

Epidemiology of Nasal Bone Fractures: A Concise Review

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Abstract:

Background: The prominent, centralized projection of the nasal architecture makes it highly vulnerable to external mechanical forces. Nasal bone fractures represent the most prevalent facial skeletal injury, contributing significantly to emergency department admissions and healthcare costs.

Objectives: This review synthesizes current epidemiological trends across diverse demographic groups, outlines the primary distinct mechanisms of injury, and discusses public health measures required to minimize chronic functional and aesthetic morbidity.

Methods: A comprehensive review of established retrospective studies and clinical trial literature evaluating patient demographics, injury mechanisms, and concurrent craniofacial trauma patterns.

Results: Young adult males consistently represent the highest-risk cohort, with an overall male-to-female ratio exceeding 2:1. Interpersonal violence, motor vehicle collisions, and sports-related impacts constitute the primary etiologies in adults. Conversely, pediatric and geriatric populations exhibit specialized presentation patterns dominated by accidental falls. Comminuted, displaced fractures frequently involve adjacent midfacial components, including the frontal process of the maxilla and the bony nasal septum, requiring prompt tomographic classification and management.

Conclusion: Nasal skeletal trauma remains an essential public health concern. Standardized reporting metrics and the proactive application of regional preventative measures are critical to refining surgical outcomes and lowering injury rates.

Keywords: Nasal Fracture, Facial Trauma, Craniofacial Epidemiology, Public Health Prevention, Closed Reduction.

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Introduction

The human facial skeleton owes both its aesthetic identity and structural vulnerability to the midface architecture. Because of its projection and low structural resistance to anterior and lateral impacts, the nasal skeleton is uniquely susceptible to trauma [1].

Nasal bone fractures (NBFs) constitute approximately 40% to 50% of all craniofacial skeletal injuries, making them the most frequently diagnosed facial fracture treated in otolaryngology and plastic surgery clinics [2, 3]. Beyond immediate soft tissue injury and epistaxis (nosebleeds), structural disruption of the nasal cartilages and bones can lead to permanent cosmetic deformities and chronic nasal airway obstruction if not accurately managed [3, 4].

Understanding the global epidemiological landscape of nasal trauma is necessary for defining clinical protocols and targeting local public health intervention strategies. Epidemiological patterns vary dynamically across distinct age brackets, biological

sexes, socioeconomic mechanisms of injury, and geographic regions [1, 5].

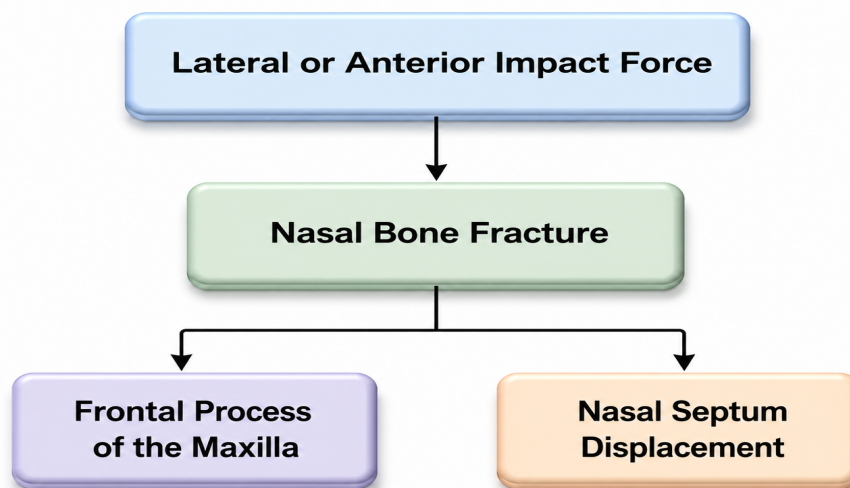
Epidemiology

Sex and Age Distribution: The distribution of nasal skeletal trauma is heavily skewed toward specific demographic sectors. Large-scale retrospective studies confirm that young adult males represent the highest-risk population group [1, 2].

The incidence of NBFs typically peaks between the second and third decades of life (ages 11 to 30 years) [3, 5]. During this phase, male patients suffer nasal fractures at rates twice to three times higher than their female counterparts, a disparity largely driven by behavioral factors, occupational exposures, and higher participation rates in contact sports [2].

Mechanism of Injury: The underlying causes of nasal trauma show clear correlation with patient age and lifestyle:

- **Young Adults:** Interpersonal altercations/physical assaults, road traffic accidents (RTAs), and high-impact sports injuries serve as the primary drivers of midfacial fractures [1, 3]. High-velocity impacts, such as those sustained in motor vehicle collisions, are substantially more likely to produce complex, displaced, or comminuted fractures [2].
 - **Pediatric Populations:** Fractures typically result from recreational play, playground falls, or accidental blunt contact. Due to the incomplete calcification and higher compliance of the pediatric nasal skeleton, greenstick or cartilaginous microfractures are more common than complete displacement [4].
 - **Geriatric Populations:** The elderly exhibit a distinct mechanism pattern dominated almost entirely by low-energy accidental falls [1]. Age-related changes in bone density, paired with comorbid gait instability, often lead to direct facial impacts against flat surfaces, resulting in predictable patterns of bilateral displacement or telescoping [1, 2].
- Coincident and Complex Structural Damage:** Isolated nasal bone fractures occur frequently, but external forces applied to the midface often extend to adjacent bony anatomy. Computed tomography (CT) imaging analysis demonstrates that widespread impacts routinely propagate into nearby structures [2].



In large-scale structural analyses, bilateral nasal bone fractures frequently coexist with disruptions of the frontal process of the maxilla and the bony nasal septum [2]. High-energy trauma can also involve the medial orbital walls or progress into complex naso-orbital-ethmoid (NOE) and Le Fort fracture complexes, necessitating precise tomographic staging [2, 3].

Public Health Implications: Addressing the systemic burden of nasal fractures requires multifaceted public health initiatives alongside immediate surgical treatment:

- **Injury Prevention:** Strict enforcement of road safety laws (including mandatory seatbelt compliance, airbag integration, and motorcycle helmet laws) directly correlates with reduced severe midfacial trauma from motor vehicle crashes [3]. Similarly, mandating protective headgear and face guards in contact sports reduces the incidence of sports-related nasal displacement [5].

- **Workplace Protection:** Stricter occupational safety regulations, including mandatory protective eyewear and face shields in heavy manufacturing and construction environments, minimize high-velocity occupational injuries.
- **Early Clinical Recognition:** Primary care and emergency room providers must rapidly identify associated complications, such as septal hematomas. If left undrained, a septal hematoma can lead to avascular necrosis of the septal cartilage, resulting in a permanent "saddle nose" deformity or septal abscess formation [3, 4]. Standardizing the timing of manipulation—ideally within 7 to 14 days post-injury before definitive osseous fixation occurs—drastically reduces the necessity for costly secondary open rhinoplasties [3].

Conclusion

Nasal bone fractures remain the most common facial skeletal injury encountered in acute care settings. While their clinical course is generally benign when managed early via closed or open reduction, their as-

sociated long-term functional and aesthetic sequelae pose a tangible quality-of-life and economic burden. Developing clear, standardized clinical reporting systems and implementing targeted regional prevention strategies are essential steps toward reducing overall incidence and improving patient recovery paths.

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