Title Risk factors for hospital admission in the elderly after sustaining Craniomaxillofacial Fractures

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INTRODUCTION

- More than three million people who suffer craniomaxillofacial trauma are admitted to emergency rooms in the United States each year.[1]
- The elderly population is at increased fracture risk due to as age-related changes in bone (i.e. collagen network) and neurosensory limitations.[2]
- The purpose of this study was to determine what factors are associated with increased rates of hospital admission in elderly patients who sustain maxillofacial fractures.
- We hypothesized that falls would be the most common mechanism of craniomaxillofacial trauma in the elderly population.
- We also hypothesized that midfacial fracture, compared to other types of fractures, would be associated with a higher hospital admission rate.

METHODS & MATERIAL

- This is a 5-year cross-sectional study that was conducted using the National Electronic Injury Surveillance System (NEISS).
- The primary outcome variable was admission rate, which was used to proxy the severity of injury.
- The primary predictor variable was the type of craniomaxillofacial fracture.
- Patient and injury characteristics were compared using chi-square and independent-sample *t-tests*. Binary logistic regression was conducted to determine the risk of hospital admission.
- All statistical calculations were performed using SPSS version 25 for Mac (IBM Corp., Armonk, N.Y., USA).

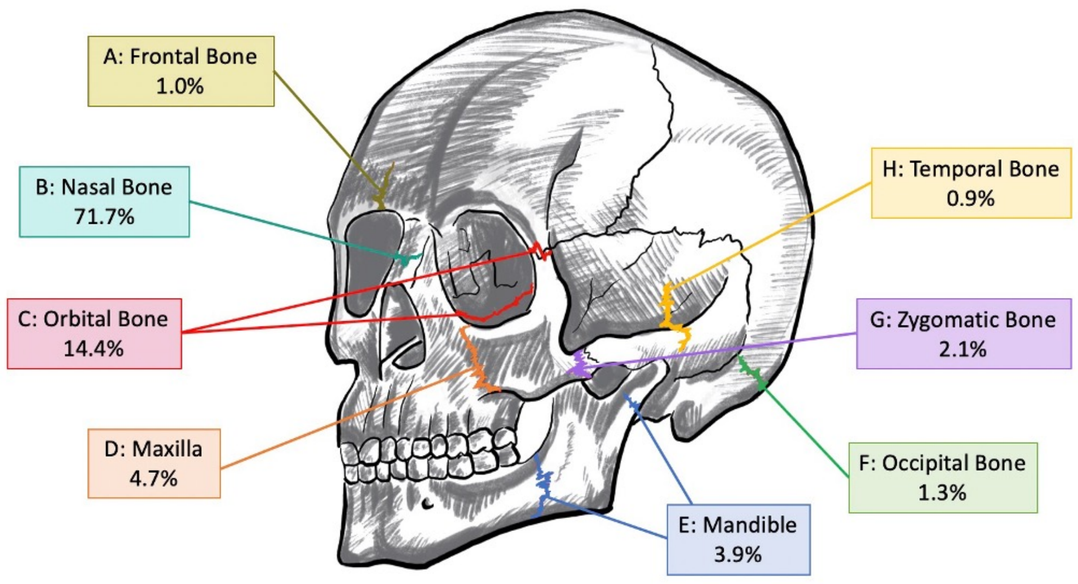

Figure 3. An illustration of the distribution of fractures in craniomaxillofacial skeleton in the geriatric population, 2015-2019.

RESULTS & DISCUSSION

- Fall/trip was the most common mechanism of injury in our study,
  - Falls are particularly pronounced in the geriatric population, being the principal cause for maxillofacial trauma due to diminished cognitive and motor skills, reduced balance in advanced age, and reduced eyesight.[3]
- The primary etiology differs of fractures differs in developing countries.
  - MVA was the most common cause of maxillofacial fractures in Nigeria
  - The reason for this is the scarcity of zebra crossings, subways, and overhead bridges that separate humans and traffic in Nigeria.

