

DR. HERRENBRUCK'S ACL PROTOCOL

1ST WEEK POST-OP (4 DAYS POST SURGERY)

GOALS: FULL PASSIVE KNEE EXTENSION. REDUCED SWELLING.

- EXERCISES: 1) ANKLE PUMPS
2) PRONE HANGS
3) HEEL PROP
4) QUAD SETTING
5) HAMSTRING SETTING
6) STRAIGHT LEG RAISE
7) HEEL SLIDES/WALL SLIDES

CRUTCHES FULL WEIGHT-BEARING AND DISCONTINUE
CRUTCHES WHEN AMBULATING WITHOUT A LIMP

2ND WEEK

GOALS: FULL KNEE EXTENSION AND 90 DEGREES FLEXION
NORMAL GAIT PATTERN.

- EXERCISES: 1) CONTINUE WITH PREVIOUS EXERCISES
2) ADD WALKING EXERCISES (FLOOR/TREADMILL)
3) CALF RAISES
4) 4-WAY SLR (WEIGHT AS TOLERATED)
5) HAMSTRING LEG CURLS (0-90 DEGREES)
PRONE/STANDING
6) SINGLE LEG STANCE WITH UNINVOLVED LEG
(STAR)
7) BAPS IN SITTING
8) STATIONARY BIKE (HIGH SEAT, LOW TENSION)
9) NON-WEIGHT BEARING
GASTROENEMIUS/SOLEUS, HAMSTRING
STRETCHES

3RD WEEK

GOALS: CONTROLLED STATIC BALANCE SINGLE LIMB SUPPORT
INVOLVED CONTROLLED DYNAMIC STABILITY ON
UNINVOLVED LEG.

- EXERCISES: 1) CONTINUE WITH PREVIOUS EXERCISES

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- 2) ADD SQUATTING EXERCISES (0-45 DEGREES)
- 3) SINGLE LEG STANCE-INVOLVED LEG
- 4) SUBMAXIMAL ISOMETRIC QUADS AT 60 DEGREES
- 5) SUBMAXIMAL ISOMETRIC HAMSTRINGS AT 60 DEGREES (SUBMAXIMAL)
- 6) LEG PRESS (0-45 DEGREES) OR SHUTTLE 2000

4TH WEEK

- EXERCISES:
- 1) STEP-UP ANTERIOR, LATERAL, POSTERIOR
 - 2) STANDING MINI-TRAMPOLINE
 - 3) POOL, WALK, JOGGING
 - 4) STANDING BALL THROWING AND CATCHING

5TH WEEK

- EXERCISES:
- 1) SINGLE LEG (STANCE EXERCISES) EYES CLOSED
 - 2) WOBBLE BOARD
 - 3) STANDING ARM AND LEG REACH INVOLVED (STAR)
 - 4) ISOMETRIC QUAD, HAMS 60 DEGREES (MAX)

6TH WEEK

GOALS: IMPROVE CONFIDENCE IN KNEE. AVOID OVERSTRESSING THE GRAFT FIXATION. PROGRESS STRENGTH, POWER PROPRIOCEPTION TO PREPARE FOR RETURN TO FUNCTIONAL ACTIVITIES.

- EXERCISES:
- 1) SPORTS CORD (FORWARD AND BACKWARD)
 - 2) BACKWARD, SIDEWAYS (WALKING) ON TREADMILL
 - 3) STAIR-STEPPER/ELLIPTICAL WALKER
 - 4) STEP UP 6"
 - 5) WOBBLE BOARD 2 LEGS THROWING BALL
 - 6) WOBBLE BOARD 1 LEG

7TH WEEK

EXERCISES: 1) SINGLE LEG STANCE TRAMPOLINE WITH
THROWING BALL

8TH WEEK

EXERCISES: 1) STEP-UP (WOBBLE BOARD)
2) SLIDE BOARD
3) SINGLE LEG STANCE ON MAT THROWING BALL
4) ISOKINETICS 30 DEGREES BLOCK SUBMAXIMAL
VELOCITY SPECTRUM (180-300 DEGREES) (10
REPS)
5) TRAMPOLINE WITH LEG JUMPS
6) SQUATTING EXERCISES WOBBLE BOARD

