




## RESEARCH-ARTICLE

## The Underreporting of Facial Bone Fractures in the Scientific Literature

Samantha Pastore, B.S.<sup>1</sup>  | Atlee Loughran, M.D.<sup>2</sup> | Donald Solomon, M.D.<sup>1,3\*</sup>

1. Cooper Medical School of Rowan University, Camden, NJ, USA
2. Division of Plastic and Reconstructive Surgery, Cooper University Health Care, Camden, NJ, USA
3. Division of Otolaryngology – Head & Neck Surgery, Cooper University Health Care, Camden, NJ, USA

**Abstract**

The worldwide incidence of facial bone fractures has been increasing over the past decade. Long bone fractures, while a more common injury, have not shown the same increasing trend. Despite the increased incidence of facial fractures, publications regarding management and outcomes are lagging. This study quantifies the relative underrepresentation of facial fractures in the literature despite their increasing incidence.

**Key words:** maxillofacial trauma, facial bone fractures, healthcare disparities, barriers to care

**Copyright:** © 2023 Medical Editor and Educational Research Publishers Ltd

## 1 | INTRODUCTION

Both facial bone fractures and long bone fractures are commonly encountered in trauma departments across the country. It is estimated that the incidence of facial bone fractures has been increasing in recent years<sup>(1)</sup>. Plawecki et al. demonstrated that the incidence of facial fractures in the United States increased by 45.3% between 2011 to 2015<sup>(2)</sup>. Long bone fractures, while a more frequent injury, have not shown the same increased incidence<sup>(3)</sup>. Despite the increase in facial bone fractures, the number of publications related to these injuries have not followed the same trend. The goal of this study is to compare the frequency of facial bone fractures to that of long bone fractures at a Level I trauma institution, followed by a comparison of these findings to the number of existing articles and types of journals that report on such injuries. The relative underrepresentation of facial bone fractures in the literature is discussed, with consideration to potential explanations of the discrepancy that exists in the literature.

## 2 | METHODS

Data from the internal database at our institution (Cooper University Hospital in Camden City, NJ) was queried from 2011 to 2022 to assess the frequencies of traumatic long bone fractures and traumatic facial bone fractures. Diagnostic codes were used to identify subjects. Using the key words for long bone fractures ('long bone fracture'/exp OR 'long bone fracture' OR (('long bone'/exp OR 'long bone' OR 'humerus'/exp OR humerus OR 'radius'/exp OR radius OR 'ulna'/exp OR ulna OR 'femur'/exp OR femur OR 'tibia'/exp OR tibia OR 'fibula'/exp OR fibula) AND ('fracture'/exp OR fracture OR fracture\*)) AND trauma\* and the key words for facial bone fractures ('face fracture'/exp OR 'face fracture' OR 'facial fracture'/exp OR 'facial fracture' OR (('fracture'/exp OR fracture OR fracture\*) AND ('nose'/exp OR nose OR nasal OR mandibul\* OR zygoma\* OR 'orbital floor'/exp OR 'orbital floor')) AND trauma\*, we queried Embase from 2011 to 2023 in order to identify the number of articles on each type of fracture.

