

# Predicting the Risk of Enophthalmos After Pediatric Orbital Floor Fractures: An Application of the “Orbital Index” Measure to Predict Surgical Planning

Alexander J. Comerci, BS<sup>1</sup>; Megan Kerbag, MPH<sup>2</sup>; Joseph Mocharnuk, BA<sup>1</sup>; Angel Dixon, BA<sup>1</sup>; Nicolás M. Kass, BA<sup>1</sup>; Zhazira Irgebay, MD<sup>1</sup>; Megan Pencek, MD<sup>1</sup>; Janina Kueper, MD<sup>1</sup>; Barton Branstetter, MD<sup>3</sup>; Jesse A. Goldstein, MD<sup>2</sup>

University of Pittsburgh Medical Center, Department of Plastic Surgery, Pittsburgh, PA; Lake Erie College of Osteopathic Medicine, Erie, PA; University of Pittsburgh Medical Center, Department of Radiology, Pittsburgh, PA; Children’s Hospital of Pittsburgh, Department of Plastic Surgery, Pittsburgh, PA

## Introduction

- Orbital fractures may present without clinical signs (e.g., white eye orbital blow-out)
- The Orbital Index (OI) can be used to predict the risk of delayed enophthalmos in adult orbital floor fractures
- Indications for surgical management in pediatric orbital floor fractures is complicated by the unique development of the pediatric skeleton

## Objectives

- Apply the OI to pediatric orbital floor fractures and analyze its utility in predicting enophthalmos, management strategy.
- Compare patient characteristics for patients with and without enophthalmos

## Methodology

- Retrospective review of all patients < 18 years who presented with facial fractures to UPMC Children’s Hospital
- Demographic, clinical outcomes, and radiographic data was used
- OI scoring (0-6): total fracture area (mm<sup>2</sup>), primary location of fracture, and shape of inferior rectus muscle

