Ocular Sequelae of Blunt Trauma: A Case Comparison

We present two patients with history of blunt force trauma. Each patient exhibits different complications as a result of ocular trauma. This case comparison highlights the spectrum of ocular sequelae of blunt force trauma.

I. Case History
   i. Patient MC
      i. 40 YO AAM
         ii. CC: unilateral swollen red eye, unable to open, blurred vision, photophobia OS, denies pain
         iii. POHx: no pertinent history
         iv. PMHx: no pertinent history
         v. Reports getting in a fight the previous night and either getting kicked or a brick thrown directly at left eye (unsure because events occurred quickly). Reported to ER after incident, CT scan was performed and was referred to eye care provider for evaluation.

   ii. Patient HC
      i. 30 YO HM
         ii. CC: unilateral swollen red eye (-) relief w/ Visine, blurred vision, peripheral floaters, 1/10 pain OS
         iii. POHx: no pertinent history
         iv. PMHx: no pertinent history
         v. Reports getting jumped by two men two nights prior and was hit with a fist in the left eye. Reported to ER after incident, CT scan was performed and was referred to eye care provider for evaluation.

II. Pertinent findings
   i. Patient MC
      i. BCVA: OD:20/20 OS:20/50
      ii. Pupils: PERRL(-)APD
      iii. EOMs: FROM OD, restricted in all gazes (+)diplopia OS
      iv. CVF: Abnormal field superior 2\textsuperscript{nd} to chemotic lid OS
      v. Slit Lamp Exam: OD within normal limits, OS as follows:
         i. Lids/lashes: 3+ periorbital edema, serous discharge with minimal blood, trace lid abrasion, ecchymosis, entropion secondary to swelling
         ii. Conjunctiva: 4+ chemosis, 4+ injection, 3+ subconjunctival hemorrhage, conjunctival protrusion with lid closure, mucus strands
         iii. Cornea: central 3mm round abrasion, (-)Seidel’s sign
         iv. Anterior Chamber: deep, 0.5+ cells (-)hypopyon(-)hyphema
         v. Lens: clear lens (-)subluxation
      vi. IOP: OD:31mmHg OS:27mmHg (Tonopen w/ significant patient squeezing)
vii. Dilated Fundus Exam: OD within normal limits, OS as follows:
   i. Vitreous: clear, (-)Shafer’s sign
   ii. Optic Nerve: flat, sharp, good color, CD:0.4/0.4
   iii. Macula: darkened macula
   iv. Vessels: normal vessels, retinal whitening along inferior nasal arcades
   v. Periphery: flat x 360 degrees, no RD, no holes, unable to view far periphery secondary to EOM restriction

viii. Additional Tests:
   i. Maxillofacial CT without contrast: Done at ER. Slight exophthalmos of the left globe, mild straightening of the left optic nerve, question of tiny nondisplaced fracture of the left lamina papyracea
   ii. Slit Lamp Photos
   iii. OCT: (+)macular thickening OS
   iv. Fundus Photography
   v. B-Scan: (-)scleral breaks (-)retinal detachment OS
   vi. Facial Sensitivity: Equal OU, Denies Crepitus
   vii. Color Vision: 11/11 Ishihara OD, OS; 10/10 Red Cap OD, OS
   
ii. Patient HC
   i. BCVA: OD:20/20-3 OS:20/25+1
   ii. Pupils OD:Bright:3.5mm Dim:4mm OS:Bright:5mm Dim:6mm (-)APD
   iii. EOMS: FROM OU
   iv. CVF: FTFC OU
   
   v. Slit Lamp Exam: OD within normal limits, OS as follows:
      i. Lids/lashes: 2+ ecchymosis
      ii. Conjunctiva: 1+ diffuse injection, 1+ subconjunctival hemorrhage temporal and inferior
      iii. Cornea: clear, (-)Seidel’s sign
      iv. Anterior Chamber: 2+ cells (-)hypopyon(-)hyphema
      v. Lens: clear lens (-)subluxation
   
   vi. IOP: OD:15mmHg, OS:12mmHg (Goldmann)

vii. Dilated Fundus Exam: OD within normal limits, OS as follows:
   i. Vitreous: clear, (-)Shafer’s sign
   ii. Optic Nerve: flat, sharp, good color, CD:0.5/0.5, crescent- shaped subretinal blood inferior to optic nerve
   iii. Macula: flat, no macular edema
   iv. Vessels: normal vessels
   v. Periphery: inferior pigmented lattice, (-)holes

viii. Additional Tests:
   i. CT scan: Done at ER. Results within normal limits OU
   ii. External Photos
   iii. OCT: subretinal fluid inferior to optic nerve (-)retinal breaks
   iv. Fundus Photography
III. Differential diagnosis
i. Patient MC
   i. Leading: Commotio retinae w/ macular involvement, Corneal abrasion, EOM restriction secondary to excessive orbital tissue edema, subconjunctival hemorrhage
   ii. Other: Traumatic Retrobulbar Hemorrhage, Traumatic Optic Neuropathy, Carotid Cavernous Fistula, Ruptured Globe

ii. Patient HC
   i. Leading: Choroidal Rupture, Traumatic Uveitis
   ii. Other: Angioid Streaks, Lacquer Cracks, Primary Uveitis

