Isolated Single Wall Orbit Fractures and Concomitant Globe Injury: Identifying High-Risk Patients

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ABSTRACT

***Introduction**: Ophthalmologic evaluation prior to surgical repair of isolated orbit fractures is ideal to rule out globe injury and possible vision loss. Unfortunately this is not always possible prior to surgery at all institutions. We hypothesize that the anatomic location of a single wall orbit isolated orbit fracture can help predict the likelihood of ocular injury and thus identify high-risk patients who mandate ophthalmologic evaluation prior to surgical repair.*

***Methods**: A retrospective chart review was performed at a tertiary academic medical center using the institutional trauma registry for maxillofacial trauma. All subjects with an isolated single wall orbit fracture were included in this study. Statistical analysis was performed using a Fisher exact test.*

***Results:** 279 subjects with orbit fractures were identified for inclusion in this study. Forty-one of the 279 (14.7%) subjects had isolated single wall orbit fractures. Isolated single wall fractures included: orbit floor= 19 of 41 (46.3%), medial wall= 15 of 41 (36.6%), lateral wall= 4 of 41 (9.8%), and orbit roof= 3 of 41 (7.3%). Concomitant ocular injury (13 of 41, 31.8%) was associated with isolated orbit wall fractures as follows: orbit floor= 4 of 19 (21.1%), medial wall= 6 of 15 (40%), lateral wall= 2 of 4 (50%), and orbit roof= 1 of 3 (33.3%). A Fisher exact test demonstrated that there was no statistically significant association between individual isolated wall fractures and ocular injury (p= 0.5000).*

***Conclusions**: Isolated orbit wall fractures are common in maxillofacial trauma and often require surgical repair. Concomitant ocular injury is common (31.8%) with this highest incidence occurring with lateral wall fractures (50%), however, statistical analysis did not demonstrate a significant relationship between the anatomic location of an isolated single wall fracture and eye injuries.*

STUDY DESIGN & METHODS

A retrospective chart review was performed. Subjects were identified by reviewing an institutional trauma registry at a tertiary academic medical center . All subjects with an orbit fracture from Jan 1, 2007 to Dec 31, 2012 were included. Two hundred seventy nine subjects were identified and 41 met eligibility for inclusion by having an isolated single wall orbit fracture. Statistical analysis was performed using a Fischer exact test.

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INTRODUCTION

Maxillofacial trauma commonly involves fractures of the eye socket. Globe injury resulting in vision loss is a rare but severe complication in these patients. Vision loss may be caused by direct injury to the globe and its structures, optic nerve and/or canal injury, vascular compromise to the eye, and/or intracranial injury to the optic chiasm or brain. The incidence of vision loss associated with maxillofacial trauma varies widely in the literature, with published ranges of 0.32% to 10.8%. A meta-analysis by Magarakis reported an actual vision loss rate of 1.7%.[1] Of interest, this same study demonstrated that the incidence of orbit fracture and concomitant ocular injury is much higher (range 5 9.8%–29.8%).

The aim of this study is to identify patients at high risk for ocular injury who have sustained an isolated single wall orbit fracture. We hypothesize that this information is clinically important when treating orbit fracture patients who are at risk for vision loss.

RESULTS

Two hundred seventy nine subjects with orbit fractures were identified for inclusion in this study. Forty-one of the 279 (14.7%) subjects had isolated single wall orbit fractures. Isolated single wall fractures were demonstrated as follows:

- Orbit floor= 19 of 41 (46.3%)
- Medial wall= 15 of 41 (36.6%)
- Lateral wall= 4 of 41 (9.8%)
- Orbit roof= 3 of 41 (7.3%)

Concomitant ocular injury was identified in 13 of the 41 (31.8%) subjects. Globe injury was associated with isolated orbit wall fractures as follows:

- Orbit floor= 4 of 19 (21.1%)
- Medial wall= 6 of 15 (40%)
- Lateral wall= 2 of 4 (50%)
- Orbit roof= 1 of 3 (33.3%).

A Fisher exact test demonstrated that there was no statistically significant association between individual isolated wall fractures and ocular injury (p= 0.5000).

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DISCUSSION

Orbit fractures may occur in isolation of a single wall, involve multiple walls, or involve concomitant factures of the frontal, zygomatic, maxillary, nasal, and/or sphenoid bones. Fracture locations within the orbit itself and fractures associated with other maxillofacial injuries indicate different mechanisms, vectors and degrees of force that caused the orbit fracture. As such all these factors may predispose certain patients to concomitant ocular injury. Any ocular injury can result in vision loss or blindness. Therefore, understanding subjects who are at high risk for vision loss is paramount in treating orbit fractures patients.

Several studies report the significance of individual wall fractures and their association with ocular injury. He et al found that 22% of 240 orbit floor fractures had associated ocular injuries. They postulated that the ocular bone-buckling theory is the most likely mechanism of globe protection in these patients.[5] Jank et al. reviewed medial wall fractures and found that they are statistically morel likely to experience exophthalmos and diplopia at the time of initial evaluation.[3] Stanley et al. studied lateral wall fractures and described a triad of a lateral blow-in fracture, decreased visual acuity, and ocular motility limitations as a common sequelae.[6] They suggested that early surgical management could correct this triad. Ocular injuries and roof fractures were reviewed by Fulcer and Sullivan.[4] In their study, five of 21 (23.8%) patients with roof fractures had ocular injuries and another five patients had periorbital problems including ptosis, intraorbital foreign body, and oculomotor nerve palsy.

The current study attempts to assess ocular injury risks associated with orbit fractures based on their anatomic location on CT scan. Commonly, orbit fractures are limited to one wall (medial, lateral, roof, or floor) Karabekir et al. found that 50% of orbit fractures were isolated to one wall, 29% to two walls, 16% to three walls, and 5% involved all orbital walls simultaneously. Since single wall fractures are common, the goal of this study is to assess whether a certain isolated orbit wall fracture was more likely to be associated with an ocular injury. Based on our studies population, we identified that floor fractures are the most common single wall fracture, but the least likely to have concomitant ocular injury. Lateral wall fractures were the most likely single wall fracture to have an associated ocular injury and occurred in 50% of these patients. All isolated orbit walls were associate with ocular injury and none was statistically more likely to have an injury.

CONCLUSIONS

Isolated orbit wall fractures are common in maxillofacial trauma and often require surgical repair. Concomitant ocular injury can occur with any isolated single wall orbit fracture Ocular injury corresponds most frequently with lateral wall fractures (50%) and least frequently with floor fractures (21.1%). Statistical analysis did not demonstrate a significant relationship between the one particular anatomic location of an isolated single wall fracture and ocular injury. Thus the authors recommend that all orbit fracture patients undergo a comprehensive ophthalmologic evaluation by a trained ophthalmologist as part of their care.