Seeing Double

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History of Present Illness

CC: Double Vision

HOPI: A 20-year-old collegiate wide receiver complained of double vision after making head-to-body contact with another player, causing his helmet to slide down and hit his left eye. On the sideline he reported seeing double when looking down, but not when looking up or straight ahead.

ROS: Denied blurry vision, loss of consciousness, headache, dizziness, fogginess, nausea, or pain.

Past Medical History: Significant for a concussion 1 year ago without prolonged recovery or vision symptoms.

Past Surgical History: None

Family History: Noncontributory

Physical Examination

Vitals: Stable
General: alert, oriented x 3, in no acute distress

Sideline Exam:
- Mild swelling in the left upper eyelid with vertical diplopia on downward gaze.

Locker Room Exam:
- Cranial nerves II-XII were intact except for the diplopia with downward gaze.
- Neurologic exam otherwise normal
- Extraocular movements appeared intact without nystagmus, and pupils were equal, round and reactive to light without conjunctival redness.
- Memory, concentration, and cerebellar function were intact.

Differential Diagnosis

1. **Concussion**
2. **Left periorbital contusion**
3. **Left Third, Fourth, or Sixth Cranial Nerve Palsy**
4. **Extraocular Muscle Strain**
5. **Cerebral Vascular Accident**
6. **Orbital fracture with nerve entrapment**

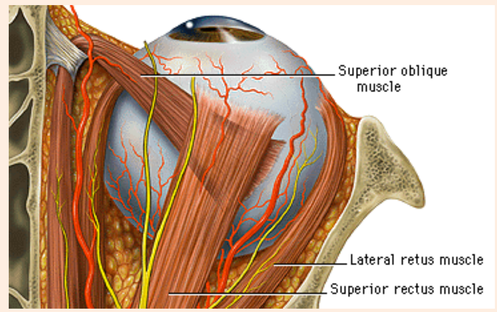
Test Results

CONCUSSION TEST	BASELINE	INJURY
SCAT 3 Symptom Evaluation	2 symptoms, "Fatigue, Trouble Falling Asleep," with severities of 1	1 symptom, "Don't Feel Right," with a severity of 1
Standardized Assessment of Concussion	27	29
Balance Error Scoring System	19	20
King-Devick Testing	34.2 secs	31.9 secs
Vestibular/Ocular Motor Screen	N/A	No symptoms provoked

CONVERGENCE TESTING	HORIZONTAL (90°) PLANE	INFERIOR (45°) PLANE
Initial Locker Room Measurements	6,6,7 cm	24,24,22 cm
Repeat Testing 45 minutes later	**7 cm**	**7.5 cm**

Anatomy

- **Origin:** Midbrain
- **Course**: Has the longest intracranial course of any cranial nerve
- **Innervation**: Superior Oblique Muscle
- **Function**: Intorsion and Depression of the eye
- **Dysfunction**: Loss of downward, inner movement of eye, dysconjugate gaze and diplopia



- The long course of the fourth cranial nerve renders it particularly prone to injury from blunt head trauma or swelling anywhere along its course.

Final Diagnosis

Transient distal trochlear nerve (CN IV) palsy

Treatment and Outcomes

- His vision returned to normal without diplopia in 45 minutes. Convergence remeasured at 7 cm in the 90° plane and 7.5 cm in the 45° plane.
- Exertional maneuvers (pushups, squats, catching passes thrown low) were performed without symptom recurrence.
- He returned to the game 1 hour from the incident without further complaints.
- Follow up visit 1 day later and throughout the next week revealed continued absence of symptoms.

Discussion

Pathophysiology:
- Traumatic fourth nerve palsies, in contrast to traumatic third and sixth nerve palsies, *may occur with a relatively mild blow to the head* (i.e. not associated with loss of consciousness or a skull fracture).[1,2]
- In this case, soft tissue swelling resulted in transient palsy.

Diagnosis:
- May present with binocular vertical diplopia and/or subjective tilting of objects (torsional diplopia). Objects viewed in primary position or *especially in down-gaze may appear double*.[1]
- Three step test ductional test can isolate muscle: (Which eye is higher? Is it worse in right or left gaze? Right or left head tilt?)
- **Differential**: Ipsilateral Depressors (superior trochlear, inferior rectus) or Contralateral Elevators (inferior oblique, superior rectus).[1]
- Isolated traumatic unilateral, bilateral CN IV palsies *do not* require additional neuroimaging.[3]

Treatment:
- Treatment for fourth nerve palsy is directed at the underlying etiology.
- Regardless of etiology (microvascular, trauma, or otherwise) 72% will resolve spontaneously within 10 months.[4]
- Surgery should not be scheduled earlier than 12 months.[5]

References

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4. Khaier A, Dawson E, Lee J. Clinical course and characteristics of acute presentation of fourth nerve paresis. J Pediatr Ophthalmol Strabismus. 2012;49(6):366-9.
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