UT★ORTHO

A Part of UT Physicians

ACL Reconstruction

Post-Operative Rehabilitation Protocol

Ironman Sports Medicine Institute

1st Edition

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ACL Reconstruction

PHASE 1 - ACUTE (0-6 Weeks)

PHASE GOALS: PROTECT GRAFT, RESTORE AMBULATION & ADL STATUS

RANGE OF MOTION* ***NO MENISCUS/CARTILAGE PROCEDURES***

- **0-1 WEEK – FULL EXTENSION SLOWLY PROGRESS FLEXION TO 90 DEGREES**
- **1+ WEEKS – MAINTAIN FULL EXTENSION & GRADUALLY PROGRESS TO FULL FLEXION**

WEIGHT BEARING

- **0-2 WEEKS - WEIGHT-BEARING AS TOLERATED**
- **2+ WEEKS - FULL WEIGHT BEARING WITH SYMMETRICAL GAIT**

BRACE & CRUTCH USE

- **0-1 WEEK - BRACE LOCKED IN FULL EXTENSION**
- **1-2 WEEKS - OPEN BRACE TO 60 DEG**
- **2+ WEEKS – BRACE OPEN WITH GOOD QUAD CONTROL & FULL EXTENSION; DC BRACE & CRUTCHES WHEN GAIT IS NORMAL**

STRENGTHENING

- **QUAD SETS, STRAIGHT LEG RAISES, HIP ABDUCTION**
- **BALANCING, PRE-GAIT, CALF RAISES**

CRITERIA FOR FULL AMBULATION

- **≥ 0 DEG KNEE EXTENSION & 90 DEG KNEE FLEXION**
- **≥ 30 STRAIGHT LEG RAISES WITHOUT LAG**
- **MINIMAL EFFUSION, PAIN, & SYMMETRICAL GAIT WITHOUT A LIMP**
- **MD OR PT APPROVAL**

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PHASE 2 – STRENGTH & JOGGING (6-12 Weeks)

PHASE GOALS: IMPROVE STRENGTH & INITIATE JOGGING PROGRAM

RANGE OF MOTION

- **6+ WEEKS - SYMMETRICAL & PAIN-FREE WITH OVERPRESSURE**

STRENGTHENING

- **LEG PRESS, STEP-UPS, & ROMANIAN DEADLIFTS (RDLs)**
- **SQUAT PROGRESSION (BODYWEIGHT SQUATS -> SINGLE LEG SQUATS)**
- **RESISTED HIP ABDUCTION LATERAL BAND WALKS**
- **CORE EXERCISES (PLANKS, V-UPS, SINGLE-LEG BRIDGING)**

CONDITIONING

- **STATIONARY BIKING (MUST BE BEYOND 110 DEG KNEE FLEXION)**
- **ELLIPTICAL & ROWING MACHINE**
- **SWIMMING (PROGRESS KICKING GRADUALLY & PAIN-FREE)**

CRITERIA FOR JOGGING

- **PAIN LESS THAN 3 / 10 (WORST)**
- **WITHIN 2 DEG NORMAL KNEE EXTENSION & 120 DEG KNEE FLEXION**
- **QUADRICEPS & HAMSTRING STRENGTH ≥ 60% NORMAL**
- **LESS THAN 4cm DEFICIT ON SINGLE-LEG SQUAT (ANTERIOR REACH)**
- **AT LEAST 1 MINUTE OF SINGLE LEG SQUATS**
- **MD OR PT APPROVAL**

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PHASE 3 - AGILITY (12-20 Weeks)

PHASE GOALS: INTRODUCE DYNAMIC & POWER MOVEMENTS

RANGE OF MOTION

- **12+ WEEKS - MAINTAIN SYMMETRY & PAIN-FREE OVERPRESSURE**

STRENGTHENING

- **GYM STRENGTHENING (SQUATS, DEADLIFTS, INITIATE OLYMPIC LIFTING)**
- **CORE EXERCISES (MOUNTAIN CLIMBERS, PLANKS, V-UPS)**
- **BIODEX FATIGUEING PROTCOLS**

CONDITIONING

- **BIKING, ELLIPTICAL, JOGGING, SWIMMING & ROWING**

PLYOMETRICS & LIGHT AGILITY

- **LADDER DRILLS, FOOTWORK AGILITIES**
- **BOX JUMPS (DOUBLE & SINGLE LEG)**
- **HIGH INTENSITY PREDICTABLE AGILITY MOVEMENTS**

CRITERIA FOR HEAVY AGILITY

- **PAIN LESS THAN 2 / 10 (WORST)**
- **QUAD & HAM STRENGTH ≥ 80% NORMAL; ≥ 50% H/Q RATIO FOR FEMALES**
- **AT LEAST 3 MINUTES OF SINGLE LEG SQUATS (RESISTED)**
- **≤ 5 ON LANDING ERROR SCORING SYSTEM (LESS)**
- **MD OR PT APPROVAL**

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PHASE 4 - RETURN TO PLAY (24+ Weeks)

