Principles of Rehabilitation

Combining the art and science of medicine

Rehabilitation

- Where does ‘treatment’ stop and ‘rehabilitation’ start?
- Difference between pain-free daily living (absence of disease) and function at the desired, previous level (true ‘health’)
- Without it:
  - prone to reinjury
  - substandard sporting performance
- Predisposed to injury

Rehabilitation

- Ankle
- Knowledge on correct exercises etc
- Rehabilitation Checks:
  - ROM
  - Proprioception
  - Strength
Learning Objectives

• Describe key elements of sports medicine rehabilitation
• Provide a background for discussing these issues with athletes and the sports medicine team

Principles of Rehabilitation

Elements of successful rehabilitation:
1. Accurate baseline assessment
2. Individualised, supervised program
3. Precise prescription
4. Optimise use of available facilities
5. Begin early

Successful Rehabilitation Program Elements

• muscle conditioning
• flexibility
• proprioception training
• functional exercises
• sport skills (graded)
• correction of poor biomechanics
• cardiovascular fitness maintenance
• psychology
• nutritional advice
Muscle Conditioning
1. Specific adaptation to imposed demand (SAID)
   – Injury specific
   – Sport-specific

Muscle Conditioning
2. Overload
   – Resistance
   – Number of repetitions
   – Frequency or duration of workouts
   – Altering the form of exercise (pattern)
   – Altering the range of motion

Aims for Muscle Rehabilitation
Muscle conditioning - 4 components
• Strength
• Power
• Endurance
• Motor re-education or ‘patterning’
Understanding Terms in Muscle Rehabilitation

Exercises categorised as…
  • Isometric
  • Isotonic
  • Isokinetic

And each of these may be done in an 'open-chain' or 'closed-chain' fashion

Usage of Different Types of Exercises?

Isometric
  • Early after injury
  • Where full ROM is contraindicated (after patellar dislocation, shoulder dislocation)
  • Done by holding for 5 s with rest 10 s
  • Repeat during day in sets of 10
  • Need to do at multiple angles if possible
  • Logical progression to ROM exercises

Usage of Different Types of Exercises?

Isotonic
  • ‘tonic’ – tone – consistent weight or resistance
  • Think of the usual gym exercise: bicep curl
  • Two types: concentric, eccentric
    – Concentric: origin and insertion approximate
      Individual muscle fibres shorten
    – Eccentric: origin and insertion separate
      Individual muscle fibres lengthen under load
Muscle Rehabilitation

- Isotonic exercise is the most common type of exercise used in rehabilitation.
- Provides the mainstay of the progression which aims to improve muscle strength, power, endurance and appropriate patterning.

Usage of Different Types of Exercises?

Isokinetic
- 'kinetic' – constant speed
- Must provide variable resistance
- Enables the athlete to do more work than is possible with isotonic program
- Was popular as a measure of muscle function in rehab but is being used less as functional testing is gaining popularity

Open / Closed Chain Exercise

- Refers to whether the limb is fixed against a ground reaction force or not
- Open chain exercises permit isolated muscle contraction
- Closed chain causes coactivation of agonists / antagonists, both strengthened simultaneously, mimics real life
Muscle Power Training

- Rate of doing work
- ‘Explosive strength’
- Later stage of rehabilitation
  - Fast speed isotonic / isokinetic
  - Fast speed functional exercises
  - Plyometric activities
    - Hopping, bounding, depth jumping

Muscle Endurance Training

- Ability to sustain contraction or perform repeated contraction
- Stationary bike
- Swimming
- Low load, high repetition circuit training

Motor Re-Education

Also called ‘motor patterning’
- Involves appropriate contraction of ‘local’ muscles (small stabilising muscles)
- ‘Global muscles’ – large, torque-producing muscles
- Behind the concept of ‘core’ strengthening

Motor re-education is very important for:
- Shoulder region (‘scapular stabilisation’)
- Groin and pelvis (‘core stability’)
- Low back pain
Review of Muscle Conditioning

2 basic principles
• Specific adaptation (SAID)
• Overload

4 components of muscle conditioning
• Strength, power, endurance, motor patterning

3 types of exercise
• Isometric, isotonic, isokinetic

Open or closed chain

Successful Rehabilitation Program Elements

• muscle conditioning • correction of poor biomechanics
• flexibility • cardiovascular fitness maintenance
• proprioception training • psychology
• functional exercises • nutritional advice
• sport skills (graded)

Flexibility

Joint Range of Motion
• CPM, passive mobilisation, passive exercises, active exercise, active-assisted

Musculotendinous Flexibility
• Stretching (note, this is for rehabilitation, not for primary prevention)
Proprioception Training

Sensory awareness of the position of body parts with or without movement.
• Affected in acute and overuse injuries
• Train early in rehabilitation process
• Progression includes weightbearing, WB with movement of other parts, eventually closing eyes, then adding movement
• Table - page 175 of Clinical Sports Medicine

Functional Exercises

Regain muscle condition, flexibility, and proprioception...
• reintroduce the functional activities that form the basis of the sport
• ‘knowing the sport’ is key
• Ballet - knee bends, hamstring stretches, hip rotations, trunk extension, flexion

Page 176 - Functional Exercises after Serious Lower Leg injury

• Walking  • Sprinting
• Jogging  • Figure of 8
• Running  • Agility drills
Sport Skills

• Gradation from ‘functional rehabilitation’
• Integrated tasks
• More fun, provides Specific overload (SAID)
• Incorporates proprioceptive component
• May incorporate flexibility training depending on the sport

Understand the Sport

Ballet:
• floor barre before barre,
• then ‘centre’ then allegro (faster, with jumps, turns)

• Basketball, tennis examples
 (Clinical Sports Medicine - page 177)

Further Rehabilitation Elements

• Correction of biomechanical abnormalities
• Cardiovascular fitness
  – Pool running
  – Stationary rowing
  – Cycling
‘Return to Sport’

Criteria for return to sport
• Biological time-constraints met
• Pain-free full range of motion
• No persistent swelling
• Adequate muscle condition
• Adequate proprioception / flexibility
• Cardiovascular fitness
• Skills regained, biomechanics appropriate
• Athlete and coach ready

Relative Contraindications

• Persistent recurrent swelling
• Joint instability
• Loss of joint range of motion
• Lack of full muscle strength

4 Key Points – Often Overlooked

Rehab must continue after athlete returns to sport!!!
Summary

- Described key elements of sports medicine rehabilitation
- Muscle conditioning, regaining proprioception and flexibility, graded incorporation of functional exercises with sport-specific activities
- Emphasised a comprehensive, holistic approach
- Underscored that rehabilitation must continue after return to sport