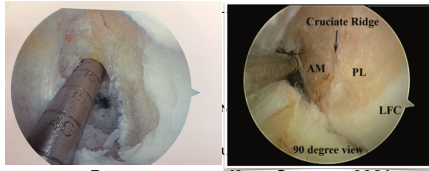
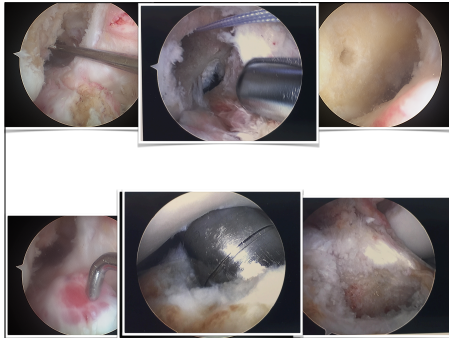


HISTORIC TREATMENT



* RECONSTRUCTION KNEE SURGERY 2001

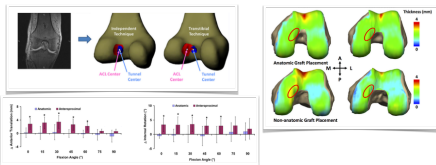


Effects of ACL Graft Placement on In Vivo Knee Function and Cartilage Thickness Distributions

Leah E. Dufresne

JOURNAL OF ORTHOPAEDIC RESEARCH 11 NOV 2017

ANATOMY IS KEY



- * AFTER 30 MIN OF NWB, SAGITTAL MRI WAS OBTAINED OF BOTH KNEES AND MEASURE CHANGES TO CARTILAGE THICKNESS LATERAL ASPECT OF MFC
- * NO DIFFERENCE IN ANATOMIC PLACED GRAFT
- * DECREASE OF CARTILAGE THICKNESS BY 8% NONANATOMIC GRAFT
- * MORE VERTICAL GRAFTS PROVIDED INSUFFICIENT RESTRAINT TO ANTERIOR TRANSLATION, MEDIAL TRANSLATION AND IR

POSTOP

- * COMPLIANCE IS VERY IMPORTANT
- * REHABILITATION IS ALSO KEY TO SUCCESSFUL RETURN TO SPORT
- * SURGERY TAKES A LITTLE OVER AN HOUR
- * FULL RECOVERY CAN TAKE 1 YEAR

"Ligamentization" in Hamstring Tendon Grafts After Anterior Cruciate Ligament Reconstruction: A Systematic Review of the Literature and a Glimpse Into the Future

JAANA 2013

✦ 48 MOS



GENERAL GUIDE

Speed

Elastic/Reactive Strength

Explosive Strength

Strength

Work Capacity

Evaluation/Testing

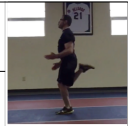
- * INITIAL VISIT EVAL
- * NEXT LEVEL REQUIRES ENHANCEMENT OF WORK CAPACITY
- * NEXT 4 LEVELS COMPRISE THE DEVELOPMENT OF PHYSICAL QUALITIES FOR ATHLETIC DEVELOPMENT
- * IT IS IMPORTANT TO BE SURE TO EMPHASIZE THE DEVELOPMENT OF THE PARTICULAR PHYSICAL QUALITY CORRESPONDING TO THE SPECIFIC PHASE BEING TRAINED



PHASE I

Traditional Rehabilitation Goals Following ACL Reconstruction During Phase I

- Protection of graft
- Pain control
- Decrease edema
- Volitional quadriceps control
- Restore ROM (emphasis on full passive extension)
- Normal gait



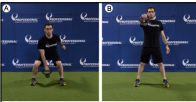
Phase Specific ACL Rehabilitation Guidelines Incorporating Innovative Techniques

Innovative Techniques PHASE I

Physical Quality	Technique / Intervention	Objective
Strength	• "Vaulting" of non-injured leg • "Wall Ball Kickers" • A-Skips	Equal distribution of body weight
	• Standing & Seated Calf Raises • Forearm Walk on Tip Toes	Symmetrical Active Knee Flexion Strengthening Gastroc, Soleus, Achilles tendon complex

Phase-specific objectives of ACL rehabilitation, ACL, anterior cruciate ligament.

Operator Techniques in Sports Medicine R.A. Parnianpour et al. 2015

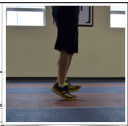


PHASE II

Phase Specific ACL Rehabilitation Guidelines Incorporating Innovative Techniques

Innovative Techniques PHASE II

Physical Quality	Technique / Intervention	Objective
Strength	• Forward Step Down Test (SDT)	Criteria to progress to Run-Walk interval training: Functional Strength Quadriceps strength Dynamic Hip Control Tonic reactivity of knee joint
	• Jumps OVDIO Box	Explosive Concentric Strength



Phase-specific objectives of ACL rehabilitation, ACL, anterior cruciate ligament.