RESULTS & DISCUSSION

- Relative to the nasal bone:
  - orbital bone fractures were 3.4 times more likely to get admitted ($P < .01$).
  - occipital bone fractures (OR, 18.45; $P < .01$) were 18.5 times more likely to get admitted ($P < .01$).
  - frontal bone fractures (OR, 5.82; $P < .01$) were 5.8 times more likely to get admitted ($P < .01$).
  - zygomatic bone fractures (OR, 2.91; $P < .01$) were 2.9 times more likely to get admitted ($P < .01$).
  - temporal bone fractures (OR, 55.2; $P < .01$) were 55.2 times more likely to get admitted ($P < .01$).
  - maxillary fractures (OR, 1.86; $P < .01$) were 1.9 times more likely to get admitted ($P < .01$).
  - mandibular fractures (OR, 4.58; $P < .01$) were 4.6 times more likely to get admitted ($P < .01$).
- Relative to face injuries, head injuries (OR, 1.67; $P < .01$) were an independent risk factor for admission.
- The most commonly fractured bone in our study was the nasal bone followed by the orbital floor, both of which are midfacial structures.
  - The result was supported by several studies.[3, 4, 5]
- The most dangerous bone fractures in our study were occipital bone and temporal bone fractures.
- Gerhard et al. determined that, unlike our study, midfacial fractures, which includes both the maxilla and nasal bone, were the most dangerous.[6]
  - It is important to note that the midface also consists of the lacrimal bone, ethmoid, sphenoid, zygomatic bone, and palatine bone, which may have influenced the result in this study.
  - We did not classify midfacial fractures since the narrative in the NEISS database did not specify them.

	Craniomaxillofacial fractures, n (%)
Sample size	5,680
Age, mean ± SD	79.23 ± 8.67
Gender	
Male	2,122 (37.4%)
Female	3,558 (62.6%)
Age group	
65-69	949 (16.7%)
70-79	1,981 (34.9%)
80-89	1,941 (34.2%)
90-99	781 (13.8%)
100-109	28 (0.5%)
Race	
White	2,940 (51.8%)
Black	214 (3.8%)
Asian	75 (1.3%)
Other	79 (1.4%)
Not Stated in ED record	2,372 (41.8%)
Craniomaxillofacial Region	
Head	1,740 (30.6%)
Face	3,909 (68.8%)
Eyeball	2 (0.0%)
Mouth	17 (0.3%)
Ear	12 (0.2%)
Mechanism of Injury	
Fall/trip	5,567 (98.0%)
MVA	42 (0.7%)
Assault	1 (0.0%)

REFERENCES

1. Jose A, Nagori SA, Agarwal B, Bhutia O, Roychoudhury A. Management of maxillofacial trauma in emergency: An update of challenges and controversies. *J Emerg Trauma Shock.* 2016;9(2):73-80.
2. Kloss FR, Gassner R. Bone and aging: effects on the maxillofacial skeleton. *Exp Gerontol.* 2006;41(2):123-129.
3. Possebon A, Granke G, Faot F, Pinto LR, Leite FRM, Torriani MA. Etiology, diagnosis, and demographic analysis of maxillofacial trauma in elderly persons: A 10-year investigation. *J Craniomaxillofac Surg.* 2017;45(12):1921-1926.
4. Shumate R, Portnof J, Amundson M, Dierks E, Batdorf R, Hardigan P. Recommendations for Care of Geriatric Maxillofacial Trauma Patients Following a Retrospective 10-Year Multicenter Review. *J Oral Maxillofac Surg.* 2018;76(9):1931-1936.
5. Aytac I, Yazici A, Tunc O. Maxillofacial Trauma in Geriatric Population. *J Craniofac Surg.* 2020;31(7):e695-e698.
6. Mundinger GS, Bellamy JL, Miller DT, Christy MR, Bojovic B, Dorafshar AH. Defining Population-Specific Craniofacial Fracture Patterns and Resource Use in Geriatric Patients: A Comparative Study of Blunt Craniofacial Fractures in Geriatric versus Nongeriatric Adult Patients. *Plast Reconstr Surg.* 2016;137(2):386e-393e.

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