Introduction

Return to Play:
- the point in recovery from an injury when a person is safely able to go back to playing sports or participating in an activity at a pre-injury level.

What we know
- No one likes to be sidelined with an injury.
- One of the goals of sports medicine is to try to get an athlete back into action as soon as possible.
- Returning too soon, before adequate healing or recovery has taken place, can put the athlete at risk for re-injury and possibly an even longer down time.
Goal

- Safely accelerate return to play
- early diagnosis
- appropriate medical treatment
- comprehensive staged rehabilitation program

A Lesson From the Pros

- Why does it seem that professional athletes return to play so much faster than the average person or athlete?
  - they are in tremendous physical condition
    - helps prevent injuries, lessen the severity of an injury, and speed recovery
  - they get prompt treatment when an injury occurs
    - early diagnosis & treatment means less swelling, stiffness, and muscle atrophy
    - rehabilitation begins with a physical therapist or certified athletic trainer as soon as medically possible
  - they bring the same intensity and focus to their recovery as they do to their sport

Systematic Recovery Plan

1: minimize swelling (RICE), decrease pain, limit activities, maintain overall conditioning
2: regain full motion injured limb or joint
3: regain normal strength
4: functional drills, endurance, agility
5: sports specific movement patterns
6: practice
7: return to competition
Return to Play: Expectations vs. Reality

Benchmark for returning an athlete back to play after an ACL tear is surgical reconstruction.

Expectations of ACLR surgery:
- to eliminate functional instability, decreasing the risk of subsequent injury to the menisci and articular cartilage
- restore normal knee kinematics
- eliminate the increased risk of OA
- allow resumption of all activities at pre-injury levels

- 48 studies, 5,770 patients ACLR
- 90% normal laxity and strength
- 82% returned to some kind of sports
- 63% participating at pre-injury level
- 44% returned to competitive sport
- Most common reason for limited RTP: fear of re-injury.
Preoperative Factors Affecting RTP

- Age
  - Older athletes have lower rate of RTP
- Preoperative rehab (prehab)
  - Decrease pain, swelling and inflammation
  - Restore normal ROM (full extension)
  - Improve neuromuscular control
  - Normalize gait
  - Prevent muscle atrophy
  - Improved post-op results
- Don’t operate on a stiff knee
  - Increased risk of arthrofibrosis
  - Optimal timing for surgery is after the knee has “settled down” and motion has been restored

Intraoperative Factors Affecting RTP

- Anatomic graft position and tension
  - anatomic graft placement and appropriate tension is critical for successful outcome
- Graft choice
  - Ideal graft:
    - adequate biomechanical properties
    - allows for secure fixation
    - minimal morbidity
    - reproduces native ACL anatomy
    - restores normal knee kinematics
    - timely RTP
    - low re-rupture rate

Quadrupled hamstring autograft
Intraoperative Factors Affecting RTP

- **Graft choice**
  - **B-PT-B autograft**
    - Pros: excellent strength and stiffness, stable interference screw fixation allowing rapid (6-8 wks) bone to bone healing and early rehab, good long term track record in elite athletes
    - Cons: harvest site morbidity – post-op pain, possible long term discomfort with kneeling, risk of patella fx

- **Hamstring autograft**
  - Pros: cosmesis, less harvest site morbidity, use skeletally immature
  - Cons: delayed incorporation (8-12 wks) and maturation, residual hamstring weakness, increased re-rupture rate in females, tend to stretch out in patients with GLL, poorer results with graft constructs <8mm diameter

- **Allografts (BPTB, hamstring, achilles, tib. anterior)**
  - Pros: cosmesis, no donor site morbidity, shorter OR times, revision surgery, multi-ligament knee injuries
  - Cons: cost, increased re-rupture rate in younger active patients, risk of disease transmission, longer incorporation and maturation times
Postoperative Factors Affecting RTP

- Accelerated Rehabilitation Protocol
  - 1st described by Shelbourne and Nitz for BPTB auto ACLR (1992)
  - increased rate of progression through the various phases of rehab
  - modified version described by Wilk et al widely adopted
  - 5 phases (time to complete each phase different for each patient)
  - specific criteria must be met before advancement to the next phase
  - clinical exam (ROM, effusion, strength, stability), neuromuscular control, proprioception, endurance, functional testing, subjective knee scores
Postoperative Factors Affecting RTP

- Accelerated Rehabilitation Protocol
  - there remains a lack of level I and II studies on accelerated rehab and RTP following ACLR
  - Fujimoto et al reported this protocol in hamstring patients may lead to graft laxity