Operator Techniques in Sports Medicine R.A. Parnianpour et al. 2015

PHASE III

Phase Specific ACL Rehabilitation Guidelines Incorporating Innovative Techniques

Innovative Techniques PHASE III

Physical Quality	Technique / Intervention	Objective
Elastic Strength	• Plyometric Training ◦ Multiple Jumps ◦ Multiple Hops • Pre-Sprint Drills ◦ A-Skips ◦ A-B-Skips • Form Running • Sprint Training	Progress from bilateral to unilateral Utilize stored elastic energy Re-train SSC Shorten Amortization Phase Re-train SSC Shorten Amortization Phase Efficiency of Movement Restore the Ability to Run

Operator Techniques in Sports Medicine R.A. Parnianpour et al. 2015

UNIVERSITY OF PITTSBURGH ACTIVITY PROGRESSION

Phase I: Return to Activity - Goals and Objectives

- **Return to Activity - Goals and Objectives**
 - 10 consecutive Single Leg Squats to 45° without loss of balance or excessive motion outside of the sagittal plane
 - 20% 1-RM on the Leg Press
 - No anterior knee pain
- **Return to Activity - Goals and Objectives**
 - 10 consecutive Single Leg Squats to 45° without loss of balance or excessive motion outside of the sagittal plane while holding > 75% extra weight (dumbbells, weight vest, etc.)
 - 20% 1-RM on the Leg Press
 - No anterior knee pain
- **Return to Activity - Goals and Objectives**
 - 10 consecutive Single Leg Squats to 60° without loss of balance or excessive motion outside of the sagittal plane while holding > 75% extra weight (dumbbells, weight vest, etc.)
 - 20% 1-RM on the Leg Press
 - No anterior knee pain
- **Return to Activity - Goals and Objectives**
 - 10 consecutive Single Leg Squats to 90° without loss of balance or excessive motion outside of the sagittal plane while holding > 75% extra weight (dumbbells, weight vest, etc.)
 - 20% 1-RM on the Leg Press
 - No anterior knee pain
- **Return to Activity - Goals and Objectives**
 - 10 consecutive Single Leg Squats to 90° without loss of balance or excessive motion outside of the sagittal plane while holding > 75% extra weight (dumbbells, weight vest, etc.)
 - 20% 1-RM on the Leg Press
 - No anterior knee pain
- **Return to Activity - Goals and Objectives**
 - 10 consecutive Single Leg Squats to 90° without loss of balance or excessive motion outside of the sagittal plane while holding > 75% extra weight (dumbbells, weight vest, etc.)
 - 20% 1-RM on the Leg Press
 - No anterior knee pain

Safe return to play should be the goal for all athletes who undergo cruciate ligament surgery. While the time it takes to recover and rehab sufficiently will never be the same for the athletes, these guidelines can serve as objective measures to determine function and help ensure a full recovery. With more difficult cruciate ligament surgeries involving anterior ligaments and medial meniscus, recovery and rehab will be prolonged.

RETURN TO PLAY

- + HOW DO WE DETERMINE WHO IS READY?
- + ONE OF THE BIGGEST OBSTACLES IN ESTABLISHING APPROPRIATE SUCCESSFUL RETURN TO PLAY IS IN THE DEFINITIONS
 - + "SAFE RETURN TO PLAY"
 - + "SAME LEVEL OF COMPETITION?"
 - + "SAME LEVEL OF PERFORMANCE?"
- + "FOR EVERY MONTH THAT RETURN TO SPORT WAS DELAYED, UNTIL 9 MOS AFTER ACLR, THE RATE OF KNEE RE INJURY WAS REDUCED BY 51%" GRINDHEM ET AL BR J SM 2016

COMPARISON OF 3 PROFESSIONAL ATHLETES



- + ADRIAN PETERSON
 - + 12/26/2011 TORE HIS ACL; SURGERY SEVERAL WEEKS LATER
 - + PLAYED IN FIRST GAME 2012
 - + REPORTS HE WAS BACK PRACTICING FULL CONTACT AT 5 MONTHS POSTOP

COMPARISON OF PROFESSIONAL ATHLETES

Source: Sports Illustrated
ACL Rehab: Comparing Adrian Peterson to RG3
Rehab and surgery for ACL tears are similar



