Physical Therapy Management of Post-Concussion Syndrome


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Outline

• Evidence Review
• Symptom/Vital Assessment
• Role of Manual Therapy
• Role of stretching/strengthening
• Sport-specific/Interval Exercise

4th International Consensus Statement on Concussion in Sport 2012

• Science of concussion is evolving
  – Recognition of individualized approach
    • Also supported by American Academy of Neurology
• Recognition of modifying factors
• Multidisciplinary approach for patients with post-concussion syndrome (PCS)
• Optimal timing of rest and/or activity is unclear
Modifying Factors (McCrory 2012)

- Female Gender
- Significance of LOC
  - > 1 minute
- Amnesia
- Convulsive Movements
- Depression
- ADD/HD

Evidence in kids?

- Currently there are NO evidence-based return to play guidelines validated for pediatric athletes after concussion (March 2014)
  - Adult model adopted from 4th International Conference on Concussion (≥ 13 yo)
- Greater amount of youth concussion medical literature in adolescents (14 recent years) (Vidal, 2012)

Table 1 | Graduated return to play protocol

<table>
<thead>
<tr>
<th>Rehabilitation stage</th>
<th>Physical activity at each stage of rehabilitation</th>
<th>Objective of each stage</th>
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</thead>
<tbody>
<tr>
<td>1. No activity</td>
<td>Complete physical and cognitive rest</td>
<td>Recovery</td>
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<tr>
<td>2. Light aerobic exercise</td>
<td>Walking, swimming or stationary cycling keeping intensity ≤ 30% maximum predicted heart rate</td>
<td>Increase heart rate</td>
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<tr>
<td>3. Sport-specific exercise</td>
<td>Stabilizing drills in ice hockey, running drills in soccer. No head impact activities</td>
<td>Add movement</td>
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<tr>
<td>4. Non-contact training drills</td>
<td>Progression to more complex training drills in football and ice hockey</td>
<td>Add cognitive load</td>
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<tr>
<td>5. Full contact practice</td>
<td>Following medical clearance and regaining normal training activities</td>
<td>Manage concussive symptoms</td>
</tr>
<tr>
<td>6. Return to play</td>
<td>Normal games play</td>
<td></td>
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</tbody>
</table>
"Typical" Return to Play Procedure

1. No Activity/Complete Rest
   • Symptoms resolve usually 24-48 hours
2. Light Aerobic Exercise (no resistance)
   • Half days → Full days of School
3. Sport-Specific Exercise
   • Increasing Aerobic Capacity, low-risk play (dribbling)
4. Non-contact Training
   • Sport-specific (position drills), Run and Jump as able
5. Full-contact Practice
6. Return to Play

What are we seeing?

• "Typical" Athlete vs Athlete with PCS
  – Typical athlete will progress through RTP stepwise progression
  – Pass all Concussion Testing
• Athlete with Post-Concussion Syndrome
  – PCS can occur in up to 14% of athletes 6-18
  • Between 20-30% at CCHMC have prolonged recovery
  – WHO = 3 or more symptoms for > 6 weeks
    • Headache, dizziness, fatigue, irritability, insomnia, concentration difficulty, memory difficulty
  – Predictors of protracted recovery (Lau, 2011)

Rehab A → Z

1. Symptoms/Vitals
   – Beginning and periodic
2. Aerobic Exercise
   – Manual Therapy
   – Stretching
   – Strengthening/Resistance
   – Sport-specific/Interval training
   – Balance/Vestibular/Oculomotor
3. Patient Education
Light Aerobic Exercise

- Growing literature
- Prolonged rest can lead to deconditioning, depression, and fatigue
- Sub-symptom exercise may be beneficial (Leddy, 2007; Leddy, 2010; Vidal, 2012)
- Consensus recommends intensity of < 70% of maximum predicted heart rate (McCrory et al., 2012)
  - Study by Leddy et al. used 80% of symptom threshold HR
Aerobic Exercise

- Mode of Exercise
  - Bike
  - Treadmill
  - Clinic Area
  - Elliptical
  - Swimming
- Intensity of Exercise
  - HR
  - Perceived Exertion
- Time

Symptom Re-assessment within session

Pay attention to:
- Headache
- Nausea
- Balance problems
- Dizziness
- Fatigue
- Sensitivity to light/sound
- Feeling slowed down
- Visual problems

Don’t pay attention to:
- Trouble falling asleep
- Sleeping more/less
- Irritability
- Sadness
- Nervousness
- Feeling more emotional

Emotionality
- More emotional
  - Sadness
  - Nervousness
  - Irritability

Cognitive Symptom
- Attention Problems
- Memory dysfunction
  - “Foginess”
- Fatigue
- Cognitive slowing

Somatic Symptom
- Visual Problems
- Dizziness
- Balance Difficulties
- Headaches
- Light Sensitivity
- Nausea

Sleep Disturbance
- Difficulty falling asleep
- Sleeping less than usual

Factor Analysis, Post-Concussion Symptoms Scale (Raskin, Lovell, Collins, 2004) on M.T. High School and University Athletes Within 7 Days of Concussion
Rehab A → Z