### 3 | RESULTS

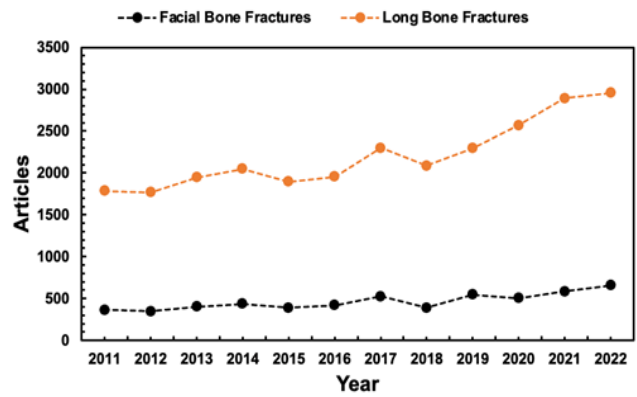
There were a total of 6,194 facial fractures and 12,616 long bone fractures that presented to our trauma department from 2011 to 2022 (Table 1). The annual frequency of facial bone fractures increased from 348 fractures in 2011 to 581 fractures in 2022. In the literature, we found 5,905 articles in total related to facial fractures and 28,511 articles in total related to long bone fractures from 2011 to 2023. The number of articles on facial fractures increased from 364 articles in 2011 to 657 articles in 2022. The number of articles on long bone trauma increased from 1,782 articles in 2011 to 2,954 articles in 2022 (Figure 1). Of the articles found on long bone fractures, the majority (71%) belonged to orthopedic journals. In contrast, articles reporting facial bone fractures were spread across nine subspecialty journals: Trauma (24%) Plastic Surgery (22%), Oral maxillofacial (OMF) (22%), ENT Journals (11%), Ophthalmology (8%), Neurology (4%), Emergency Medicine (3%), Pediatrics (3%), and Radiology (3%). The ratio of facial bone fractures to long bone fractures at our institution's trauma center was calculated to be 1:2. The ratio of scientific articles on facial bone fractures versus long bone fractures was 1:5 (Table 1).

**Table 1.** Shows the relationship of facial fractures vs. long bone fractures at our institution (2011 - 2022) compared to the total number articles depicting each type of fracture (2011-2023), as well as the ratio between the two fractures at our institution in relation to the scientific literature.

	Number of Fractures (2011-2022)	Number of Articles (2011-2023)
Facial Bone Fractures	6,194	5,905
Long Bone Fractures	12,616	28,511
Ratio (Facial Bone Fractures: Long Bone Fractures)	1:2	1:5

**Supplementary information** The online version of this article (<https://doi.org/10.52845/JORR/2023/4.4.2>) contains supplementary material, which is available to authorized users.

**Corresponding Author:** Donald Solomon, (610)-310-7090 Cooper University Hospital, One Cooper Plaza, Camden, NJ 08103, USA  
E-mail: [solomon-donald@cooperhealth.edu](mailto:solomon-donald@cooperhealth.edu)



**Figure 1.** Total number of articles related to each type of fracture from 2011 to 2022.

### 4 | DISCUSSION

Despite the increasing frequency of facial bone fractures, scientific publications dedicated to the documentation of facial bone trauma are underrepresented when compared to those representing long bone trauma. As shown in our study, the ratio of facial bone fractures to long bone fractures at our institution's trauma center is 1:2. However, when comparing the number of articles on facial bone fractures to those of long bone fractures in the literature, the ratio is only 1:5, which is markedly disproportional.

We posit various reasons for the disparity in the literature. First, long bone fractures often affect functional capacity and thus require either operative or non-operative fixation to restore function. This is less often the case for facial bone fractures. Facial bone fractures have a higher propensity to be treated conservatively, without reduction or fixation and thus often have less complicated sequelae. For instance, uncomplicated facial fractures such as nasal fractures and non-displaced mid-face fractures are often treated conservatively and may include soft diet and observation. Many patients with these types of fractures are seen only in the emergency department, do not require surgical intervention, and may be lost to follow-up<sup>(4)</sup>. A systematic review by Pereira et al. in 2021 concluded that a closed-reduction approach to facial fractures resulted in significantly less complications than a surgical approach and is therefore the preferred management

for facial bone fractures<sup>(5)</sup>. The lack of complex treatments for many facial bone fractures may result in fewer talking points for researchers, which would presumably decrease academic output related to this subject. Long bone fractures, on the other hand, are more likely to hinder mobility or other functional capacity if not treated. To this end, there are three dedicated orthopedic trauma surgeons at our institution who manage long bone fractures as part of the primary focus of their practices, while all surgeons who manage facial fractures at our institution do this in addition to the primary focus of their practices. Given that long bone fracture management is frequently performed by orthopedic sub-specialist dedicated to this type of injury, it stands to reason that these types of fractures may be the focus of their clinical research, and hence more publications are written dedicated to long bone fracture study.

