

Trends in Concurrent Orbital Floor Repair during Zygomaticomaxillary Complex Fracture Repair

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INTRODUCTION

Orbital floor (OF) fractures are, by definition, a component of zygomaticomaxillary complex (ZMC) fractures. The need for concurrent OF repair during ZMC repair remains a topic of discussion. Current evidence in the literature favors a more selective approach to exploring and repairing the OF during repair of ZMC fractures.¹⁻⁴ Proponents of selective OF exploration advocate that precise ZMC reduction corrects orbital volume without the need for OF exploration in most concurrent ZMC and OF fractures. Unnecessary OF exploration increases potential morbidity, and adds to costs.

We sought to determine if surgeons' operative trends in clinical practice paralleled recommendations in the literature regarding concomitant OF exploration and repair during ZMC fracture reduction.

METHODS

- The American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) databases were reviewed for the years 2010-2016 as a means to analyze current clinical practice trends.
- 2012 Current Procedural Terminology (CPT) codes for ZMC fracture repair were queried (21355, 21356, 21360, 21365, 21366). Within the ZMC fracture repair codes, we queried CPT codes for cases which also underwent OF repair (21385, 21386, 21387, 21390, 21395, 21400, 21401, 21406, 21407, 21408).
- The relative rate of concomitant OF repair with ZMC fracture reduction was examined by operative year.
- Data were analyzed using SPSS Version 25 (IBM Corporation, Armonk NY, USA). Continuous variables are presented using the median and interquartile range, and comparisons were performed using Mann-Whitney U tests. Categorical data were compared using Chi-Squared and Fisher-Exact tests.

RESULTS

- A total of 1396 patients were identified who underwent ZMC repair. Of those, 260 had a concomitant OF repair.
- Patient demographics, operative factors and outcomes were compared (Table 1). Concomitant OF repair occurred with varying frequency between races and was more commonly performed for complex ZMC fractures as defined by CPT code.
 - White patients underwent OF repair more frequently than other races (71% vs. 12%)**
 - Operative time was longer in those who underwent concomitant OF repair (145 vs. 68)**
 - Hospital length of stay and complications were similar between the groups.**
 - Relative OF repair rates for concomitant OF and ZMC fractures from 2010-2016 have remained constant (Table 2).**

Table 1

| Patient Demographics | | | |
|--------------------------|--------------------------------------|-----------------------------------|---------|
| | ZMC without orbital repair n=988 (%) | ZMC with orbital repair n=254 (%) | p-value |
| Age, y | 37 (27-50) | 38 (26-53) | 0.563 |
| Sex, male | 783 (79.3) | 197 (77.6) | 0.513 |
| BMI | 24.4 (21.8-27.5) | 24.5 (22.1-27.6) | 0.188 |
| Race | | | |
| White | 571 (57.8) | 182 (71.7) | <.001 |
| Black | 121 (12.2) | 32 (12.6) | |
| Other | 50 (5.1) | 8 (3.1) | |
| Unknown | 246 (24.9) | 32 (12.6) | |
| Operative factors | | | |
| Operative time, | 68 (32-118) | 145 (100-205) | <.001 |
| Hospital LOS, d | 0 (0-1) | 1 (0-1) | <.001 |

ZMC, Zygomaticomaxillary Complex; BMI, Body Mass Index; CPT, Current Procedural Terminology; LOS, Length of Stay; d, days

DISCUSSION

A growing body of literature supports observation alone for most OF fractures occurring with ZMC fractures. Selective CT-based criteria have been described in order to assist with OF repair decision making.² Wilde et al. demonstrated that only 2 of 19 (10%) concurrent ZMC and OF fractures required OF exploration and reduction based on intraoperative CT findings after ZMC reduction alone.⁴ Of the 1396 patients who underwent ZMC reduction, 23% of these patients underwent concomitant OF repair. Despite evidence supporting increased OF observation, this study demonstrates that from 2010-2016, there was no correlating clinical practice decrease in the rate of OF repair.

We also identified a statistically significant race discrepancy regarding management of the OF. White patients underwent concomitant repair in 71% of cases, while black patients underwent repair in 12% of cases. Race inequalities have been specifically identified among trauma patients.^{5,6} This finding may be accounted for by mechanism of injury or hospital setting; however, the wide disparity between these groups suggests the need for further investigation.

Table 2

ZMC Fracture Repair Trends

| Repair Type: | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Total |
|--|------|------|------|------|------|------|------|-------|
| ZMC repair | 121 | 129 | 143 | 146 | 191 | 224 | 288 | 1396 |
| ZMC without orbital repair | 96 | 107 | 113 | 123 | 153 | 173 | 223 | 1136 |
| ZMC with orbital repair | 25 | 22 | 30 | 23 | 38 | 51 | 65 | 260 |
| ZMC with orbital repair per ZMC without orbital repair (as percent) | | | | | | | | |
| | 26% | 21% | 27% | 19% | 25% | 30% | 29% | 23% |

ZMC, Zygomaticomaxillary complex

CONCLUSION

This study suggests discordance between clinical practice and current evidence for management of concomitant OF repair and ZMC fracture reduction. This discordance may be increasing cost of care, operative time, and putting patients at unnecessary risk for complications.

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