued research integrating imaging, surgical outcomes, and rehabilitation protocols to optimize scapular fracature care is critical.