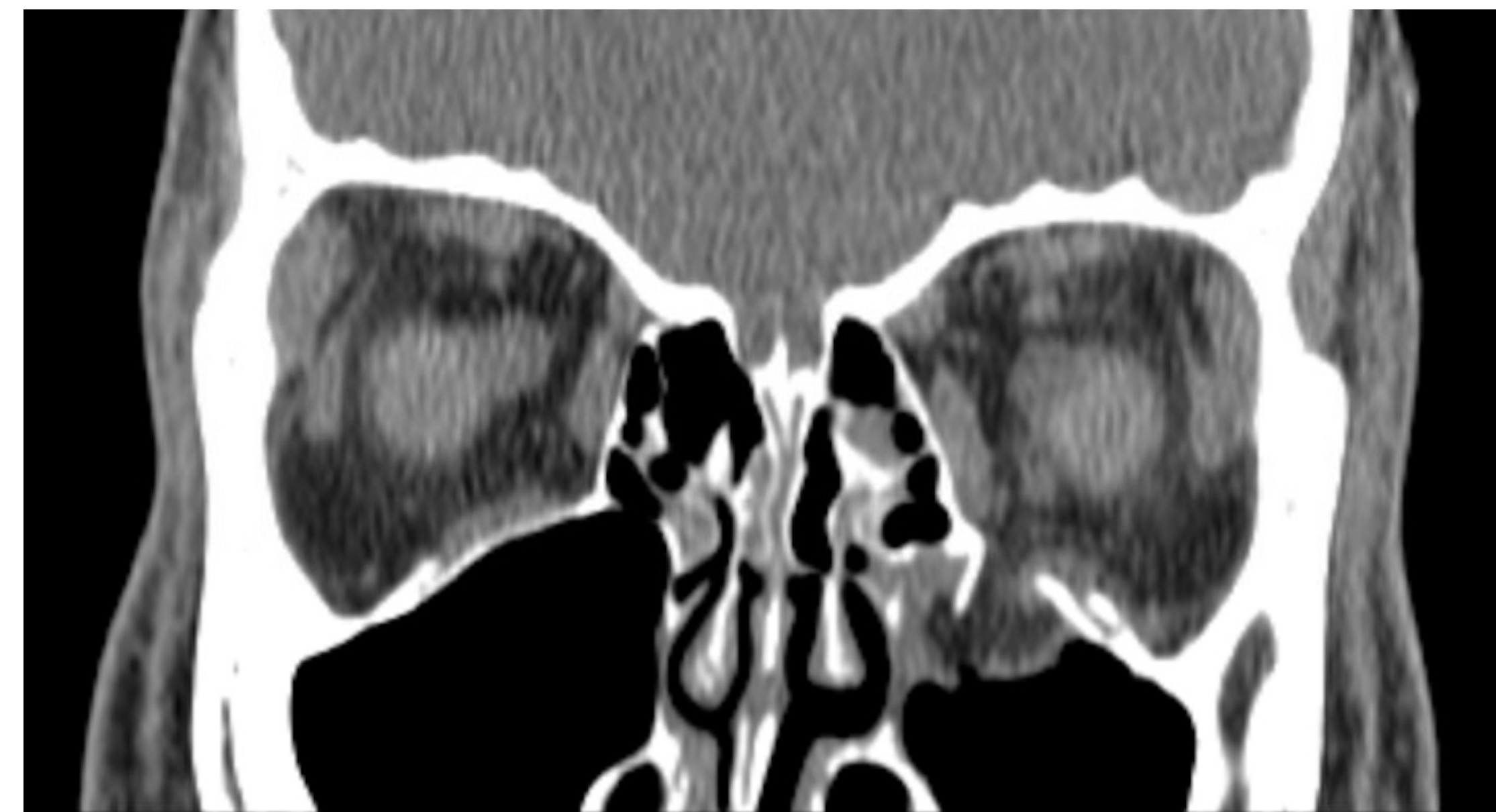


**Figure 1.** Frontal view CT of an orbital floor fracture with “trap-door” presentation.

## Results

- OI was significantly different between patients with and without enophthalmos (p=0.005)
- IR entrapment associated with enophthalmos (p=0.004)
- For each unit increase in OI scores, patients have a 73% increase in odds of enophthalmos (p=0.005)
- Adjusting for OI, there is a 200% increase in odds of surgery when cause of injury is MVA (p=0.007)

