The role of active rehabilitation: taking a targeted approach to therapy

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Key questions

Why does timing of return to play (RTP) matter?

How do you know when the athlete is ready to RTP?

How do you approach cases that don’t recover as expected?
Why does timing of RTP matter?
Changes in the brain – neurometabolic cascade

Giza & Hovda, 2001
Challenges

Spectrum of injury

Multiple domains are affected

Recover independently

- Symptoms can recover before other deficits
- 30% of asymptomatic players still have measurable cognitive deficits (Makdissi et al AJSM, 2010)
- Equivalent to BAC 0.05% or 24 hours sustained wakefulness (Faletti et al J Sleep Res, 2003)
Increased risk with premature return and continued participation

(Impaired performance)

Increased risk of other injury
- 60% increased risk of MSK injury within 12 months (Cross & Kemp BJSM)
- Odds of lower limb injury 2.48 times higher in the first 90 days (Brooks et al AJSM)

Prolonged symptoms

?Long-term complications (mental & cognitive health)

“Period of vulnerability”
Implication

Must err on side of caution

Be conservative (both at the time of diagnosis and return to play)
How do you know when the athlete is ready to RTP?
Return to play when clinically recovered

BUT

No perfect tool/direct measures of recovery
Most concussion tests are measuring things that are not specific to concussion (e.g. symptoms)
Measuring recovery

Use a multifaceted clinical approach
◦ Symptoms
◦ Balance
◦ Cognitive function
◦ Other domains (as relevant)

Stepwise graded return to play
◦ Allows detection of recurrent clinical features with increasing physical/cognitive stress
Symptoms

Everyone “feels fine/ok”

Ask:
  ◦ “On a scale of 0 to 100%, how do you feel?”
  ◦ “If not 100%, why?”

Use a graded symptom checklist (e.g. SCAT5)
Testing balance

Modified balance error scoring system (BESS)

Objective measure

Returned to baseline by 72 hours post injury
Testing the cognitive injury – why?

Cognitive deficits in a range of domains observed following concussion (e.g. reaction time, memory, information processing, etc)

Provides an objective assessment of recovery (and overcomes the reliance on symptoms)
Testing the cognitive injury – what?

Simple neurocognitive tests (e.g. SCAT5)

Pros:
◦ Inexpensive
◦ Can be done by a trained health care practitioner

Cons
◦ Likely to have ceiling effects
Testing the cognitive injury – what?

Computerised test batteries
(e.g. CogState Sport, ImPACT, etc.)

- Who should interpret these
- Test re-test reliability
  - Dependent on test interval (72 hours vs 1 year)
Testing the cognitive injury – when?

Baseline
- Utility in question
- Still recommended (especially in elite environment)
- Assists education

Post-injury
- SCAT5 serially
- Computerised NP test when asymptomatic
- Formal NP tests in special cases (e.g. delayed recovery)
Testing the cognitive injury

Important to note that neuropsychological testing is only one component of the assessment and is not the sole basis for management decisions.
Return to play
Return to play

**Brief** period (24-48 hours) of physical and cognitive rest to allow symptoms to settle

Encourage early sub-symptom threshold activity

Step wise return to training
- Symptom free
- Return to learn/study/work
Step wise return

Typically – 24 hours (or more) for each step

Monitor symptoms
  ◦ If symptom recurrence – go back to previous symptom free stage
Important considerations

More conservative approach to return to play is appropriate in
Children/adolescent athletes
  ◦ Often take longer to recover
  ◦ Developing brain
Multiple concussions
Prolonged symptoms (>10-14 days)
How do you approach cases that don’t recover as expected?
Expected timeframes of recovery

10-14 days for adults (80-90% of cases)
Up to 4 weeks for children/adolescents (~50% of cases)
Predictors of prolonged recovery

Acute/subacute symptom burden

Pre-injury history of mental health problems (anxiety, depression)

Age (teenagers appear to take longer to recover)

Previous concussion (number, recency, etc)
Key concepts – prolonged symptoms

Symptoms are non-specific (e.g. headache, fatigue, etc)

Not a single diagnosis

Multiple contributing factors

◦ Persistent changes affecting the brain (connectivity, cerebral blood flow, etc)
◦ Co-existing pathologies (e.g. cervical spine injury)
◦ Confounding pathologies/secondary morbidities (e.g. anxiety, depression, etc)
Management of prolonged symptoms

Try to identify contributing/co-existing conditions
- Headache syndromes
- Cervical spine
- Vestibular/oculomotor deficits
- Persistent brain deficits (neuropsychological testing)

Requires multi-system, multimodal assessment
Focused history

Pre-morbid status (e.g. depression, anxiety, migraines, etc.)
Symptoms: should extend beyond the standard post-concussion graded symptom checklist
Consider use of depression/anxiety questionnaires
Targeted physical examination

 Including clinical assessment of
 ◦ Cervical spine
 ◦ Vestibular function
 ◦ Ocular-motor function, etc
 Others: autonomic dysfunction
Special tests

Graded aerobic exercise test for evaluation of exercise tolerance
  ◦ Buffalo Concussion treadmill test
Formal neuropsychological testing
Standard sequence MRI

Rule out underlying structural head injury

Cautions
- Very low yield
- Be prepared for incidental findings
Treatment

Treat any pathologies identified

- Assessment should drive treatment decisions
- It is not a case of one treatment fits all
Rest versus activity

Limited evidence for further rest

Consistent preliminary evidence for:

- Individualised sub-symptom threshold activity (in patients who demonstrate physiological changes on graded treadmill testing)
- All demonstrated reduction in symptoms & improvement in exercise tolerance
Targeted therapy

Physical therapy/rehabilitation
- Greater improvement in patients with cervical and/or vestibular cause of symptoms identified on clinical examination

Cognitive Behavioral Therapy
- Beneficial when added to treatment of patients with persistent symptoms
Pharmacotherapy

Low quality evidence for
- Amantadine
- Local anaesthetic nerve blocks for persistent headaches
- Amitriptyline for persistent headaches
Requires a collaborative multi-disciplinary approach
Build specialist network
Why does timing of return to play (RTP) matter?

To reduce the risks associated with concussion and premature return
How do you know when the athlete is ready to RTP?

Use a multi-faceted assessment
- Symptoms, balance, cognitive function
- Don’t forget other domains

Understand that these are all indirect measures

Combine with a graded return to sport (with monitoring)

Be conservative (especially in children, multiple concussions)
How do you approach cases that don’t recover as expected?

Identify contributing/co-existing conditions

Treat any pathologies identified
  ◦ Assessment should drive treatment decisions

The benefit of further rest is limited

Emerging evidence for
  ◦ Individualised sub-symptom threshold activity
    ◦ Targeted therapy (physio/rehab/CBT)
    ◦ Limited evidence for use of medications

A multidisciplinary approach is critical
Thank you