examination of the left eye revealed a small abrasion on the medial aspect of the superior lid and 2-3+ injection of the conjunctiva. Diffuse microcystic edema of the cornea with Descemet's folds inferiorly was present as well as posterior synechiae of the iris inferiorly. The lens was dislocated anteriorly contacting the inferior nasal aspect of the corneal endothelium. The anterior chamber appeared flat inferiorly with potential partial closure of the iridocorneal angle inferiorly. Intraocular pressure by Goldmann applanation tonometry was 14mmHg OD, and 24mmHg OS. Although views of the posterior segment were difficult due to debris within the anterior chamber and dislocation of the lens, dilated examination of the left eye revealed commotio retinae inferiorly and nasally, with no retinal detachment, breaks or tears. Assessment of the optic nerve revealed perfused rim tissue with distinct margins and a cup-to-disc ratio of 0.3 round.

Treatment was initiated as follows: Brimonidine 0.2% twice per day OS, Prednisolone Acetate 1% every hour OS while awake, and Cyclopentolate 1% four times per day OS. An urgent referral to a retinal specialist was made, and the patient was scheduled for evaluation the next morning.

Per ophthalmology notes, the patient’s vision was 20/250 in the affected eye upon presentation, and there were no anterior or posterior segment changes noted from the prior afternoon. The surgeon performed a pars plana vitrectomy, lensectomy, and vitrectomy.
Blinding Ocular Trauma from Fishing Accident

and prophylactic pan retinal photocoagulation in the left eye, during which several surgical complications arose. An intraoperative retinal detachment involving the macula along with a significant intraocular pressure spike occurred. Laser repair was immediately initiated to mend the detachment; however, the patient did not recover vision and was light perception only post-operatively. On multiple post-operative visits with the retinal specialist, significant anterior segment inflammation was noted, and the patient’s intraocular pressure remained elevated despite maximum topical medical therapy with hypotensive drops. The patient reported mild to severe eye pain on postoperative visits between one and fifteen days following surgery. During this time period, it was noted that the patient had an anterior chamber gas bubble, anterior chamber red blood cells, and his pressures ranged from 28-42mm Hg. Multiple vitreous taps were performed in an attempt to deepen the anterior chamber and open the angle, but no improvement in IOP was achieved. A diagnosis of glaucoma secondary to surgery was made due to the extended period in which the intraocular pressure remained elevated, leading to subsequent damage to the optic nerve. However, it is not certain whether the optic nerve atrophy can be attributed to the elevated intraocular pressure post-surgical intervention or to the blunt force trauma the patient initially endured. Once he reached 4 months after surgery, the patient consistently reported that he suffered no ocular pain.

The patient continued treatment with Brimonidine 0.2% twice per day OS and is being monitored every six months with dilated fundus examination. At his next presentation, the patient had developed an afferent pupillary defect OS.

Discussion

Ocular Trauma

Ocular sequelae from trauma include an array of conditions that can be visually devastating. The less severe findings secondary to traumatic events include hyphema, cataracts, uveitis, and iridodialysis, among many others. More serious sequelae include, but are not limited to, retinal detachments, subluxation of the crystalline lens, choroidal ruptures, orbital blowout fractures, and among the most devastating, globe ruptures and traumatic optic neuropathy. The Birmingham Eye Trauma Terminology System (BETTS) provides precise terms for ocular trauma.12 The purpose of BETTS is to streamline ocular injury reporting to the United States Eye Injury Registry (USEIR). According to BETTS, there are two major categories of ocular trauma, closed globe and open globe. These two are then broken down further into subcategories including contusions and lamellar lacerations (closed globe) and lacerations and ruptures (open globe). Lacerations under the open globe category are classified as either penetrating, perforating, or as an intraocular foreign body (see Figure 4).12 These classifications offer the ability to accurately report injuries and record appropriately in the medical record.

A discussion of all the types of ocular trauma is beyond the scope of this article. Moving forward, this discussion will focus on traumatic optic neuropathy and lens subluxation as it relates to this case and the prevalence of injury in the fishing sportsmen population.

Traumatic Lens Subluxation/Dislocation

Our patient suffered from lens dislocation from the blunt force of the jig hitting the globe. Trauma is the most common cause of lens subluxation and dislocation. Lens subluxation involves the incomplete severance of zonular fibers, while the term dislocation often indicates complete disruption of all zonular fibers resulting in a posteriorly or anteriorly displaced lens. Blunt force trauma to the eye leads to equatorial expansion of the globe, which can cause said disruption of zonular fibers. The diagnosis of lens dislocation is made based on clinical signs along with history. A CT scan can confirm the presence of a posteriorly dislocated lens, while a partially dislocated, or subluxed, lens may be visualized in the anterior chamber or close to its location of origin. Lens subluxation should be considered any time there is a misshapen pupil following a traumatic event.8 Complications of lens dislocation and subluxation can be quite severe and include secondary glaucoma, retinal detachment, and cataract formation. Marfan Syndrome and pseudoxefoliation should be considered as differential diagnoses in cases of lens dislocation or subluxation in the absence of trauma or associated with

---

**Figure 2 & 3.** Posterior segment photographs taken months after the initial insult demonstrate marked atrophy of the left optic nerve compared to the healthy appearance of the right optic nerve. The left eye is pseudophakic, while the right eye remains phakic.

