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# Underdiagnosis of Nasoorbitoethmoid Fractures in Patients with Midface Trauma



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## Abstract

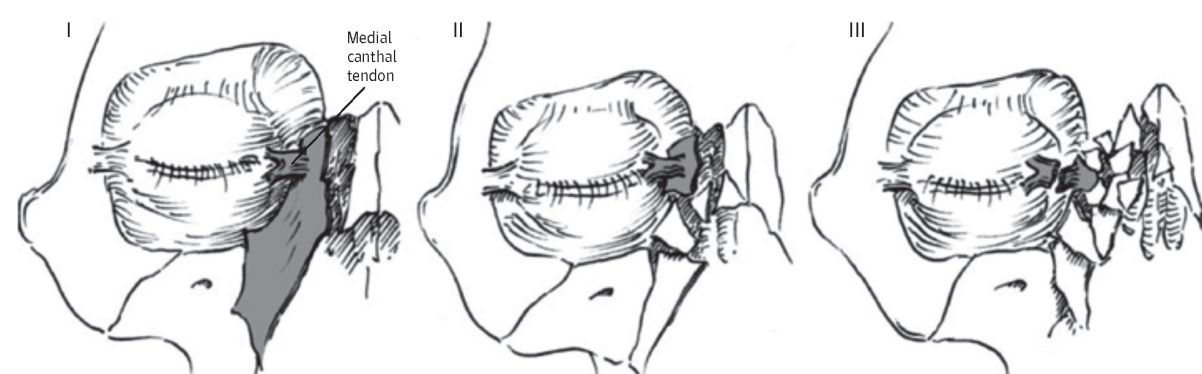
Nasoorbitoethmoid (NOE) fractures are common midface fractures that are often undiagnosed, resulting in incomplete reconstruction. We analyzed NOE fracture concomitance with zygoma fractures in order to better understand NOE fracture diagnosis and treatment tendencies.

The plastic surgery facial trauma database at a level 1 trauma center was utilized to identify 339 eligible patients with zygoma fractures from 07/2011-03/2016. The incidence of concomitant NOE fractures was 30.6% (109/356). 0% of NOE fractures were mentioned in radiology notes, 1.8% in plastic surgery notes, and 8.3% in operative notes. 22.9% (25/109) of NOE fractures were surgically corrected. 44.9% (49/109) of all NOE fractures were minimally-displaced and clinically insignificant. Subset analysis of clinically significant (CS) NOE fractures yielded an incidence rate of 16.8% (60/356). Of these, 0% were mentioned in radiology notes, 9.1% in plastic surgery notes, and 20.4% in operative notes. 31.7% (19/60) of CS NOE fractures were surgically corrected.

These findings suggest a high concomitance of NOE fractures with zygoma fractures as well as a tendency to under-document and under-treat NOE fractures. Radiologists should be trained in identifying NOE fractures. Clinicians treating patients with midface trauma should have a high suspicion for NOE injury.

## Purpose

Nasoorbitoethmoid (NOE) fractures commonly accompany midface fractures and are often undiagnosed, resulting in incomplete reconstruction. Incomplete reconstruction is associated with serious complications, such as blindness, telecanthus, enophthalmos, midface retrusion, anosmia, and nasal deformity<sup>1</sup>. The purpose of this study is to analyze NOE fracture concomitance with zygoma fractures in order to better understand NOE fracture diagnosis and treatment tendencies.



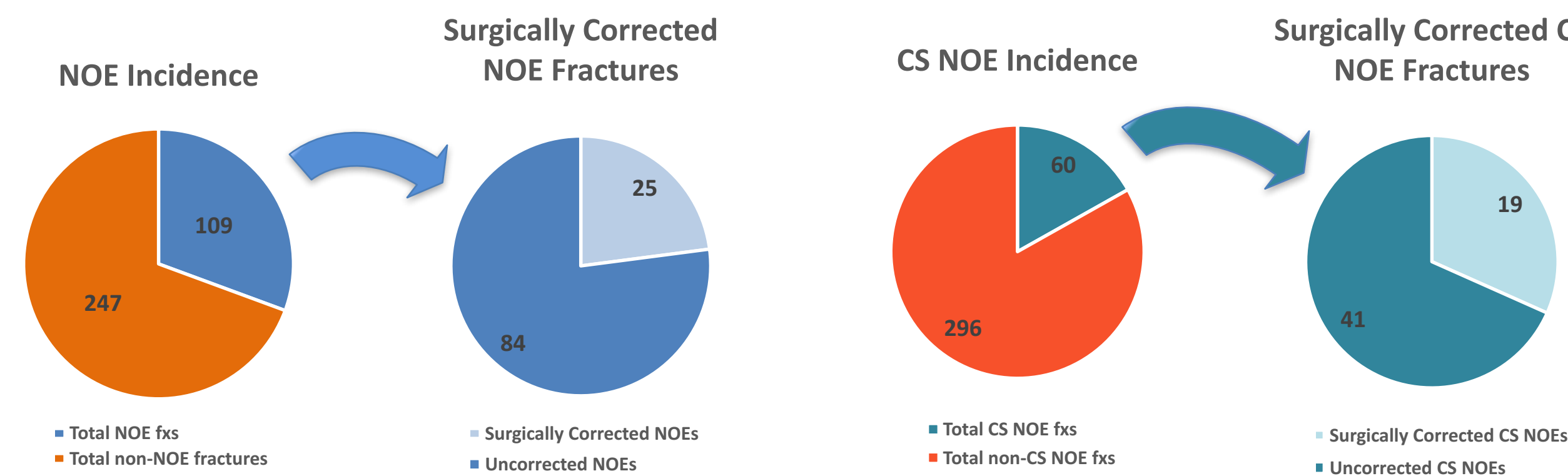
## Methods

The plastic surgery facial trauma database at a level 1 trauma center was evaluated. All patients with diagnosed zygoma fractures from 07/2011-03/2016 were assessed for a concomitant NOE injury using computed tomography imaging, according to Markowitz criteria<sup>2</sup>. Rate of documentation of NOE fractures in radiology, plastic surgery, and operative notes was recorded as well as rate of NOE surgical correction.