12TH-16TH WEEKS

GOALS: BIODEX TESTING (30 DEGREES BLOCK) 180-300
DEGREES (IF 80% THEN MAY START RUNNING)

EXERCISES: 1) RUNNING ON TRAMPOLINE
2) SPORT CORD RUNNING
3) JOGGING OUTDOORS
4) SUBMAX AGILITY DRILLS (SHUTTLE, LATERAL
SLIDES, CROSSOVERS, FIGURE OF EIGHT)
5) LINE JUMPS
6) JUMP ROPE
7) JUMP TRAINING ON TRAMPOLINE WITH
INCREASED KNEE FLEXION
8) 180° JUMP ON TRAMPOLINE

16TH - 20TH WEEKS

GOALS: RETURN TO UNRESTRICTED ACTIVITIES.

EXERCISES: 1) RUNNING BACKWARDS
2) BOUNDING FOR DISTANCE
3) 180° DEGREES JUMP TURNS ON FLAT SURFACE
4) JUMPS UP AND DOWN STEPS

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- 5) RUNNING FIGURE OF EIGHT
- 6) SINGLE LEG JUMPS ON TRAMPOLINE
- 7) SINGLE LEG JUMPS ON BALANCE MAT
- 8) SINGLE LEG JUMPS - ANTERIOR, POSTERIOR,
LATERAL
- 9) VERTICAL JUMPS
- 10) TWO FOOTED JUMP 6-8" STEP, JUMP OFF STEP
FOLLOWED BY VERTICAL JUMP
- 11) AGILITY DRILLS

20TH – 24TH WEEKS

GOALS: 90% OF UNINVOLVED EXTREMITY ON BIODEX TESTING.
FUNCTIONAL TESTING – ONE LEG HOP 90% OF UNINVOLVED
EXTREMITY. LEFT TEST: MALES – 100 SECONDS; FEMALES – 135
SECONDS.

RETURN TO SPORT:

- 1) SWELLING LESS THAN 1 CM
- 2) FULL ROM
- 3) RUNNING AND AGILITY (NO LIMP)
- 4) BIODEX 90% OF UNINVOLVED
- 5) ONE LEG HOP 90% OF UNINVOLVED
- 6) LEFT TEST: MALES – 100 SECONDS; FEMALES –
135 SECONDS

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DR. HERRENBRUCK'S ACL MEASUREMENTS TIMEFRAME

DAY 1 (1ST PHYSICAL THERAPY VISIT) 1 X WEEK

- 1) CIRCUMFERENCE AT THE JOINT LINE
- 2) CIRCUMFERENCE 20 CM PROXIMAL TO JOINT LINE
- 3) SUPINE ROM – EXTENSION WITH HEEL PROP, HEEL SLIDE FOR FLEXION
- 4) MEASUREMENTS TO BE TAKEN ON A WEEKLY BASIS THROUGH WEEK 12

12 WEEKS POST-OP

- 1) BIODEX TESTING 30 DEGREE BLOCK 180 DEGREES/300 DEGREES 10 REPS EACH

16 WEEKS POST-OP

- 1) FUNCTIONAL TESTING – ONE LEG HOP

20-24 WEEKS POST-OP

- 1) BIODEX TESTING AT 60, 180, 300 DEGREES – 30 DEGREE BLOCK
- 2) FUNCTIONAL TESTING – 1 LEG HOP TEST AND LEFT TEST

52 WEEKS POST-OP

- 1) BIODEX FULL ROM – 60, 180, 300 DEGREES PER SECOND
- 2) FUNCTIONAL TESTING – 1 LEG HOP TEST AND LEFT TEST

Guidelines for Rehabilitation after Reconstruction of the Anterior Cruciate Ligament

Phase I

Begins immediately after surgery through approximately 2 weeks

Goals

Protect graft fixation
Minimize effects of immobilization
Control inflammation
No continuous passive motion
Full extension range of motion, 90 degrees of knee flexion
Achieve quadriceps control
Educate patient about rehabilitation progression

Brace

Locked in extension for ambulation and sleeping

Weight-bearing Status

Weight-bearing as tolerated with two crutches
Discontinue crutches as tolerated after 7 days