PHASE GOALS: INITIATE SPORTS SPECIFIC MOVEMENTS & RETURN TO PLAY

STRENGTHENING

- **PROGRESS GYM STRENGTHENING (SQUATS, DEADLIFTS, & OLYMPIC LIFTING)**
- **BIODEX FATIGUE PROTCOLS & CORE EXERCISES**

CONDITIONING

- **JOGGING, BIKING, SWIMMING, & INTERVAL SPRINT WORKOUTS**

PLYOMETRICS & AGILITY (2-3 DAYS/WEEK)

- **MAX EFFORT BOX JUMPS (PROGRESS WITH ROTATION)**
- **LATERAL & ROTATIONAL AGILITY**
- **UNPREDICTABLE CUTTING AGILITY & CONTACT DRILLS**

CRITERIA FOR RETURN TO PLAY

- **PAIN LESS THAN 2 / 10 (WORST)**
- **> 75/100 ON ACL-RSI SURVEY**
- **QUAD & HAM STRENGTH ≥ 90% NORMAL; ≥ 60% H/Q RATIO FOR FEMALES**
- **90% NORMAL ON SINGLE-LEG HOP TESTS**
- **95% NORMAL FIGURE OF 8, 5-10-5 PRO-AGILITY, & S-L VERTICAL JUMP**
- **MD APPROVAL**

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Meniscus / Cartilage Knee Surgery

Post-Operative Rehabilitation Protocol

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Meniscus/Cartilage Protocol

ACUTE AMBULATION – PHASE 1

The specific goals of the acute phase are to restore:

1. **FULL KNEE EXTENSION & QUADRICEPS ACTIVATION**
2. **PATELLAR & FATPAD MOBILITY**
3. **RESTORE BALANCE & GAIT/WALKING**

CRITERIA FOR PHASE PROGRESSION		MEASUREMENT OUTCOMES
Functions and Symptoms	->	Pain $\leq$ 5/10 (Worst) & IKDC Score $\geq$ 30
0° of Knee Extension ROM or Symmetry	->	Extension ROM (Goniometer)
110° of Knee Flexion ROM*	->	Passive Flexion ROM (Goniometer)
Adequate Single Leg Balance	->	Balance Error System Scoring System (FIRM) $\leq$ 5
Good Quadriceps Activation & Endurance	->	Straight Leg Raise Test
Progress to Phase 2	->	**MD or PT Approval**

FUNCTIONAL SYMMETRY – PHASE 2

The *Functional Symmetry Phase* is intended to:

1. **PROGRESS STRENGTH & SYMMETRY WITH FUNCTIONAL MOVEMENTS**
2. **NORMALIZE BALANCE AND PROPRIOCEPTION**

CRITERIA FOR PHASE PROGRESSION		MEASUREMENT OUTCOMES
Function and Symptoms	->	Pain $\leq$ 4/10 (Worst) & IKDC Score $\geq$ 40
Near Normal Knee Extension	->	At least 0 degrees extension
Adequate Knee Flexion	->	See Appendix*
Symmetrical Double Leg Squat	->	Overhead Squat (FMS) $\geq$ 2
Adequate Single Leg Balance	->	Balance Error System Scoring System (Unstable) $\leq$ 5
Progress to Phase 3	->	**MD or PT Approval**

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STRENGTH – PHASE 3

The main focus of the *Strength Phase* is to:

1. **EMPHASIZE SINGLE LEG SQUAT MECHANICS AND BALANCE**
2. **PROMOTE STRENGTH ON THE INVOLVED LOWER EXTREMITY**
3. **IMPROVE STRENGTH OF COMPOUND MOVEMENTS**

CRITERIA FOR PHASE PROGRESSION		MEASUREMENT OUTCOMES
Functional and Symptoms	->	Pain $\leq$ 3 (Worst) & IKDC $\geq$ 60
Maintain Knee Extension	->	At least 0 degrees extension
Increase Quad/Hamstring Strength	->	Isometric Strength: $\geq$ 60% Symmetry
Good Single-leg Balance & Control	->	Single-Leg Squat ($\leq$ 4 cm)
Restore Single-Leg Muscle Endurance	->	Vail Single Leg Squat Test > 1 minute
Progress to Phase 4	->	**MD or PT Approval**

JOGGING PROGRAM

1. **FULL KNEE EXTENSION & NO PAIN > 3/10**
2. **$\geq$ 1 MINUTE OF SINGLE LEG SQUATS**

JOGGING PROTOCOL	Walk Time (minutes)	Jog Time (minutes)	Total Time (minutes)
Phase 1 (3 days)	**1**	**2**	**12**
Phase 2 (3 days)	**1**	**4**	**15**
Phase 3 (3 days)	**1**	**6**	**21**
Phase 4 (3 days)	**1**	**8**	**24**
Phase 5 (3 days)	**1**	**10**	**20+**
Phase 6	**Progress as tolerated without walking breaks**		

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POWER & AGILITY- PHASE 4

The main focus of the power & agility phase it to continue gaining strength and introduce plyometric & agility movements