In addition, facial bone fractures are often linked to acts of interpersonal violence and substance abuse, both of which are associated with societal disapproval<sup>(6)</sup>. Facial bone trauma is markedly higher amongst underserved populations, including individuals of African American race, low socioeconomic class, those of lower education levels, and those living in urban communities<sup>(7),(8)</sup>. Juncar et al. found the incidence of facial bone trauma to be significantly higher among patients in the 20-29 age group who were living in urban environments, and having a low level of education<sup>(7)</sup>. Cohn et al. reported that most urban patients who suffer from facial bone fractures are assault victims of African American or Hispanic race<sup>(8)</sup>.

Furthermore, compared to suburban patients suffering facial bone injuries, this population of urban patients is more likely to be single, unemployed, and have Medicaid insurance coverage<sup>(8)</sup>. The aforementioned factors may lead to decreased reporting on outcomes, as patients with facial fractures may have less access to healthcare outside of the emergency room and therefore may have difficulty obtaining follow up care, especially in those instances where the fracture does not affect function.

## 5 | CONCLUSIONS

Our present study is limited by the fact that the cases evaluated were from a single level I trauma center. In addition, the high prevalence of assault and facial fractures at our institution is likely representative of our specific urban setting. Nonetheless, our findings suggest that facial fractures are relatively underreported in the literature when compared to long bone fractures. In order to improve patient care and advance outcomes, we must remain vigilant in our effort to report on facial bone fractures in the scientific literature. We believe future studies conducted across multiple trauma centers will help validate the insights gained from our analysis.

**Authorship:** All authors have contributed significantly to this publication.

**Funding:** None

**Competing interests:** None

## REFERENCES

1. Amin S, Achenbach SJ, Atkinson EJ, Khosla S, Melton III LJ. Trends in Fracture Incidence: A Population-Based Study Over 20 Years. *Journal of Bone and Mineral Research*.2014;29(3):581-589. doi:10.1002/jbmr.2072
2. Court-Brown CM, Caesar B. Epidemiology of adult fractures: A review. *Injury*. 2006;37(8):691-697. doi:10.1016/j.injury.2006.04.130
3. Chukwulebe S, Hogrefe C. The Diagnosis and Management of Facial Bone Fractures. *Emerg Med Clin North Am*. 2019;37(1):137-151. doi:10.1016/j.emc.2018.09.012
4. Manodh P, Prabhu Shankar D, Pradeep D, Santhosh R, Murugan A. Incidence and patterns of maxillofacial trauma-a retrospective analysis of 3611 patients-an update. *Oral Maxillofac Surg*. 2016;20(4):377-383. doi:10.1007/s10006-016-0576-z

5. Pereira I, Pellizzer E, Lemos C, Moraes S, Vasconcelos B. Closed versus open reduction of facial fractures in children and adolescents: A systematic review and meta-analysis. *J Clin Exp Dent*. 2021;13(1): e67-e74. Published 2021 Jan 1. doi:10.4317/jced.57323
6. Lee KH, Snape L, Steenberg LJ, Worthington J. Comparison Between Interpersonal Violence and Motor Vehicle Accidents in the Aetiology of Maxillofacial Fractures. *ANZ Journal of Surgery*. 2007;77(8):695-698. doi:10.1111/j.1445-2197.2007.04189.x
7. Juncar M, Tent PA, Juncar RI, Harangus A, Mircea R. An epidemiological analysis of maxillofacial fractures: a 10-year cross-sectional cohort retrospective study of 1007 patients. *BMC Oral Health*. 2021;21(1). doi: <https://doi.org/10.1186/s12903-021-01503-5>
8. Cohn JE, Licata JJ, Othman S, Shokri T, Zwillenberg S. Comparison of Maxillofacial Trauma Patterns in the Urban Versus Suburban Environment: A Pilot Study. *Craniofacial Trauma Reconstr*. 2020;13(2):115-121. doi:10.1177/1943387520910338

---

**How to cite this article:** Samantha Pastore, B.S et al. The Underreporting of Facial Bone Fractures in the Scientific Literature, *Journal of Otolaryngology and Rhinology Research*. 2023;181-184. <https://doi.org/10.52845/JORR/2023/4.4.2>

---