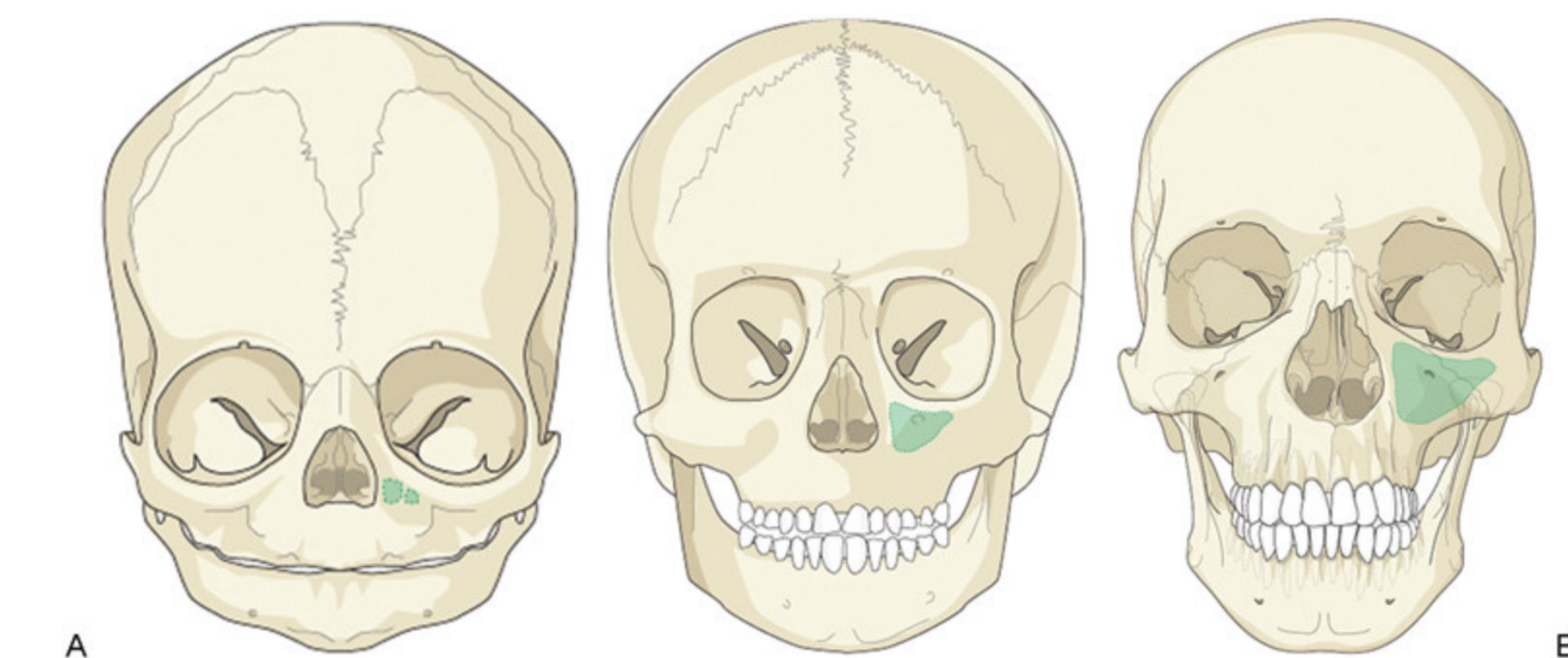


**Figure 2.** Development of the pediatric craniofacial skeleton.

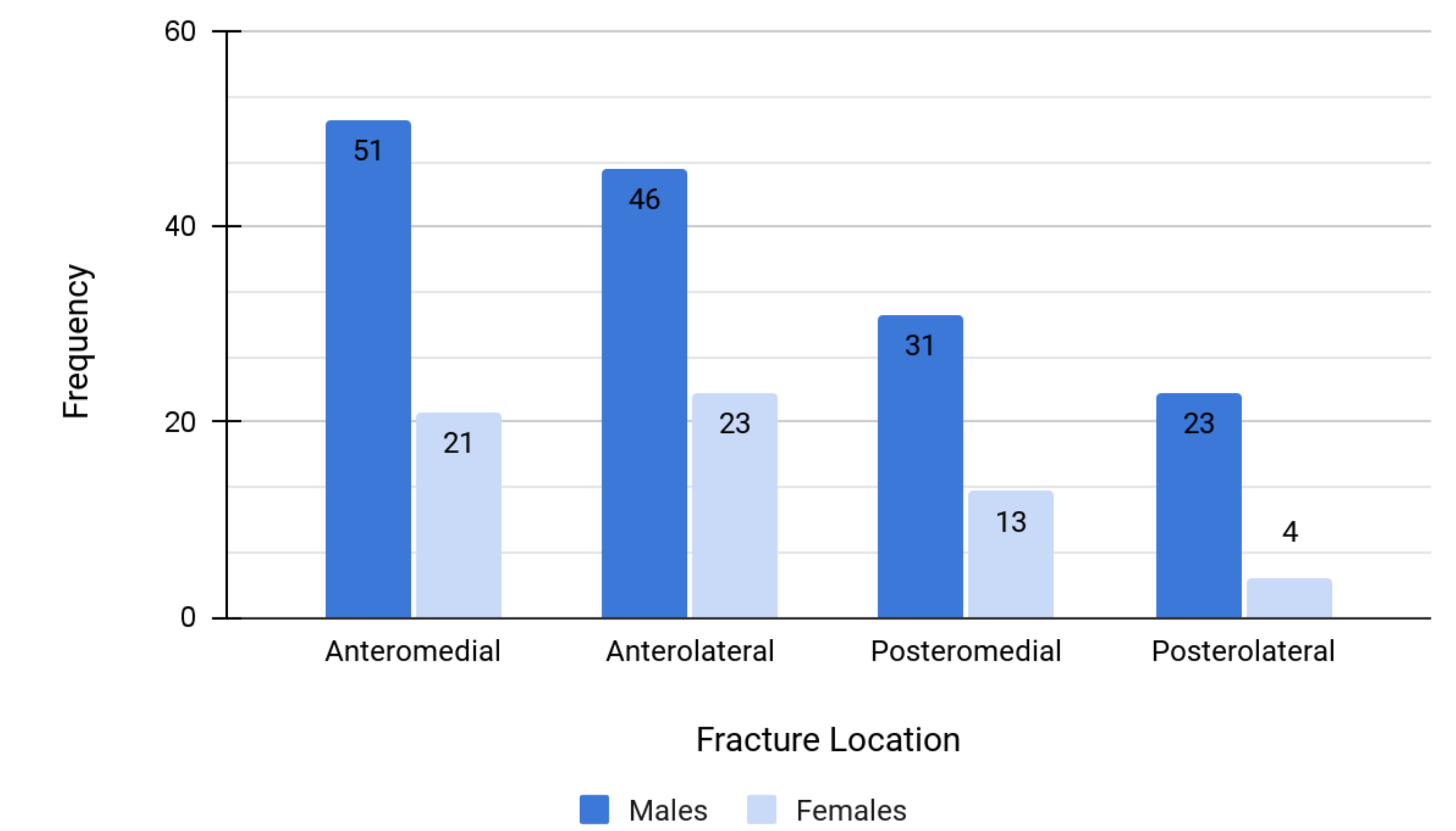


**Figure 3.** Distribution of orbital floor fractures.

## Conclusion

- Orbital index varies significantly between patients with or without enophthalmos
- Enophthalmos patients have unique injury characteristics on presentation
- Orbital index may be effective in predicting enophthalmos and management strategy