



ORAL PRESENTATION GROUP 1 – PRESENTATION 3

The Orbital Index: A Novel Comprehensive Quantitative Tool for Prediction of Delayed Enophthalmos in Orbital Floor Fracture Management

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Purpose

Early identification of surgical indication is critical to optimizing outcomes in orbital floor fracture management. Delay of repair in this cohort risks persistent diplopia, persistent facial deformity, and infraorbital nerve injury. While muscle entrapment and acute globe malposition are widely accepted absolute indications for repair, it has remained a challenge to identify those patients at risk for developing delayed enophthalmos and requiring subsequent surgery. The aim of this study is to validate a clinical prediction tool that guides orbital floor fracture management by stratifying risk for late enophthalmos and establishing a threshold value for surgical intervention.

Methods and Materials

The Orbital Index stratifies fractures by size, location, and inferior rectus muscle rounding (a surrogate for fascioligamentous sling disruption); scale of 0-6. A twenty year (1998-2018) single center retrospective analysis of orbital floor fractures was performed. Exclusion criteria included age <18, non-isolated fractures, bilateral fractures, globe rupture, muscle entrapment, and inadequate documentation of follow up. Scans for each patient were reviewed, scores were assigned and verified by two investigators, and scores were then correlated with treatment courses.

Inter-observer reproducibility across scoring components was assessed comparing scores between craniofacial specialists, plastic surgery trainees, and medical students. Providers were surveyed pre-and post-intervention to determine whether use of this tool improved understanding and communication.

Results

The Orbital Index demonstrated high fidelity, inter-observer reproducibility, and identified a score of greater than or equal to 4 as a surgical threshold. Retrospective chart review identified 201 fractures meeting the inclusion criteria; 35% scored 0 (operative rate 3%), 12% scored 1 (8%), 10% scored 2 (10%), 11% scored 3 (18%), 9% scored 4 (50%), 12% scored 5 (63%), and 11% scored 6 (77%). A statistically significant difference in decision for operative intervention was found between scores of 3 vs 4 ($p=0.04$), but not scores 0 vs 1 ($p=0.27$), 1 vs 2 ($p=0.82$), 2 vs 3 ($p=0.43$), 4 vs 5 ($p=0.43$), or 5 vs 6 ($p=0.29$). 91% of scoring across all components and aggregate Index scores were within 1 point of reference. Participants demonstrated increased ability to correctly identify surgical need with use of the Orbital Index ($p=0.01$). Pre-and post-intervention surveys demonstrated increased subject self reported understanding ($p=0.001$) and communication. ($p=0.0003$)

Conclusions

The Orbital Index is a reproducible tool to stratify risk for late enophthalmos in orbital floor fracture management.

ORBITAL INDEX SCORING OVERVIEW

SIZE (score 0-2)

- $<1\text{cm}^2 = 0$ points
- $1-2\text{cm}^2 = 1$ point
- $>2\text{cm}^2 = 2$ points

LOCATION (score 0-2)

- Anterolateral = 0 points
- Anteromedial = 1 point
- Posterolateral = 1 point
- Posteromedial = 2 points

ROUNDING OF THE INFERIOR RECTUS MUSCLE (score 0-2)

- Inferior rectus muscle height to width ratio $<1 = 0$ points
- Inferior rectus muscle height to width ratio $\sim 1 = 1$ point
- Inferior rectus muscle height to width ratio $>1 = 2$ points