IV. Diagnosis and discussion
i. Commotio retinae w/ macular involvement
   i. Occurs secondary to contra coup forces that mechanically disrupt the outer segment of photoreceptors.
   ii. Decreased visual acuity is observed when the macula is involved.
   iii. A grading scale for macular commotio retinae based on features seen on OCT imaging has been developed. The extent of photoreceptor damage can be determined, and in turn help estimate prognosis for visual recovery (Grade 4 has worst prognosis).
      i. Grade 1: Increased IS-OS junction reflectivity with disappearance of hyporeflective optical space
      ii. Grade 2: Cone outer segment tip (COST) defects only
      iii. Grade 3: COST and IS-OS junction defects
      iv. Grade 4: COST defects, IS-OS junction and ELM defects
      v. OCT results of patient MC correlate with Grade 1, VA will likely return to pre-injury level.
   iv. Clinical signs and BCVA typically improve around 3 months post trauma
   v. A study following outcomes of macular commotio retinae reported that 84% of patients returned to a VA better than 20/30.

ii. Corneal Abrasion
   i. One of the most common ocular emergencies
   ii. Decreased VA in patient MC can likely be attributed to a combination of macular commotio retinae and a central corneal abrasion.

iii. EOM restriction secondary to excessive chemosis of orbital tissues
   i. EOM motility is improving each day as swelling decreases
   ii. (+) forced duction testing informs us that the muscles are mechanically blocked, and innervation is not reason for decreased motility

iv. Subconjunctival hemorrhage w/ significant chemosis
   i. Traumatic subconjunctival hemorrhage is usually localized to the temporal area
   ii. Subconjunctival hemorrhage 360 degrees can be indicative of a ruptured globe.

v. Choroidal Rupture
   i. Occurs in 5-10% of blunt ocular trauma cases
   ii. Incidence is considerably higher in males vs females.
iii. Choroidal ruptures secondary to a punch will spread the force more diffusely than a projectile object and are more likely to cause peripapillary rupture. This diffusion of force leads to a better visual prognosis.

iv. One study shows that choroidal neovascular membranes form in approximately 10% of patients with choroidal rupture. This most often occurs between 1 and 18 months after the initial injury and 81.2% occur during the first 12 months.

vi. Traumatic Uveitis
   i. Typically young, male, unilateral
   ii. One of the most common diagnoses status post trauma.
   iii. Better visual outcome than non-traumatic uveitis

V. Treatment, management
i. Patient MC
   i. Commotio retinae w/ macular involvement – Monitor for resolution within 1-6 months with OCT/DFE
      i. Patient reassurance that vision will likely return to normal, emotional support secondary to reduced VA
      ii. Acuity monitoring, Amsler Grid testing
   ii. Corneal abrasion – erythromycin ointment QID OS, artificial tears q1hr, cycloplegic instilled in office, follow up daily to ensure resolution
   iii. EOM restriction secondary to excessive chemosis of orbital tissues – cool compresses QID OS, monitor closely as edema improves to ensure resolution
   iv. Subconjunctival hemorrhage – Limitations on NSAID use, avoid heavy lifting or straining, monitor closely for resolution, perform gonioscopy to rule out angle recession
   v. Lamina Papyracea Fracture – Educated on risks of infection with nose blowing.

ii. Patient HC
   i. Choroidal Rupture – Monitor closely within the first year post injury for choroidal neovascular membrane formation with OCT/DFE/Photos
   ii. Traumatic Uveitis – prednisolone acetate 1% gtt's QID OS x 7 days
      i. cycloplegic agent, steroid drops QID, very short taper of steroid drops
      ii. Perform gonioscopy to rule out angle recession

iii. References


**VI. Conclusion**

i. Ocular blunt force trauma has a spectrum of complications.

ii. Optical coherence tomography can be especially helpful in the diagnosis and management of posterior complications of ocular trauma such as commotio retinae and choroidal rupture.

iii. Several complications of blunt force trauma must be watched for years after initial event due to long term implications.