Gunshot Wounds to the Face in Pediatric Patients at a Level One Trauma Center in the United States: A Case Series

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Introduction

- Thousands of children are the victims of gunshot wounds (GSW) annually in the United States, with one study finding that 15.9% involve the head and neck.[1]
- GSW to the head in pediatric patients is associated with facial fractures, skull fractures, and intracranial bleeding,[1,2] however there is little literature examining patterns of ocular/orbital injuries secondary to GSW in a pediatric population.
- 44% of adults with GSW to the head experience permanent vision loss in at least 1 eye, with reported injuries including orbital fractures and open globe injuries.[3,4]
- This study aimed to identify presenting features of pediatric patients with GSW to the face and clinical outcomes, with particular attention to ocular injuries and outcomes.

Methods and Materials

- Case series of all patients seen by oculoplastics at a level one trauma center in the United States after a GSW injury to the face from May 1, 2018 to September 4, 2024.
- Retrospective chart review was performed on all 9 patients to identify relevant demographic and clinical information.
- Categorical variables are described using percentages and numerical variables are described using median with interquartile range.

Figure 1: Fracture Locations

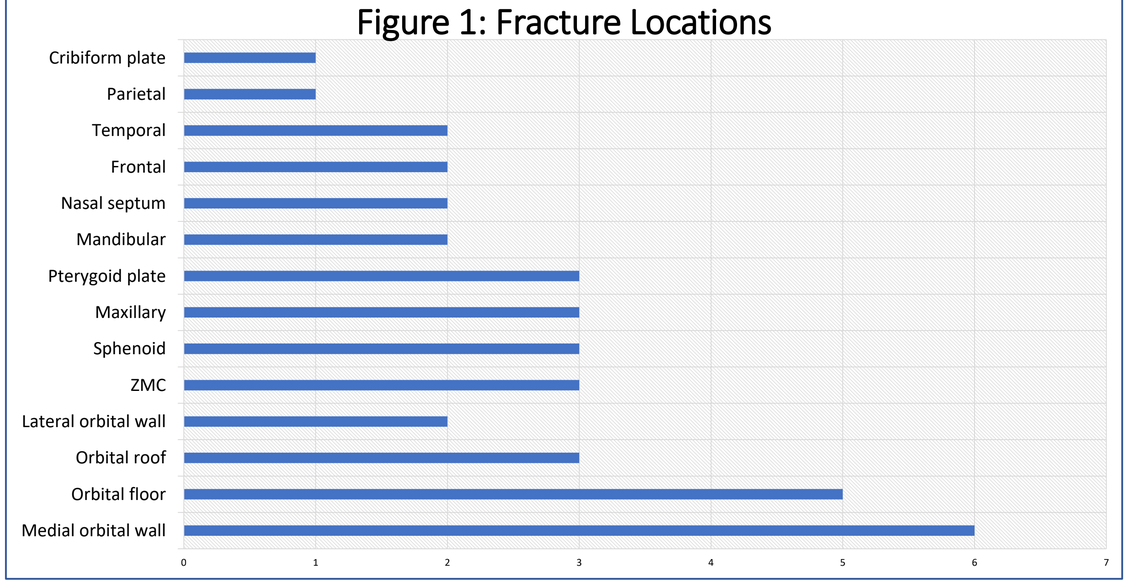
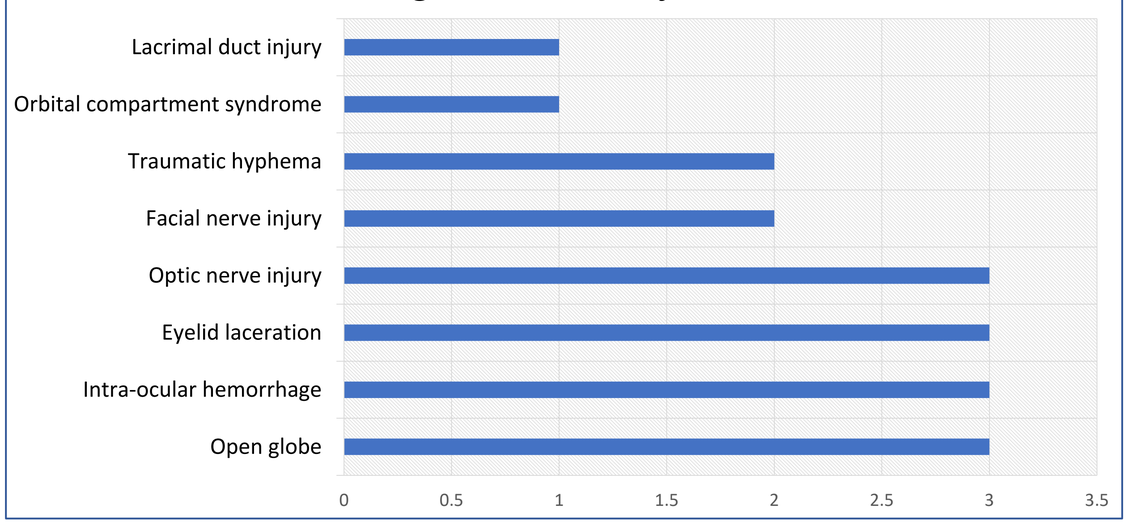


Figure 2: Ocular Injuries



Results

Study Population:
- 9 patients were included with median age of 16.6 (4.7) years.
- 6/9 (67%) patients were male.

Presentation:
- Median Glasgow Coma Score of 13.
- Orbit (4/9 patients or 44%) followed by cheek (3/9 patients or 33%) were the most common bullet entry site.
- Bullet traversed the midline in 7/9 (78%) of cases.

Injuries:
- 8/9 (89%) patients experienced fracture of at least 1 orbital wall.
- 5/9 (56%) patients presented with skull vault and midface fractures.
- 5/9 (56%) patients had concurrent intracranial hemorrhage.
- Ocular injuries are described in Figure 2.

Treatment:
- 8/9 (89%) patients underwent surgery to the head or face.
- 6/8 (75%) surgical interventions occurred in the first day after injury.
- Most common surgical intervention was facial fracture repair (5/8 patients or 63%) followed by eye enucleation or evisceration (3/8 patients or 38%).

Outcomes:
- At final ophthalmology follow-up, 2/9 (22%) patients were legally blind (less than 20/200 vision) in both eyes.
- 4/9 (44%) patients had NLP vision or had undergone eye evisceration or enucleation in at least one eye.

Figure 3: Coronal (A), sagittal (B), and axial (C) CT maxillofacial images from a patient with bullet wound to the left orbit causing complete destruction of the orbit. Patient was also noted to have traumatic avulsion of the optic nerve, pre-retinal hemorrhages, and intracranial bleeding.

Discussion

- This study is consistent with previous work demonstrating the high incidence of facial fractures and intracranial hemorrhage in pediatric GSW to the face.[1,2]
- The rates of ocular injuries such as ruptured globe (17%-28%) and optic nerve injury (6%-28%) were slightly lower in similar studies of adult patients compared to the rates in our pediatric population.[3,4]
- The rate of severe, permanent vision loss in at least one eye was similar to that in studies of adult patients (44%).[3,4]

Limitations:
- The small sample size and inclusion of patients from a single institution limits generalizability.
- The study's descriptive nature does not allow conclusions to be drawn on best-management practices or prognosticating factors.

Conclusions:
- GSW to the head and face in children are devastating injuries, particularly with respect to the globe and orbit.
- Further studies with larger sample sizes are warranted to establish management guidelines and risk factors for poor ocular and systemic outcomes in children presenting with these injuries.

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