

Surgical Intervention on Pediatric Orbital Floor Fractures Improves Enophthalmos but does Not Affect Visual Outcomes: An Analysis of 72 Children with Isolated Orbital Floor Fractures

Justin M. Broyles, MD, Danielle Jones, BS, Justin Bellamy, BS, Tarek Elgendy, MBBCh, Mohamad Sebai, MD, Paul N. Manson, MD, Amir H. Dorafshar, MBChB

Abstract

Introduction: Isolated orbital floor fractures are common in the pediatric population. While guidelines such as fracture size greater than 2 sq cm. have been used to dictate surgical intervention in adults, less is known about the relative indications for surgery in the pediatric population. (1, 2) Therefore, the aim of the current study is to review the presentation, management, and outcomes for children with isolated orbital floor fractures in an effort to refine operative indications and prevent complications.

Methods: A retrospective review was performed on 72 children with isolated orbital floor fractures at a tertiary pediatric hospital from 1994 to 2010.

Results: Seventy-two patients with 76 fractures were identified. The average age at the time of injury was 8.41 +/- 3.8 years. Follow-up time was 14.2 +/- 4 months. The majority (50%) of patients suffered minimally displaced fractures, while 18% (13/72) suffered blowout fractures and 6% (4/72) suffered trapdoor fractures.

Nineteen percent (14/72) of children presented with decreased visual acuity. Patients who were assaulted had a significantly increased risk for decreased visual acuity (RR: 3.25, CI:1.82-5.81, p<0.05).

Eight percent (6/72) had enophthalmos on presentation when assessed by an Ophthalmologist. Patients with increasing defect widths had a significantly increased risk for developing enophthalmos after adjusting for age, surgery, and mechanism of injury (RR:1.8, CI:1.11-2.96, p<0.05).

Thirty-three percent (24/72) underwent surgery with the most common indication for surgery being size of the fracture followed by muscle entrapment. Eighty-three percent (20/24) received either medpore or titanium implants, with the remaining 4 patients receiving autologous bone. Patients who underwent surgical intervention had statistically greater defect widths compared with their conservatively managed counterparts (20.7mm vs. 7.7mm, p<0.05). Additionally, patients who underwent surgical intervention had statistically greater defect/orbital width ratios when compared with than their conservatively managed counterparts (0.54 vs. 0.32, p<0.05). Surgery was not associated with improved visual outcomes; however, patients who received operative intervention displayed significantly decreased rates of enophthalmos on follow-up (RR:0.02, CI:0.00-0.49, p<0.05). (Table 1)

Baseline Characteristics				
		Operative (n=24)	Non-operative (n=48)	P
*	Defect Width (mm)	20.7	7.8	<0.001
*	Defect/Orbit Width Ratio	0.54	0.32	<0.001
*	Age (years)	8.7	8.3	<0.05
Logistic Regression for Decreased Visual Acuity				
		Adjusted RR**	95% CI***	P
	Age	0.91	0.74-1.12	0.356
	Surgery	1.36	0.22-8.44	0.132
*	Assault	3.25	1.82-5.81	<0.001
Logistic Regression for Enophthalmos				
		Adjusted RR	95% CI	P
*	Surgery	0.02	0.00-0.49	<0.05
*	Defect Width (per mm)	1.81	1.11-2.96	<0.05
	Age (per year)	0.84	0.48-1.44	0.518

*Statistically significant at $\alpha=0.05$. **RR=Relative Risk ***CI=Confidence Interval

Table 1: Statistical evaluation of endpoints.

Conclusions: Isolated pediatric orbital floor fractures are common injuries and the majority should be managed conservatively. Patients with decreased visual acuity on presentation should be cautioned that surgical

intervention does not improve visual outcomes. Greater defect width is associated with the development of enophthalmos and this is improved with surgical correction.

References

1. Manson PN, Grivas A, Rosenbaum A, Vannier M, Zinreich J, and Iliff N. Studies on enophthalmos: II. The measurement of orbital injuries and their treatment by quantitative computed tomography. *Plast. Reconstr Surg.* 77: 203-14, 1986.
2. Manson PN, and Iliff N. Management of blow out fractures of the orbital floor: Early repair of selected injuries. *Surv. Ophthalmol.* 35: 279-80, 1990.

Disclosure/Financial Support

There is no external source of funding for this project.

None of the authors has a financial interest in any of the products, devices, or drugs mentioned in this manuscript.