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Manual Therapy

- Joint Mobility
  - Upper vs Lower Cervical
  - Upper Thoracic
- Soft-tissue Mobility
  - Suboccipital region
  - Scalenes
  - Upper Trapezius
  - Levator Scapulae
  - SCM
- Headaches

Cervicogenic Headache (CEH)

- Systematic Review 2012 (Chaibi)
  - 7 RCT’s
    - Physiotherapy
    - Cervical spinal manipulative therapy (SMT)
  - RCT’s suggest that physiotherapy and SMT might be an effective treatment in management of CEH
- Other causes of headache
  - Tension-type
  - Migraine
  - Autonomic Dysfunction
**Stretching/Strengthening Exercise**

- NO Evidence in Concussion
  - Ylinen et al. 2010 RCT – Neck Ex and CEH
    - Stretching was LESS effective alone than when combined with muscle endurance and strength training
    - Focus on DNF's and Scapula
- Mechanism of Injury:
  - Whiplash
  - Rotational
- Posture Presentation

**Strength Training**

- Follow stepwise progression
  - Light resistance initially
- Set parameters
  - Sets, reps, resistance, rest times
- If asymptomatic during ex → progress
  - Need to account for cumulative effect of exercise

**Our 16 y/o football player**

- Initial plan
  - Low weight, low reps, form focused → posture
- Progression
  - Low weight, higher reps → target deficits
- Progressive resistance
  - Increasing weight and reduction in reps
- Core lifts
  - Squat, Bench, Clean, Deadlift
Sport-specific/Interval Training

• Criteria
  – Steady decline in symptoms
  – Able to remain symptom free during aerobic portion of exercise
  – Increasing resistance levels with strength exercise
• Begin with appropriate work:rest ratio
  – Example: 10 seconds on: 50 seconds off

16 y/o FB – start of interval training

• Initial plan
  – Low level agility (agility ladder, line)
    • 5 seconds: 30 seconds at BORG 11
    • Remain asymptomatic → re-assess vitals/PCSS
• Progression
  – Agility ladder → complexity of patterns (dual task)
    1. Same ratio w/ higher intensity
    2. Change ratio (10:20) at same intensity
• Sport Specific
  – 5-10 second bursts (Borg 16-18) with 30 second rest
Case Series of Active Rehabilitation

- 6 adolescents (16.5 ± 2.18 years)
- 4.6 ± 3.1 months of PCS prior to start of program
- Duration of program 6.7 ± 4.9 weeks
- Mean PCSS at start = 12.1 ± 5.8
- Mean PCSS at finish = 3.5 ± 4.1

Case Series

- Symptoms start to “finish”

Balance/Vestibular/Oculomotor

- Incorporated throughout treatment
- Initially
  - Gaze stability
    - Eye-head coordination exercise most often prescribed initially for vestibular rehabilitation after concussion (Alsalaheen 2012)
  - Convergence – “difficulty going to/from board in class”
    - “dizzy” “eye fatigue” “difficulty reading”
  - “Room is spinning” – refer on
Treatments

- Gaze Stability
  - Seated in chair, 3 feet from wall, with objects on wall 3 feet apart
  - 140 bpm on metronome
  - Go until symptomatic, rest, repeat
  - Track number of repetitions
- Beaded String
  - Focus on going far to near/near to far with beads
  - Increase sets, reps or change distance
- Saccades

Role of Dual Task

- Cognitive Domain Impairments Persist
  - Attention Problems
  - Memory dysfunction
- Supplement PT with Speech Therapy input/activities
  - Balance with retro counting
  - Postural re-education with counting by multiples
  - Immediate and Short-Term Recall
    - SCAT, Standardized Assessment of Concussion

Pitfalls of Active Rehabilitation

- Improper clinic setup
  - Time of day
  - Lighting/noise
- Reliance on symptom reporting
- Disconnect between old vs new school
- Disconnect between patient and parent
- NO GREAT EVIDENCE
**Education**

- Includes patients, parents, coaches, school, etc.…
- Balance school, activity, sports and rehab
- Coaches and parents
  - Risks of multiple concussions
  - Second impact syndrome
  - Role of proper technique in prevention
  - AWARENESS

**Return to Play Decision Making**

- Multidisciplinary Approach
  - Input from various healthcare providers
  - Progress made
  - Gradual team participation without contact
  - Eventual return if able
- Legal ramifications
  - www.knowconcussion.org
- Patient and parent EDUCATION
- Prevention and minimizing risk

**Risky Sports**

- Football
- Rugby
- Soccer
- Horseback Riding
- Martial Arts
- Cheerleading (stunt)
- Basketball
- Boxing
- Ice Hockey
- Wrestling
- Gymnastics
- Ski/snowboarding
- Lacrosse
- Baseball/softball
Role of PT with Concussion

• Diagnostic Tests and Measures
• Rehabilitation
  – Address Impairments
  – Aerobic Exercise
  – INDIVIDUALIZED
    • Continuously “Evolving”
• EDUCATION!!!

Putting it all together…

• No protocol available
• Individualized and evolving treatments
• Sub-symptom aerobic exercise is beneficial and SAFE
• PT can address additional impairments
• EDUCATION

References


References


