Early Factors in ACL Rehabilitation-The First 3 Months/RTP

Darren L. Johnson, M.D.
Professor and Chairman
Department of Orthopaedic Surgery
University of Kentucky School of Medicine

ACL Injuries Introduction
- ACL is the most commonly ruptured knee ligament
- 200,000 ACL injuries, 100,000 ACL surgeries
  (Harner, Arthroscopy ’04)
- Rehab has changed dramatically in last ten years
- Therapy is an important variable!!!!
  (Kaplan, MJ, AJSM ’91)

Pre-op Consultation
- Realistic expectations – Not as good as new
- Recovery time and ultimate return to sports!
- Partners in Health - patients vested in process, rehab, discipline, limitations
- Acceptance of risk and complications - Infection, stiffness, DVT, weakness, recurrent tear
  (e.g. Tom Brady)

TIME INVESTMENT
- Surgeon-3 hours
- PT/ATC-30 hours
- Patient-300 hours

ACL Rehab
- Significant attention paid to rehabilitation
- ‘Old School’ immobilization and rest no longer relevant
- Empiric evidence over science has driven accelerated regimens
- Muscle control, soft tissue healing and maturation of tissues require time and effort

Myths
- All ACL’s do well
- All knees have the same potential for recovery
- Elite athletes recover better
- Modern techniques and innovations have changed recovery statistics
- Braces are necessary for functional return
ACL Injuries

• Not an isolated injury!!!!!!
• Meniscus injury
  55-65% incidence
  Lohmander: AJSM ’07
  Noyes: JBJS ’83
  Tandogan: Knee Surg ’04
  Repair Menisectomies Leave Alone

ACL Injuries

• Not an isolated injury
• Injury affects mechanoreceptors
• Within 24 hrs. after injury
  – Lephart: AOSSM ’97
• Deficits may persist longer than a year
  – Denti: Knee Surg Spots Trauma ’80
  • “Quadriceps avoidance gait”
    » Andriacchi: CPRR ’94
    » Berechuck: JBJS ’90

What’s New in ACL Rehabilitation: What you need to know!!

ACL REHABILITATION
Current Rehabilitation Approach

• Immediate motion, & early weight bearing
• Immediate muscle exercises
• Closed kinetic chain exercise
• Early functional activities
• Earlier return to sports

More aggressive rehabilitation

ACL Rehabilitation

When do you allow the athlete to being running?

When do you allow the athlete to return to sports?

ACL REHABILITATION
Rehab Program Changes Based on Surgery

• Graft
  • PTG, STG, QTG
• Meniscus
  • Repair, excised
• Articular Cartilage
  • Debride, procedure, bone bruise
• Other ligaments
  • MCL, PL corner, LCL, PCL
ACL Rehabilitation

Surgical Variables

- Graft source: PTG or STG
- PTG: accelerated → regular
- STG: soft tissue to bone healing
  - No accelerated rehab approach
  - No hamstring strength 4wks
  - Isometrics: week 5-6
  - Isotonics: week 6-8 (light)
  - No running for 3 mos., no jumping till 12-14 wks, return to sports 6 mos.

Rodeo, Amorzyk, Torilli, et al: JBJS ’93
Beyonne, Kaplan et al: JBJS ’02

ACL Rehabilitation

Factors that Effect Rehab

- Concomitant injuries
- Timing of Surgery
- Graft selection
- Concomitant surgeries
- Type of patient: Athlete ↔ Non-Athlete
- Quality of rehabilitation
- Insurance plans

Play significant role in outcome

ACL Rehabilitation

6 Phase Program

- Pre-operative stage
- Immediate Post-Operative stage (Day 1-7)
- Acute Phase (week 2-4)
- Intermediate phase (week 4-10)
- Advanced stage (wk 10-16)
- Return to activity stage (wk 16+)

Pre-Operative Planning-Adaptable Milestones

ACL Rehabilitation

What You Need to Know

1. Prepare the patient & knee for surgery
   - Reduce swelling and pain
   - Restore knee motion (extension)
   - Activate the quads
   - Control activities-protect the knee in the brace from further injury
   - Prepare for surgery-mental/education

Shelbourne et al: J Ortho Sci ’06

ACL Post-Op Rehabilitation

What You Need to Know

- 12 important rehab factors to careful consider, assess and ensure they happen.