- + RG III
 - + 1/9/2012 ACL RECONSTRUCTION LCL REPAIRED
 - + PLAYED IN FIRST GAME 9/2013

COMPARISON OF PROFESSIONAL ATHLETES



- + SAM BRADFORD
 - + TORN ACL WEEK 7 OF 2013 SEASON
 - + RETURN 2014 WEEK 3

RETURN TO PLAY

Return to Play & Post-Operative Management									
Study	Year	Authors	Sample Size	Design	Intervention	Control	Scale	Follow-up	Comments
McIntosh et al	2005	McIntosh et al	100	Retrospective	ACL reconstruction	ACL reconstruction	100	100	ACL reconstruction
Shen et al	2005	Shen et al	100	Retrospective	ACL reconstruction	ACL reconstruction	100	100	ACL reconstruction
Shen et al	2005	Shen et al	100	Retrospective	ACL reconstruction	ACL reconstruction	100	100	ACL reconstruction
Shen et al	2005	Shen et al	100	Retrospective	ACL reconstruction	ACL reconstruction	100	100	ACL reconstruction
Shen et al	2005	Shen et al	100	Retrospective	ACL reconstruction	ACL reconstruction	100	100	ACL reconstruction
Shen et al	2005	Shen et al	100	Retrospective	ACL reconstruction	ACL reconstruction	100	100	ACL reconstruction
Shen et al	2005	Shen et al	100	Retrospective	ACL reconstruction	ACL reconstruction	100	100	ACL reconstruction
Shen et al	2005	Shen et al	100	Retrospective	ACL reconstruction	ACL reconstruction	100	100	ACL reconstruction
Shen et al	2005	Shen et al	100	Retrospective	ACL reconstruction	ACL reconstruction	100	100	ACL reconstruction

- FOR THOSE ATHLETES LOOKING TO RETURN TO PRIOR LEVEL OF PERFORMANCE AND ACTIVITY RECONSTRUCTION IS TREATMENT OF CHOICE
- GOAL IS TO PROVIDE FUNCTIONAL STABILITY AND PROTECT OTHER STRUCTURES

JAAOS 2015 ELLMAN ET AL.

Incidence of Second ACL Injuries 2 Years After Primary ACL Reconstruction and Return to Sport

Mark V. Paterno,^{1,10} PT, PhD, SCB, ATC, Mitchell J. Reula,¹ PT, PhD, MPH, FACSM, Laura C. Schmitt,^{1,11} PT, PhD, Kevin R. Ford,^{1,12} PhD, FACSM, and Timothy E. Hewett,^{1,11,11} PhD, FACSM

- 78 PTS WHO HAD ACLR AND WERE RETURNED TO CUTTING SPORTS C/W 47 CONTROLS FOLLOWED FOR 24 MONTHS
- OVERALL INCIDENCE OF ACL INJURY WAS 6X GREATER IN THE ACLR GROUP
- FEMALES IN THE ACLR GROUP WERE 2X AS LIKELY TO SUFFER A CONTRALATERAL INJURY
- 29.5% OF ATHLETES SUFFERED SECOND ACL INJURY WITHIN 24 MOS OF RETURN TO SPORT
- 20.5% CONTRALATERAL 9% IPSILATERAL

Return to Play and Future ACL Injury Risk After ACL Reconstruction in Soccer Athletes From the Multicenter Orthopaedic Outcomes Network (MOON) Group

Robert H. Brophy,¹ MD, Leah Roberts,¹ PA, Rick W. Wright,¹ MD, Warren H. Dunn,¹ MD, Robert D. Puffer,¹ MD, Jack T. Aerni,¹ MD, Eric C. McCarthy,¹ MD, and Kurt P. Spindler,¹ MD

- 100 SOCCER PLAYERS (55M,45F) CHOSEN OUT OF THE MOON COHORT
- COMPLETED QUESTIONNAIRE
- 72% OF PLAYERS RETURNED TO PLAY AT AN AVERAGE OF 12.2-14.3 MONTHS
- 76% M, 67% F
- 85% WENT BACK AT SAME LEVEL OR HIGHER
- AT 7 YRS OUT ONLY 36% STILL PLAYING
- 12 UNDERWENT FURTHER ACL RECONSTRUCTION
- 9 ON CONTRALATERAL AND 3 ON IPSILATERAL KNEE

FACTORS AFFECTING RETURN TO PLAY

- PREOPERATIVE FACTORS
- ROM AND SWELLING
- OPERATIVE FACTORS
- TECHNIQUE/TUNNEL POSITION
- ANATOMIC RECONSTRUCTION IS KEY
- GRAFT CHOICE
- POSTOPERATIVE FACTORS
- REHABILITATION
- COMPLIANCE

JAAOS 2015 ELLMAN ET AL.