CRITERIA FOR PHASE PROGRESSION		MEASUREMENT OUTCOMES
Full Range of Motion	->	Passive and Active ROM (Goniometer)
Symmetrical Knee Strength	->	Ham/Quad Ratio > 55% & 85% Symmetry
Neuromuscular Control with Jumping	->	Landing Error Scoring System (LESS)
Demonstrate Single Leg Power	->	Single Leg Hop for Distance ≥ 80% Symmetry
Progress to Phase 5	->	**MD or PT Approval**

RETURN TO SPORT - PHASE 5

The main focus of the Sports Specific phase is introduce sports specific stimuli, unpredictable movements & to facilitate a graded return to full competition

CRITERIA FOR FULL PARTICIPATION		MEASUREMENT OUTCOMES
Restore Confidence, Reduce Fear of Movement	->	ACL-RSI
Full Knee Range of Motion	->	Passive and Active ROM (Goniometer)
Symmetrical Quadriceps and Hamstring Strength	->	Ham/Quad Ratio ≥ 55% & ≥ 90% Symmetry
Neuromuscular Endurance & Control	->	Landing Error Scoring System (LESS)
Symmetry on Hop Tests	->	Single Leg Hop Tests: ≥ 90% Symmetry
Symmetrical Agility	->	Figure of 8 Test, 5-10-5 Test ≥ 95% Symmetry
Complete Injury Prevention Program	->	Sports Metrics
FULL RETURN TO ACTIVITY/SPORT	->	**MD or PT Approval**

Meniscus/Cartilage Protocol

APPENDIX. Range of Motion, Weightbearing, and Functional Restrictions

Passive ROM Limitations for Meniscus & Chondral Procedures	
MENSCAL/CHONDRAL PROCEDURE	**PROM LIMITS (EXTENSION - FLEXION)* TIMEFRAME GOAL(S)**
Body Repair (Small)	Allow Full ROM Immediately
Body Repair (Large)	Weeks 0-2 Allow 0-90 After Week 2 Allow Full ROM
Root Repair	Weeks 0-2 Allow 0-60 Weeks 2-4 Allow 0-120 After Week 6 Allow Full ROM
Meniscus Transplant	Weeks 0-2 Allow 0-60 Weeks 2-4 Allow 0-120 After Week 6 Allow Full ROM
Trochlear MicroFx	Allow Full ROM Immediately
Chondral MicroFx/ Carticel/ OATS	Weeks 0-2 Allow 0-60 Weeks 2-4 Allow 0-90 Weeks 4-6 Allow 0-120 After Week 6 Allow Full ROM
***All Motion and Timelines are for Non-Weight Bearing Activities**	

Weight Bearing & ROM Limitations for Meniscus and Chondral Procedures	
MENISCAL/CHONDRAL PROCEDURE	WEIGHT BEARING TIMEFRAME LIMITATIONS
Body Repair (Small)	Allow Immediate FWB* in Extension Allow Loaded Flexion > 90 at 4 Weeks
Body Repair (Large)	Allow Immediate FWB* in Extension Allow Loaded Flexion > 90 at 6 Weeks
Root Repair	Weeks 0-4 TTWB* Allow FWB in Extension at 4 Weeks Allow Loaded Flexion > 90 at 8 Weeks
Meniscus Transplant	Weeks 0-4 TTWB Allow FWB in Extension at 6 Weeks Allow Loaded Flexion > 90 at 10 Weeks
Trochlear MicroFx	Allow Immediate FWB in Extension Allow Loaded Flexion > 90 at 4 Weeks
Chondral MicroFx/ Carticel/ OATS	Weeks 0-4 TTWB Allow FWB in Extension at 4 Weeks Allow WB in Flexion > 90 at 8 Weeks
***FWB - Full Weight Bearing** ***TTWB - Toe-touch Weight Bearing**	

Functional Progression of Meniscus & Chondral Procedures	
MENISCAL/CHONDRAL PROCEDURE	MINIMAL TIMELINE FOR PROGRESSION
FULL AMBULATION WITHOUT ASSISTIVE DEVICE	
Body Repair (Small)	2 Weeks
Body Repair (Large)	4 Weeks
Root Repair	6 Weeks
Meniscus Transplant	6 Weeks
Trochlear MicroFx	2 Weeks
Chondral MicroFx/ Carticel/ OATS	6 Weeks
INITIATE JOGGING	
Body Repair (Small)	3 Months
Body Repair (Large)	4 Months
Root Repair	4 Months
Meniscus Transplant	4 Months
Trochlear MicroFx	3 Months
Chondral MicroFx/ Carticel/ OATS	5 Months
INITIATE AGILITY	
Body Repair (Small)	4 Months
Body Repair (Large)	5 Months
Root Repair	5 Months
Meniscus Transplant	6 Months
Trochlear MicroFx	4 Months
Chondral MicroFx/ Carticel/ OATS	6 Months
FULL RETURN TO SPORT	
Body Repair (Small)	6 Months
Body Repair (Large)	7 Months
Root Repair	8 Months
Meniscus Transplant	9 Months
Trochlear MicroFx	6 Months
Chondral MicroFx/ Carticel/ OATS	9 Months