**Figure 4.** BETTS classification system of ocular injuries.12
mild trauma, as both conditions can weaken zonular fibers and predispose patients to lens subluxation. Treatment of a dislocated crystalline lens is almost always surgical and involves repositioning, removing, or replacing the lens.

**Traumatic Optic Neuropathy (TON)**

It is likely that our patient suffered from traumatic optic neuropathy based on the fact that the force of the jig striking his globe was hard enough to dislocate his crystalline lens and the optic nerve developed pallor consistent with that seen in traumatic optic neuropathy. Traumatic optic neuropathy (TON) is a complex condition that most commonly results from blunt force trauma. This type of TON is known as indirect trauma, as the nerve itself is not directly injured. TON can also occur from direct disruption and destruction of optic nerve fibers from a penetrating object or bony fragment within the orbit. The mechanism of damage in cases of indirect TON may be based on the principle of transmission of forces. This theory asserts that blunt trauma causes shearing of the intracanalicular portion of the optic nerve, causing irreversible damage through axonal injury or disruption of blood supply. Another theory suggests that the optic nerve swells following trauma resulting in an ischemic event, which ultimately kills neuronal tissue. In the International Optic Nerve Trauma Study, 85% of their 127 patients with unilateral TON were male and the average age of these patients was 34±18 years. The most common causes of indirect TON in the International Optic Nerve Trauma Study were motor vehicle accidents, biking accidents, falls, and assault.

Traumatic optic neuropathy is most often unilateral, and the diagnosis is made based on patient history along with clinical presentation. Patients may present with central vision loss/blurry vision, color vision defects, visual field defects, and/or pupil abnormalities. Although rare, TON may present bilaterally, in which case an afferent pupillary defect would not be observed, although pupil cycle time would be expected to be bilaterally reduced. Early in the TON disease process, the optic nerve appears normal in color, but pallor typically becomes evident around 3-6 weeks after the initial trauma.

Patients with a history of trauma accompanied by signs and/or symptoms of TON should be evaluated with thorough imaging to rule out orbital fracture and intraocular foreign body. The most common approach to acute post-trauma imaging is computerized tomography (CT) of the orbit with axial scans through the optic canal. This imaging strategy allows visualization of the nerve to determine if there is nerve compression by a hematoma or nerve injury by bony fragments in the presence of a fracture. Management of TON patients primarily includes treatment of ocular sequelae and observation. It has been proposed that high dose corticosteroids may result in a better visual outcome in patients with TON, but studies have shown no statistically significant improvement in visual acuity with high-dose corticosteroids versus observation groups.

**Sports-Related Fishing Eye Injuries**

Our middle-aged patient suffered permanent loss of vision in one eye because of a fishing accident. Ocular trauma is the leading cause of blindness and ocular morbidity in the working-age population. Approximately 3% of emergency room visits in the United States are secondary to ocular trauma and nearly 25% of these cases are related to recreational activities. According to the US Eye Injury Registry, approximately 19.54% of all sports related eye injuries occurred as a result of fishing accidents, only second to baseball-related injuries (22.27%, see Figure 5).

Nearly 25% of all fishing-related eye injuries affect bystanders of the activity. The leading risk factors for fishing-related eye injuries are male gender and young age, with the mean age of presentation being 37 years.

The unique risks that fishing poses to the eye include blunt trauma from fishing equipment such as lures and lead weights, penetrating trauma from hooks, and even impalement from fishing poles, along with general risks such as foreign bodies and damage from UV rays. Recommendations for sports eyewear is under the jurisdiction of a nonprofit organization known as the American Society for Testing and Materials (ASTM) International. Unfortunately, we could not find an ASTM International protective eyewear standard for sports-related fishing at the time of this writing. Given the prevalence of ocular fishing injuries, the potential severity of these injuries, and the potential of ocular injury to bystanders, we believe it is important to recommend to our patients who enjoy fishing that both they and those who choose to accompany them when fishing wear polycarbonate lenses in a sturdy frame with UV protection either included in the lenses or in the form of a hat or both. Educating patients on the importance of the use of protective eyewear when fishing could make the difference between a minor incident and a severe injury resulting in the loss of an eye.

![Figure 5. Prevalence of sports-related eye injuries according to US Eye Injury Registry](Image)
Conclusion
This case reviews traumatic ocular injury secondary to a recreational activity (fishing).

Events from the trauma and sequelae from the subsequent ocular surgeries led to a visually devastating outcome due to traumatic optic neuropathy, crystalline lens dislocation, and intraoperative retinal detachment. Though some complications from ocular trauma are irreversible, it is important to properly triage and refer patients for appropriate post-event care. It is of prime importance to educate patients with recreational hobbies that could result in ocular trauma about the need for protective eyewear, particularly those in the sportsmen population.

References