Functional Testing for Return to Sports

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When are athletes ready for return to sports???

- Post ACL reconstruction, average time to return to sport is 7 mos, but some as early as 2 mos? and as long as 24 months
- Graft healing progresses from remodeling to maturation phase by 6 mos.
- Different injuries and different surgeries will require different RTS times.

Important Factors Involved in Return to Sport

- Subjective questionnaires
- Clinical exam: full ROM, no effusion, stability
- Isokinetic/Strength Testing
- Functional Testing
Goals and Skill Acquisition for RTS

- The ability to equalize ground reaction forces between extremities.
- Improved confidence and stability with high intensity activities involving change of direction.
- Improved and equalizing power and endurance between extremities.
- Demonstrate safe biomechanics (increased knee and hip flexion and decreased knee abduction angles) when performing high intensity plyometric activities.

So how do we know they are ready??

- There has been a shift from a time based return to play criteria to guidelines that are based on function. The hope is to decrease the likelihood of failure due to insufficient rehabilitation.
- Data shows significant failure rate in young athletes in the 4-9 mos period following most commonly ACL repairs.

Univ of Pittsburg Medical Center Guidelines for RTS

- Achieves >90% on strength assessments
- Displays normal running pattern that does not increase pain
- Has practiced and displays no hesitation or compensation strategies during agility drills, especially decelerating when performed at 100%
- Has practiced and displays normal loading and soft athletic landings
- Has practiced and displays no hesitation or compensation strategies during cutting drills, especially deceleration when performed at 100%

Functional Testing Following Injury/Surgery

- Developed with the goal to incorporate kinetic chain activities that mimic functional activities and correlates to sports to include: strength, agility, power, balance and neuromuscular control.
- It is recommended and can be used in conjunction with other tests to test for dynamic function and determine athlete readiness for RTS.
- Provides objective measures to determine athletes readiness RTS.
- Can lead to decreased re-injury risk for athletes.
UPMC RTS Test (Involved/Uninvolved)

- Single leg broad jump landing 1 foot
- Triple broad jump, landing last jump on 1 foot
- Single leg forward hop
- Single leg triple hop
- Single leg triple crossover hop
- Timed 6m single leg hop
- Single leg lateral hop
- Single leg medial hop
- Single leg medial rotating hop
- Single leg lateral rotating hop
- Single leg vertical hop
- 10 yard lower extremity functional test (sprint, back peddle, shuffle, carioca, sprint)
- 10 yard pro-agility run

International Knee Documentation Committee (IKDC) – Subjective Knee Form

- IKDC subjective knee form is a reliable and valid tool for the athlete to subjectively rate their knee symptoms, function, and ability to return to sport following knee injury.
- IKDC score= sum of items/87 (max poss score) X 100
- Higher scores represent higher levels of function.
- IDKC score > 70 indicates higher functional abilities and readiness to enter RTS phase of rehab or RTS.
- IDKC score < 70 may indicate that an athlete in in need of extra rehab and recovery time prior to RTS.
- www.sportsmed.org

Documentation and Testing for RTS

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Hop Testing

• Most commonly reported functional test following ACL surgery that provides a reliable and valid outcome measure.
• Side to side imbalances in strength, flexibility and coordination may be a predictor of risk of injury.
• Side to side imbalances may increase risk to both limbs.

Single Leg Hop for Distance

6M Timed Hop
Triple Hop for Distance
(nearest .01sec)

Unsuccessful Hop

• Touching down of contralateral leg
• Touching down of either upper extremity
• Loss of balance
• An additional hop on landing

Crossover Hop for Distance

Testing

• 3 trials each
• Limb Symmetry Index: mean of involved/mean of uninvolved X 100
• Previous desired results: involved 85% of uninvolved.
• New desired results: involved 90% of uninvolved.
Y Balance Test

• Reliable test for measuring single leg stance excursion distances while performing dynamic balance testing.
• Easy way to test motor control and demonstrate functional limb symmetry
• Highly accurate and high ability to predict future extremity injury.

Performance Y Balance Test

• Performed no shoes
• 3 trials all directions
  • anterior uninvolved then involved
  • posterior medial uninvolved then involved
  • posterior lateral uninvolved then involved

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Performance Y Balance Test
Posterior Lateral Excursion

Y Balance Test Scoring
- Mean of each direction for each limb
- Statistically the difference from side to side should be less than 4cm for return to sport or a participating screen.
- Can figure a percentage of involved/uninvolved × 100

Y Balance Test Failures
- Unable to maintain stance on platform
- Failure to maintain reach foot contact (no kicking)
- Placing foot on top of pushing block or using it for stance support.
- Failure to return reach foot back

Single Limb Vertical Power Hop
- Vertical jump correlates with max isometric peak force, 1rep max squat, ground reaction forces in eccentric and concentric phases, knee extensor muscle strength and relative quad strength.
- Performance:
  - Athlete jumps as high as they can with one leg, height is recorded. Can be done from standing or taking a counterstep.
- Controversy: It has been proposed that the more important factor is the ability to absorb forces than to produce it in knee function.
Drop-Jump Test (Sportsmetrics)

- General assessment of lower limb position, poor control on landing and acceleration into a vertical jump.
- Studies show that valgus lower limb alignment commonly occurs during non contact ACL injuries, either with landing a jump or accelerating into a jump.
- Performance:
  - Athlete stands on a 30cm box, athlete jumps down and immediately jumps vertical into the air upon landing.
  - Knee separation and landing mechanics are observed.

Tuck Jump

- Useful in identifying extremity valgus and side to side differences.
- Valgus torques on the knee can significantly increase tibial subluxation and load on the ACL.
- Performance:
  - Athlete performs repeated tuck jumps for 10 sec.
  - Evaluating 8 different items, grading from never (0) to always (10).

Modified Agility T-Test

- Tests symmetry during agility performance
- More accurate than the standard T-Test
- Isolates involved side deficits during a multi directional agility test with four 90 degree cuts.
- Goal: 10% symmetry in time.
Return to Sports

- Ultimately we need MD clearance.
- We also need to make sure our athletes are fully prepared for RTS before their full release back to sport.
- Progression back to sport should involve: functional testing with progression to non-contact practice, to contact practice at 100% effort without any increased pain, edema, warmth or episodes of giving way, with progression to competition.
- Something to think about: is it more important to get athletes back quickly with high risk of re-injury or to get our athletes to reach their fullest rehab potential prior to RTS decreasing the chances for re-injury.

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