ACL Rehabilitation

What You Need to Know

2. Restore Full Knee Extension
   - Full knee extension critical
   - Prevents scar formation in knee
   - Assists in improving knee function running-hyperflexion
   - Must restore knee extension-hyperextension
     - How much? Symmetrical

Shelbourne et al: J Ortho Sci ’06
ACL Rehabilitation
What You Need to Know

3. Calm the Knee Down First
   - To go fast (accelerate) you have to start slow
   - Cannot accelerate a swollen/painful knee ("reactive knee")
   - Reduce the swelling/pain
   - Restore full knee extension
   - Activate quads
   - Then progress

ACL Rehabilitation
What You Need to Know

4. Gradually Restore Knee Flexion
   - Start Slow
   - Slowly restore flexion
   - If you push it too fast—swelling
   - Full flexion should be restored
   - Must return hyperflexion
     Heel to Glut
   *Even a small loss of flexion unacceptable*

ACL Rehabilitation
Range of Motion

- "Full" passive extension immediately!!
- PRONE HANGS EVERY DAY!!
- Gradual restoration of flexion
  - Week 1: 90 degrees
  - Week 2: 105-110 degrees
  - Week 3: 115-125 degrees
  - Week 4: 125 degrees or >
  - Week 8: "heel to gluts"

ACL Rehabilitation
What You Need to Know

5. Must Restore Patellar Mobility
   - Especially when PTG are utilized
   - Patellar mobility enables restoration of motion but also quad function
   - Protects the patella wear & tear
   - Prevents anterior knee pain
   *Patellar mobility is critical to successful outcome*

ACL Rehabilitation
What You Need to Know

6. Individualize & Adjust the Rehab Program Based on Knee Status
   - Bass rehab program on knee status:
     - All involved tissues
     - Patient healing response
     - Rate of progression
     - MCL injury-stiffness
     - PF stabilization surgery
     - Meniscus repair-protection
     - Articular cartilage-protect/preserve/longevity

ACL Rehabilitation
What You Need to Know

7. Need for Quads
   - Activate the quads early
     - EMS to quads
   - Need quads for shock absorption
   - Assists in proper running, jumping, skating
   - Quad/Hamstring ratio important:
     - Males: 66%-70%
     - Females: 70%-75%
7. Need for Hip Strength & Control
   - Stabilization of the knee joint occurs from above & below
   - Hip abduction, hip ER & hip extension strength & control
   - Hyper-pronation of the foot control
   - Key components to rehab
   Wilk et al: J Athl Train '99
   Wilk et al: JOSPT '09
   Powers et al: JOSPT '03

8. Restore Dynamic Functional Stability to the Knee Joint
   - Proprioception & neuromuscular control restores stability
   - Proprioception is diminished after ACL injury
   - Utilize perturbation training
   Key to Successful Outcomes

Perturbation Training to Enhance NM Control

Train the Uninjured Extremity Too!!

9. Knee Control from Above & Below
   - Restore hip control for knee control
   - Control hip adduction & IR
   - Also train hip extensors & hamstrings
   - Control foot mechanics
   - Foot hyperpronation

10. Protect the Knee Now & Later
    - Knee outcomes dependent on joint integrity
    - Protect menisci & articular cartilage
    - Rehab the bone bruise
    Longevity is the Key!!!!
11. Return to Running:
   - Take your time to return
   - Gradually increase WB forces
   - Utilize pools, unloading, treadmills…..
   - Running programs:
     - Backward…Forward
     - Side slide…Cross Over
     - Stops…Cutting

12. When to Return to Sports:
   - When the knee is ready—not based on timeframes, protocols…
   - Use criteria based approach
   - Objective test information
     - Subjective knee score
     - KT Test
     - Isokinetic test
     - Functional test
   - Appropriate rehab progression
   - Return to sport is variable

Key Points:
- Rehab plays vital role to outcome
- “Faster is not Better”
- Injury to ACL & to the joint
- There are speed limits
- Progressive & sequential rehab program
- Restore Knee motion but also neuromuscular control

Longevity is the Knee-Painfree Function

THANK YOU!!