Beyond the Basics, Bringing Concussion Out of the Dark

Objectives

- Recognize different types of concussion based on symptomatology
- Identify risk factors for prolonged recovery after a concussion
- Predict which patients may benefit from earlier referral into a pediatric concussion program
- Review treatment options for persistent symptoms of concussion

Concussion Clinical Trajectories

- A model for concussion management
  - Cognitive/fatigue
    - Decreased concentration
    - Increased distractibility
    - Difficulty learning/retaining new information
    - Decreased multitasking abilities
    - Sometimes increased fatigue as the day progresses
  - Vestibular
    - Altered ability to interpret motion
    - Difficulty coordinating head and eye movements
    - Difficulty with stabilization of vision upon head movement
    - Affect 1/3 of patients
    - Initial deficit presentation predicts prolonged recovery > one month
    - Neurocognitive vestibular motor speed deficits
  - Ocular
    - Movement of the eyes in tandem or binocular eye movement is affected
    - Difficulties bringing the eyes together
    - Difficulties with tracking motion
    - Approximately 1/3 concussions
    - Frontal headache
    - Symptoms triggered by tasks at school with math and science
    - Reaction time and visual memory effected
  - Post-traumatic migraine
    - Headaches
    - Nausea
    - Sensitivity to light or noise
    - Often take the longest to recover
    - Neurocognitive deficits in memory
- Behavior management
  - Sleep hygiene
  - Exercise
  - Hydration
  - Diet
  - Minimize stress levels
- Treat vestibular dysfunction first
  - Cervical
    - Concussive blow affects the extra-cranial region including neck and/or spinal cord
    - Whiplash type injury
    - Can cause cervicogenic dizziness
    - On-going headaches
    - Treatment with physical therapy for neck and manual mobilization and manipulation
  - Anxiety/Mood
    - Difficulties with turning thoughts off
    - Often with excessive worry or concern
    - No neurocognitive deficits

Risk Factors for Prolonged Recovery

- Participation in high risk sports
  - Soccer
  - Football
  - Hockey
- Lack of proper or properly fitted and worn safety equipment
- Female sex
  - More symptoms
  - Symptoms last longer
- Previous concussion
- Younger age >18 years
- History of learning disabilities
- History of migraine headaches
- Returning to play too quickly
- Repeat concussion
  - New injury prior to full recovery
  - Also increases the change of long-term effects from injury
Evaluation of the Complex Concussion

- Vestibular/Ocular Motor Screening (VOMS)
  - Evaluates function of systems responsible for integrating balance, vision, and movement
    - Smooth pursuits
    - Saccadic or rapid eye movements
    - Near point of convergence
    - Vestibular ocular reflex
    - Visual motion sensitivity
  - 5-10 minutes to administer

Treatment of Persistent Concussion

- Patients can experience more than one type of concussion
- Vestibular
  - Vestibular rehabilitation
- Ocular-motor
  - Vestibular therapy
  - Vision therapy – more severe impairments
- Cognitive
  - Academic accommodations
  - Behavior modification
    - Sleep hygiene
    - Optimize nutrition
    - Optimize hydration
    - Stress management
    - Stepwise progression back to exercise
    - Medication may be prescribed
      - Amantadine – off label
- Post-traumatic Migraine
  - Behavioral management
    - Sleep hygiene
    - Optimize nutrition
    - Optimize hydration
    - Stress management
    - Stepwise progression back to exercise
    - Medication may be prescribed (adolescents)
      - Amitriptyline/nortriptyline
        - Initial dose 10-25 mg QHS
        - Black box warning for increased suicidality
        - Associated sleep disturbance
- **Topiramate**
  - Initial dose 25 mg QHS x 1 week, then increase to BID
  - No sleep disturbance
- **Verapamil**
  - Initial dose 20 mg BID x 1 week, then increase to 40 mg BID
  - Associated vestibular component
- **Propranolol**
  - Initial dose 20 mg QDay x 7 days, then increase to 40 mg QDay

- **Cervical**
  - Physical therapy
    - Posture correction exercises
  - Osteopathic manipulative treatment
    - Mobilization techniques
  - Biofeedback to train patients to control pain with their mind
- **Anxiety/Mood**
  - Exertion therapy
    - Daily exercise plan
  - Psychology
    - Cognitive behavioral therapy

**Therapies Used in the Treatment of Concussion**

- **Vestibular Rehabilitation**
  - Primary function of vestibular system
    - Stabilize vision while the head moves
    - Provide information to help maintain balance
  - Symptoms addressed
    - Dizziness
    - Difficulty focusing
      - Blurring
      - Double vision
    - Difficulty maintaining balance
    - Motion sickness
    - Difficulty functioning in busy environments
  - Evaluation of deficit
    - Smooth pursuits – “H-test”
    - Vertical/Horizontal Saccades
      - Symptom provocation
    - Vertical/Horizontal gaze stability
      - Nystagmus
• Provocation of symptoms
  ▪ Ocular convergence and accomodations
    ▪ Near point of convergence < 6 mm
  ▪ Balance
    ▪ Romberg
    ▪ Balance Error Scoring System

• Exertional Therapy
  o Progressive exertion by heart rate monitoring
  o Progressive cognitive and physical demands
  o Stepwise approach

• Cognitive therapy
  o Performed by speech therapy
  o Exercises for
    ▪ Attention
    ▪ Memory
    ▪ Focus
    ▪ Comprehension

• Occupational therapy
  o Noise desensitization
  o Light desensitization
  o Organization
  o Taking
  o Ocular therapy
  o Navigating various environments
  o Stress management
    ▪ Relaxation techniques

• Ocular Therapy
  o Optometrist with specialization in neuro-optometry
  o Correct visual-motor or perceptual-cognitive deficits
  o Enhance brain’s ability to control eye alignment, teaming, and movement
  o Focusing abilities and visual processing