KEEPING YOUR ATHLETES ON THE FIELD AFTER ACL SURGERY

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» BEFORE WE START
  » Thanks to...
  » Very little is original thought
  » “If we train muscles, we forget movement.
      If we train movement, we will NEVER forget muscles!”
  » Trust those who seek the truth. Be wary of those who have found it.”
OBJECTIVES

» Research & Trends in knee injuries & sport
» Bridging the gap through science & practical application
» Simple strategies I use for injured athletes
» Progression charts to use next week

Sit-ups vs. Core Stabilization in Army Recruits

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Results: Both groups demonstrated significant improvements in sit-up performance and overall fitness scores over time (P < 0.001). There were no significant between-group differences in overall fitness scores (P = 0.142) or sit-up performance (P = 0.543). However, CSEP resulted in a significant improvement in sit-up passing rates by 5.6% compared with 3.9% for the TEP group (P = 0.004).

Conclusions: CSEP did not have a detrimental impact on sit-up performance or overall fitness scores. There are a number of key findings to note from this study. First, sit-up performance was significantly improved by CSEP. Second, CSEP has a small but significant impact on sit-up passing rates. Finally, CSEP can be implemented within the Army's physical training program without compromising performance on other fitness tests.
ACL FACTS AT A GLANCE
» over 100,000 / year
» $24,000
» osteoarthritis 10x greater
» females 4-6x greater chance after puberty
» lower leg asymmetry increases prevalence
» 70% non-contact

WHY DOES THE ACL TEAR?
WHAT ARE THE FACTORS?
» Environmental
» Neuromuscular
» Structural
» Hormonal

Greatest risk when the knee is hyper extended, the distal aspect of the tibia is externally rotated, and the femur is internally rotated.
STRUCTURAL / HORMONAL FACTORS

- Pelvis anatomy
- Femoral Notch
- Size of ACL
- Menstrual Cycle
- Lower Testosterone

ENVIRONMENTAL / NEUROMUSCULAR FACTORS

- Controlled vs Chaos
- Quad Dominance
- Muscle Weakness
- Lack of Eccentric Strength
- GRF
- NM Fatigue
- 3-D Control
- Immobility in Hips/Ankles
- Psychological
Deficits in Neuromuscular Control of the Trunk Predict Knee Injury Risk (Zazulak et al, 2007)
—With factors related to core stability, the researchers could predict knee, ligament and ACL injuries

Neuromuscular Responses in Individuals with ACL Repair (Madhavan & Smith, 2010)
—ACLR subjects showed impaired responses to perturbation & altered EMG

Biomechanical measures of neuromuscular control and valgus loading of the knee predict anterior cruciate ligament injury in female athletes: a prospective study (Hewett et al, 2005)
—Female athletes with increased dynamic valgus and high abduction loads are at increased risk of anterior cruciate ligament injury.

Quadriceps & hamstring fatigue alters hip & knee mechanics (Thomas et al, 2010)
—Muscle fatigue produced leg patterns which compromise the ACL. There were no sex differences

Fatigue-induced ACL injury risk stems from a degradation in central control (McLean, 2009)
—Fatiguing a single leg also affects the contralateral leg

Squat generates twice the hamstring activity compared to leg press and knee extension

EMG in squat, quads fired simultaneously
—Rectus Fem fired first while VMO fired last AND at smaller amplitude

ACL joint forces during isokinetic knee extensions: a case study (Chow et al, 1999)
—Hinomeral shear F's also showed ACL loaded throughout ROM. Also as speed increases, F's decrease

Radiographic findings in restrained hip joints associated with ACL rupture (Silva-Gomes et al, 2010)
—Early specialization can change the structure of the hip leading to compromised knee mechanics

Neuromuscular Performance Characteristics in Elite Female Athletes (Huston et al, 1996)
—The female athletes appeared to rely more on their quadriceps muscles in response to anterior tibial translation.

Correlation of the intercondylar notch width of the femur to the width of the anterior and posterior cruciate ligaments (Davis et al, 1999)
—The mean ACL width was 5.7 mm for women and 7.1 mm for men. Our results indicate that NW correlates with ACL and PCL width. In addition, ACL widths are narrower in women.
SUMMING UP THE RESEARCH

- Quality control
- Good quality movement / kinesthetic awareness
- Work through the whole continuum

<table>
<thead>
<tr>
<th>static</th>
<th>dynamic</th>
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<tbody>
<tr>
<td>strength / power</td>
<td>endurance</td>
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- Symmetry
- Gravity is good
- Don’t isolate
- Stretch what needs to be stretched
- Don’t specialize too early...have a plan

Data sheet used to test & retest on given movements / exercises
- This on top of what is expected by the physio is my litmus test
- video tape for immediate feedback

MY FINDINGS THROUGH THE YEARS

- Non-contact ACL
  - movement dysfunction in “good” leg
  - over 90% damage in dominant leg
  - End of match / game
- FMS
  - PU & RS issues
- Strength
  - Weak Hips / Core
  - Weak UE
ACL training….or is it just good training?

» Proper warm up
  » SMR, breathing, mobility work
  » Plyometric progressions
  » Movement / Strength training
  » Conditioning
  » Homework
  » hot / cold plunges, mobility / movement work, breathing, nutrition, sleep etc.

WHAT NEXT?

» “Kids (and their parents) don’t care how much you know until they know how much you care!”
» Educate the player / parents
  » Smart progressions
  » Make it fun!
BOXES USE THESE TO TAKE GRAVITY OUT OF THE EQUATION
TAKE OFF MECHANICS ECCENTRIC
LANDING CONTROL THE LOADING OF TISSUE
LANDING MECHANICS

PHASE 2
ADD GRAVITY BACK INTO THE EQUATION

PHASE 3
ADD STRETCH SHORTENING CYCLE MINI HURDLES ADDED IN WITH A “BUNNY HOP”

PHASE 4
TRUE PLYOMETRICS EXPLOSIVE MOVEMENT WITH MINIMAL GROUND CONTACT TIME

PLYO PROGRESSIONS

STRENGTH PROGRESSIONS
My goals for athletes post op..

» FMS / Hop Stop
» Stronger UE & LE
» Phase 4 Plyos
» Fatigue Agility Challenge
» Educate / Inspire
» Psychological Strength