Therapeutic Exercises

Heel slides/wall slides
Quad sets, hamstring sets (electrical stimulation as needed)
Patellar mobilization
Non-weight-bearing gastrocnemius/soleus, hamstring stretches
Sitting assisted flexion hangs
Prone leg hangs (extension)
Straight leg raise, all planes, with brace in full extension until quadriceps strength is sufficient to prevent extension lag

Phase I functional training

Aerobic conditioning
 Upper extremity ergometry
 Well-leg bicycling
Proprioception
 Active and passive joint positioning
 Balancing activities
 Stable platform, eyes open
 Stable platform, eyes closed
 Seated ball throwing and catching

Phase II

Begins approximately 2 weeks postoperatively and extends to approximately 6 weeks

Criteria

Good quad set, straight leg raise without extension lag
Approximately 90 degrees of flexion
Full extension
No signs of active inflammation

Goals

Restore normal gait
Restore full range of motion
Protect graft fixation
 Improve strength, endurance, and proprioception of the lower extremity to prepare for functional activities

Brace/Weight-bearing Status

Patellar tendon graft: continue ambulation with brace locked in extension; may unlock brace for sitting and sleeping, may remove brace for range of motion exercises
Hamstring and allograft: may discontinue brace use when normal gait pattern and quad control achieved

Therapeutic Exercises

Mini-squats 0-45 degrees
4-way hip exercises
Stationary bike (begin with high seat, low tension)
Closed chain extension (leg press: 0-45 degrees)
Toe raises
Continue hamstring stretches, progress to weight-bearing gastrocnemius/soleus stretches
Continue prone leg hangs with progressive ankle weights until extension is achieved

TABLE 28J1-15 *Continued*
Guidelines for Rehabilitation after Reconstruction of the Anterior Cruciate Ligament

Phase IV

Begins at approximately 4-6 months

Criteria

Full, pain-free range of motion
 No evidence of patellofemoral joint irritation
 Sufficient strength and proprioception to progress to functional activities
 Physician clearance to initiate advanced closed kinetic chain exercises and functional progression

Goal

Return to unrestricted activities

Therapeutic Exercises

Continue and progress flexibility and strengthening program

Phase V functional training**Aerobic conditioning**

Continue as above

Running

Continue as above

Agility

Continue as above

Cutting drills

Plyometrics

Advance heights

Proprioception

Reaction drills

Advanced sport-specific drills (full-speed)

Phase V

Begins after return to sports

Criteria

No patellofemoral or soft tissue complaint
 Meets all criteria for return to sports
 Physician clearance to resume full activity

Goals

Safe return to athletics
 Maintenance of strength, endurance, proprioception
 Education of patient with regard to any possible limitations

Bracing

Functional brace may be recommended by the physician for use during sports for the first 1-2 years after surgery for psychological confidence

Therapeutic Exercises

Gradual return to sports participation
 Maintenance program for strength, endurance

Functional Training

Aspects of athletic performance such as cardiovascular conditioning, proprioception, and muscle coordination should be addressed with the use of appropriate exercises and activities that are gradually phased into the rehabilitation program as safety allows (see Table 28J1-15). Functional training is also a useful way of maintaining the patient's interest during therapy sessions because it takes some of the focus away from the knee and is often perceived as more fun than the standard rehabilitation exercises. A great deal of creativity can be used in designing functional activities. Aids such as balance boards, mini-tramps, steps, balls, and the pool add variety, break up the "routine" of therapy, and maintain the patient's motivation. Sport-specific drills not only keep the patient's interest but can also enhance the return of skills that the patient will need to relearn on returning to the sport after the rehabilita-

are appropriate and safe for use during the given recovery phase.

In the early phase of recovery, protection of the bone graft prevents significant lower extremity activities; however, upper extremity ergometry and well-leg bicycling can be used to promote aerobic conditioning, and some proprioception training can begin. As progression to protected walking begins, additional proprioception drills can be added, and stair-walking exercises can be started. In retraining the musculature for eccentric loading patterns, when running is safely allowed, more advanced proprioception drills and plyometric exercises can be added. Figure-of-eight pattern running may be started at this time. It should advance slowly, beginning first with large circles at a walking or jogging pace and progressing to smaller circles at a faster pace as the return of muscle strength and graft healing allow. Cutting and agility drills can be added during the late phases of recovery. Sport-specific drills such as dribbling and shooting drills for basketball