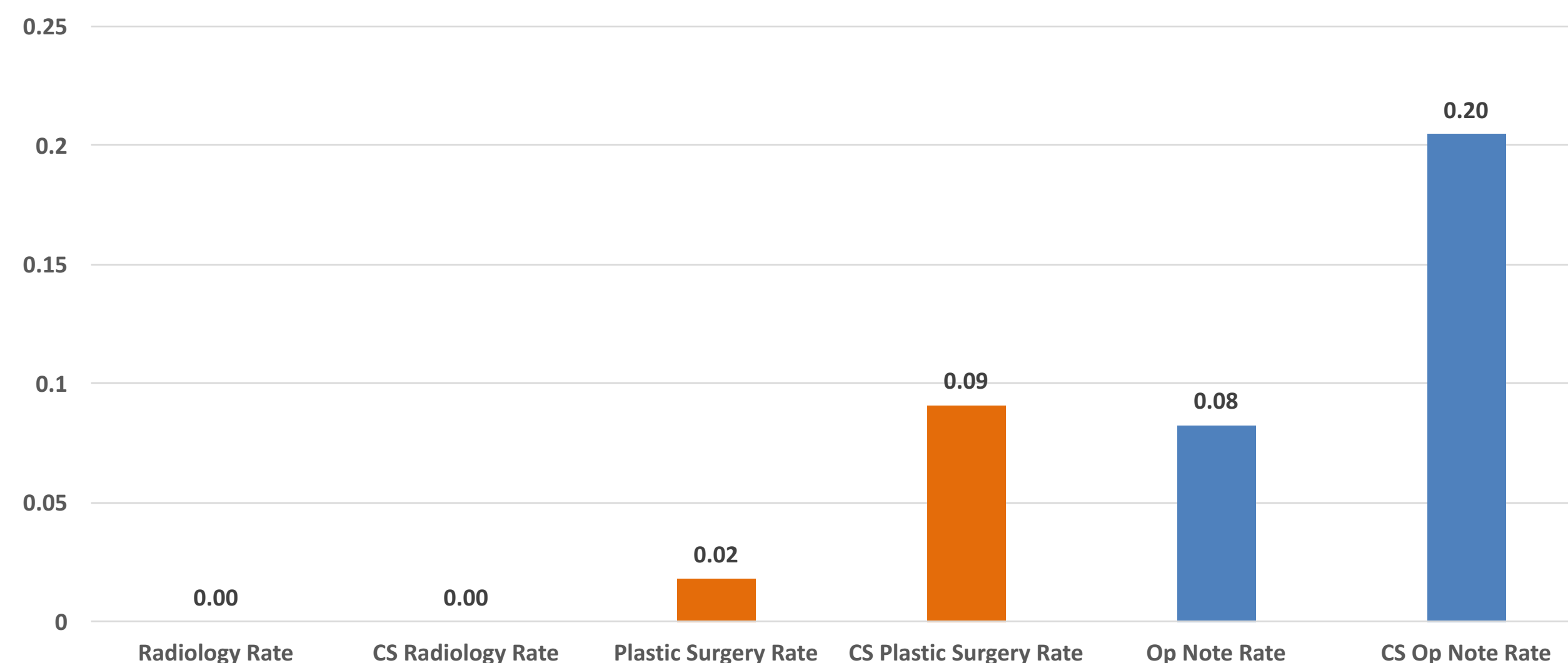
## Results

We identified 339 eligible patients and completed retrospective analysis of CT images for their 356 zygoma fractures. The incidence of concomitant NOE fractures was 30.6% (109/356). 0% of NOE fractures were mentioned in radiology notes, 1.8% in plastic surgery notes, and 8.3% in operative notes. 22.9% (25/109) of NOE fractures were surgically corrected. 44.9% (49/109) of all NOE fractures were minimally-displaced and clinically insignificant.

Subset analysis of clinically significant (CS) NOE fractures yielded an incidence rate of 16.8% (60/356). Of these, 0% were mentioned in radiology notes, 9.1% in plastic surgery notes, and 20.4% in operative notes. 31.7% (19/60) of CS NOE fractures were surgically corrected.



## NOE Documentation Rates



## Conclusions

- There is a high concomitance of NOE fractures with zygoma fractures.
- There is a tendency to under-document NOE fractures in radiology, plastic surgery, and operative notes.
- NOE fractures are largely under-treated.
- Radiologists should be trained in identifying NOE fractures.
- Clinicians treating patients with midface trauma should have a high suspicion for NOE injury.

## Future Directions

- Formulate better diagnostic criteria for NOE fractures
- Develop a multivariate model to alert clinicians of NOE fracture presence
- Educate radiologists and plastic surgeons on the importance of proper NOE diagnosis and management

## References

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2. Markowitz BL, Manson PN, Sargent L et-al. Management of the medial canthal tendon in nasoethmoid orbital fractures: the importance of the central fragment in classification and treatment. *Plast. Reconstr. Surg.* 1991;87 (5): 843-53.

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