Postoperative Factors Affecting RTP

- Understanding the Accelerated Rehab Protocol
  - ACL provides 85% of total resistance to anterior tibial translation
  - Quadriceps contraction:
    - anterior directed force on the proximal tibia between 0° - 60° of knee flexion (loading the ACL)
    - posteriorly directed force with knee in >60° flexion (unloading the ACL)
  - Hamstring contracture:
    - posterior directed force on proximal end of tibia throughout full range of knee flexion (unloading the ACL), especially at higher degrees of knee flexion
Postoperative Factors Affecting RTP

Understanding the Accelerated Rehab Protocol

- When performing various exercises, the relative activation of both the quad and hamstring has the ability to change the load sustained by the ACL.
- For all exercises, the ACL is loaded to a greater extent between 10° - 50°, with peak loading occurring 10° - 30°. ACL loading progressively decreases from 30° - 60° of knee flexion, with no ACL loading occurring at angles beyond 60°.

- NWB (open chain) exercises generally load the ACL more than WB (closed chain) exercises.
- WB exercises recruit important muscle groups at the hip and knee that serve to help control LE alignment and enhance proprioception.

- External resistance does not increase ACL loading during WB exercises (in contrast to NWB knee extension exercises).
- Minimizing ACL loads during WB exercises:
  - Forward trunk tilt 30° - 40° (recruits hamstrings)
  - Keeping heels on the ground (not elevated)
  - Keeping knees from extending beyond toes more than 8-10cm
  - Ensure proper limb alignment in the transverse and frontal planes
Postoperative Factors Affecting RTP

- Understanding the Accelerated Rehab Protocol
  - Adjust Rehab:
    - additional pathology
    - graft selection:
      - protect autograft donor site
      - graft incorporation (tunnel healing)
    - graft maturation (ligamentization)
      - weakest at approximately 2-3 months post-op
    - graft maturation:
      - BPTB autograft 12 months
      - Hamstring allograft 18 months
      - Allografts 24 months
  - Timeframe for graft incorporation:
    - BPTB auto 6-8 weeks
    - Hamstring auto 8-12 weeks

Postoperative Factors Affecting RTP

- Objective Criteria as Guidelines for RTP
  - Barber-Westin, Noyes: Factors used to determine return to unrestricted sports activities after ACLR. Arthroscopy 2011.
    - Systematic review 264 studies
    - 40% failed to provide any measure for RTP after ACLR.
    - Only 13% included objective criteria
Post-op ACLR Return To Play Issues

- Objective criteria for return to play
  - Hop testing
  - Isokinetic strength testing (Biodex)
  - Laxity testing (KT1000)
  - Vertical drop test

Return To Play after ACLR

Decision Making is Multifactorial:

- Time from Surgery: graft incorporation and maturation
- Physical Exam: ROM, swelling, stability, strength
- Rehabilitation: patient specific, advance through all stages
- Objective Measures: biodex, hop test, vertical drop test, etc.
- Psychological Factors: fear of re-injury may be the single greatest reason delaying RTP

Functional Bracing after RTP

Controversial

- Studies show that the use of braces can improve early coordination and jumping mechanics, while providing a positive psychological effect
- Prevent recurrent ACL injury in skiers
- Other studies have shown no increase in stability and may decrease speed and turning quickness
Risk of Reinjury Following ACLR

- Graft re-rupture rates after RTP range from 5% - 25%
- Risk factors:
  - MOON Cohort Study:
    - 2,683 ACLR: 4.4% ipsilateral retear, 3.5% contralateral tear
    - Risk factors: younger athletes, higher activity level, allografts
  - Additional Studies:
    - Male gender, (+) family history ACL injury
    - Hamstring autograft (?)
    - Biomechanical factors:
      - Dynamic valgus on vertical drop test
      - Valgus malalignment
      - Increased hip rotation moment

Risk of Reinjury Following ACLR

- Contralateral ACL tears
- Risk Factors:
  - Younger age, higher activity level
  - Failure to achieve full strength and neuromuscular control before RTP
  - Female gender
  - (+) family history ACL injury
  - Return to pre-injury sport
  - ACLR with BPTB autograft

Injury Prevention Programs

- KLIP (knee ligament injury prevention program)
- PEP (prevent injury and enhance performance)
- Sportsmetrics
  - 4 components (dynamic warm up, jump training, strength training, flexibility)
- FIFA 11+
Injury Prevention Programs


Injury Prevention Programs
Remember

- There is often tremendous pressure to get the athlete back to competition as soon as possible.
- The athlete's health and safety must be placed above all other concerns.
THANK YOU