Age, however, did affect the decision to undergo operative interventions, especially in the adult cohort. Elderly patients experienced more complications than their adult counterpart. Posttraumatic olfactory disturbance was the most frequent complication reported in both groups, secondary to distortion of the sinus tract. Sinusitis and olfactory disturbances are more likely to be experienced in the elderly.

The Impact of Age, Injury Severity, and Mechanism on Orbital Blow-out Fracture Patterns after Blunt Trauma: An 11-Year Review

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BACKGROUND: Craniofacial injuries contribute substantially to morbidity after blunt trauma, with orbital fractures seen in approximately 10–25% of all traumatic facial fractures. Orbital blow-out fractures occur when an orbital wall is fractured with an intact orbital rim, and usually occurs after significant blunt trauma from an object larger than the orbital aperture. The aim of this study is to determine the impact of age, injury severity, and mechanism of injury on orbital blow-out fracture patterns.

METHODS: We retrospectively reviewed all patients admitted to a regional Level 2 Trauma Center, who sustained blunt orbital fractures, over an 11-year period, from January 2006 to December 2016. We excluded all patients who had orbital rim fractures and all penetrating trauma. Only patients who had a computed tomography scan of their face on presentation were included. There were 825 patients who met inclusion criteria. Individual charts were reviewed for demographics, length-of-stay(LOS), mechanism of injury(MOI), injury severity score(ISS), and mortality. Individual facial CT scans were reviewed along with the formal radiologist report to determine fracture locations. Statistical significance was set at a p value ≤0.05. This study was approved by our Institutional Review Board.

RESULTS: Our cohort consisted of 825 patients, with 42 mortalities (5.1%). The mean age was 40.4 years old (range 1–97) and there was an approximate 4:1 male:female ratio. The mean LOS was 5.4 days (range 0–78) and the mean ISS was 14.7(range 1–50). The most common MOI was motor vehicle collisions(MVC) in 211 patients, followed by assault, ground-level mechanical falls, All-Terrain Vehicle(ATV) accidents, motorcycle collisions(MCC), and other mechanisms in 171, 151, 112, 53, and 127 patients, respectively. Overall, the most common orbital blow-out fracture involved the orbital floor in 567 patients (68.7%), followed by the lateral, medial, superior(roof), and posterior walls in 310(37.6%), 183(22.2%), 160(19.3%), and 16(1.8%) patients, respectively. The most common fracture pattern combination was orbital floor and lateral wall fractures in 202 patients (24.5%). The mean number of orbital blow-out fractures per patient in the entire cohort was 1.50. Orbital floor fractures remained the most common blow-out fracture in all age groups, accounting for 72.4% in pediatrics (1–17 years old), 66.4% in adults (18–64 years), and 77.7% in the elderly (age ≥65 years). Patients with ISS <15 were significantly more likely to have an orbital floor fracture when compared to patients with ISS ≥15, with fractures present in 81.1% and 56.9% of patients, respectively(p<0.05). MCC resulted in the highest mean number of orbital blow-out fractures per patient (1.83), which was significantly higher than other mechanisms(p<0.05). Patients who had ground-level mechanical falls were most likely to have orbital floor blow-out fractures (90.0%) compared with other mechanisms(p<0.05).

CONCLUSION: Orbital blow-out fractures are a common injury after significant blunt craniofacial trauma. The orbital floor is most frequently involved, and patients who have mechanical falls seem particularly prone to this injury. Patients with lower ISS in our cohort likely had more concentrated craniofacial injuries, explaining their worse fracture patterns. MCC appears to confer the greatest craniofacial trauma with the most severe orbital blow-out fracture patterns. Age did not independently predict fracture patterns.

Intra-Operative Navigation Assisted Surgery with 2-Dimention Planning for Orbital Wall Fracture Reconstruction, Benefit and Limitation

Presenter: Yen-Chen Yu, MD

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BACKGROUND: Correction of enophthalmos in reconstruction of orbital wall fractures depends on intra-operative judgement by direct observation. Intra-operative navigation assistance could provide more precise guidance to “how exophthalmos of the orbit” after reconstruction of orbital wall, than observation only by raw eye. Pre-operative planning is a key procedure of this technique. Theoretically, 3-dimention planning is more precise, but may not be available for every institute due to limited facility. We performed navigation assisted surgery by pre-operative 2-dimention planning and evaluated the clinical outcome and benefit.

PATIENTS AND METHODS: From April 2015 to January 2018, six patients undergone navigation assisted surgery for reconstruction of orbital wall fracture, with pre-operative 2-dimention planning, including 4 for combined orbital floor and medial wall fractures, and 2 for orbital floor fracture alone. Four of them were cases of secondary reconstruction. We input unformatted DICOM images into Medtronic StealthStation® Surgical Navigation System, and made the planning by the built-in planning software. On axial view, we firstly identified and drew the vertical midline from nose tip to center of cervical spine. Then, we made horizontal lines at top of the normal side orbit, extended to the fractured side, perpendicular to the midline, at the middle of the whole orbit. Points of the predicted position of the top of orbit at the fractured side was marked, in same distance opposite to the normal side. In secondary reconstruction cases, this predicted point was marked 1mm higher than the top of the orbit of the normal side. Then we performed reduction and reconstruction of the orbital wall fracture. Titanium mesh was used for orbital wall reconstruction, and was adjusted under assistance of navigation system. Medpor® was used for further orbital content reconstruction and correction of enophthalmos in secondary cases, and was adjusted with guidance of the predicted point (to reach the predicted point after inserting the Medpor®). Clinical result was evaluated by photographing of facial appearance, post-operative CT scan, and measurement of exophthalmometer.

RESULTS: The 2-dimention planning of predicted reduction point was easy by drawing the vertical and horizontal lines. The predicted points of top of the orbit were compatible by intra-operative direct inspection in all cases. Post-operative exophthalmometer showed less than 1mm enophthalmos in injured eye in primary cases, and satisfied correction of enophthalmos in secondary cases (three cases less than 1mm post-op enophthalmos, and one case less than 2mm). Post-operative photographing showed satisfied appearance. CT scan revealed acceptable position of orbit and the titanium mesh.

CONCLUSION: For limited facility, navigation assisted surgery by 2-dimention planning for orbita wall reconstruction might be an alternative of 3-dimention planning. Optimal result could be reached with less cost and easier planning. However, it may not be as precise as 3-dimention planning and may have limitation in patients with more complicated fractures.

Pediatric Pediatric Facial Fractures from Motor Vehicle Collisions: What Are the Patterns and Appropriate Management Strategies?

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PURPOSE: Pediatric injury due to motor vehicle crashes can be especially destructive to the pediatric population as the facial skeleton has immature growth centers, leading to possible long-term defects in form and function. To our knowledge, there are few studies examining fractures patterns of this etiology, and thus a lack of literature for management strategies to optimize functional recovery in this specific population.

METHODS: A retrospective chart review was performed for all facial fractures resulting from motor vehicle collisions with pedestrians in the pediatric population at a level 1 trauma center in an urban environment (University Hospital in Newark, NJ) from 2002 to 2012. Patient demographics were collected, as well as location of fractures, concomitant injuries, and surgical management strategies.

RESULTS: During the time period examined, 55 patients were identified as 18 years of age or younger and having sustained a facial fracture as the result of being struck by a motor vehicle. The mean age was 11.3 (range 1 – 18) years, with a male predominance of 69.0%. There were a total of 107 fractures identified on radiologic imaging via