Incidence of Orbital Foreign Bodies

Orbital foreign bodies may occur with any ocular or orbital injury

*Barbar TF et al. (2007)*
N = 1,105 ocular injuries
23% associated with ocular or orbital FB’s

*Appiah AP 1991*
N = 50 penetrating ocular injuries
20% with orbital foreign body

Any ocular or orbital injury should suspect a FB
If you don’t suspect it and look, you will miss it
Demographics

80% orbital FB’s occur in males

70% occur in patients less than 30 years old

25-60% of orbital foreign bodies are missed in the emergency room and on initial treatment of orbital trauma

May become evident only after the onset of late orbital complications

Delay may be months to years after the injury
Etiology

Foreign bodies usually enter the orbit in two ways:

*High velocity* – explosions, bullets, industrial accidents
Etiology

Foreign bodies usually enter the orbit in two ways:

*Low velocity* – puncture wounds, falls
Etiology

Entrance site may be through the globe, or periorbital tissues

Wound may be small and inconspicuous

40-50% penetrate through conjunctiva
Orbital tissue Injury

Can result from:

- direct trauma to structures
- mechanical compression
- hemorrhage
- edema
- late scarring
Initial Evaluation

For any ocular or orbital injury:

Evaluate for systemic injuries

Rule out associated periorbital injuries, especially intracranial

Evaluate visual status

Consider the possibility of retained foreign bodies
History

Try to determine the nature of any foreign body

Initial evaluation must include:

A detailed history of the traumatic event

*Time course of the event*

*How did the accident happen*

*Source of the FB, probable velocity*

*Any clues to the nature of the FB*

A history of the visual status prior to the injury
Examination

Rule out ruptured globe; more likely with small high velocity FB’s

35% of orbital foreign bodies are associated with penetrating globe injury
Examination

20% associated with contusion globe injuries

* vitreous hemorrhage
* comotio retinae
* retinal detachment
Examination

Comprehensive evaluation of the current visual status

Visual acuity
Visual fields
Ocular motility
IOP
Pupillary reactions
Color vision
Exophthalmometry
Levator muscle function
Examination

Search for skin/conjunctival entrance wounds

Explore wounds; fat indicates orbital penetration

Palpate for orbital rim fractures

CSF rhinorrhea, neurological exam
Symptoms of Orbital Foreign Bodies

Early findings:

- Orbital mass
- Decreased ocular motility
- Proptosis
- Orbital hemorrhage
- Decreased vision
- Pain on eye movement
Symptoms of Orbital Foreign Bodies

Late complications:

- Persistent orbital edema
- Orbital mass
- Optic neuropathy
- Orbital cellulitis
- Orbital abscess
- Orbital pain
- Orbital-cutaneous fistula
Imaging

Plain Films:
poor for localization and relationships
mainly useful to rule out metallic FB’s
Imaging

*Computed Tomography:*
most versatile imaging modality
thin section axial and direct coronal
use to rule out metallic bodies
provides 3-D relationships
wood may be missed or misdiagnosed as air
Imaging

Computed Tomography:

Associated fractures
Imaging

Computed Tomography:

Emphysema
Imaging

Computed Tomography:

Multiple foreign bodies
Imaging

Computed Tomography:

Associated intracranial injuries
Imaging

Computed Tomography:

Normal calcifications may mimic foreign bodies
Imaging

Computed Tomography:

Signs of a ruptured globe
Imaging

*Magnetic Resonance Imaging*:

Best for non-metallic and organic FB’s
Delineates anatomic detail
Localization and relation to structures
Should be avoided unless you are certain there is no ferrous metal or alloys with iron contamination

Even if the history indicates a non-metallic or organic FB, screen with plain X-rays or CT first
Magnetic Resonance Imaging:
Better than CT for imaging wood
Types of Foreign Bodies

Can be grouped by type:

**Metallic**
- bullets
- BB’s
- hammer/nail fragments
- knives
- industrial objects
- steel, iron, aluminum, lead, copper, alloys

**Non-Metallic**

**Non-Organic**
- plastics
- glass
- concrete
- pebbles

**Organic**
- wood
- vegetable matter
Types of Foreign Bodies

**Metallic material:**

- Lead can lead to systemic toxicity (rare)
- Copper often incites a major inflammatory reaction
- Iron may lead to focal absorption into the eye when adjacent to sclera
- BB’s manufactured in US are steel coated with zinc, well tolerated in the orbit
Types of Foreign Bodies

*Organic material:*

- 25% of all foreign bodies associated with infection
- 70% of these with organic material
- Up to 65% of organic FB lead to infection, abscess, osteomyelitis
Case Examples
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Case Examples

Nobe MY et al., Ophthal Plast Reconstr Surg 2010;475-9
Initial Management

Start antibiotics:
  late generation cephalosporins and aminoglycoside
  in children cover for penicillinase resistant organisms and *Hemophylus influenzae*

If wood or vegetable matter cover for anaerobics

Tetanus prophylaxis
Any Foreign Body:

Do not remove in ER unless superficial
Evaluate for globe rupture
Explore to depth of wound for superficial FB’s
Decision to remove a FB must be individualized
Any surgical removal can be associated with excessive tissue damage
Weigh risk of attempted removal vs risk of leaving the foreign body
Surgery

**Metallic and Non-Organic Materials:**

Leave the FB in the orbit if:
- inert, small, smooth, imbedded in fat, low infectious risk, posterior location

Consider removing the FB if:
- toxic, organic, sharp, large, impinging on vital structures, high infectious risk, anterior location, intracranial extension, cellulitis or abscess
Maintain high index of suspicion
Chronic infection, cellulitis suggests retained FB
Detailed history and imaging
Cover with antibiotics
Therapy is individualized
Surgery based on risks of removal vs leaving
Thank You