Penn Highlands Healthcare System
Department of Orthopaedics and Sports Medicine

Dr. Matthew Varacallo

ACL RECONSTRUCTION REHAB PHILOSOPHY

<u>This protocol is to be utilized as a guideline.</u>

There will always be individual differences amongst patients regarding progression and tolerance of specific activities. Progression through the protocol will depend on successful accomplishments of set milestones as assessed by the physician and the physical therapist/athletic trainer.

The patient's home exercise program is of utmost importance and should be monitored and emphasized. Initially, patients should be performing their exercises several times a day to regain motion. In general, my patients should be participating in formal physical therapy within 3-5 days following the reconstruction procedure. Most patients get an adductor canal regional block and will have a brace and cryotherapy cold compression device following the surgery.

The first few days after surgery my standard instructions include:

- **OK for brace removal when not up and mobilizing**
- **When up and about, 2 crutches should be used and patients will either be WBAT with the brace locked straight or they will be instructed to be toe-touch weight bearing with 2-crutch assistance if an extensive or radial meniscal tear is repaired during the reconstruction operation.**

Due to the importance of regaining early motion, my patients are to be seen 3x/week for the first month. There are NEVER (unless otherwise instructed) restrictions to motion achievement following surgery.

Rehabilitation should create the optimal environment for the natural process of healing to occur. Initially, there should be a strong emphasis on minimizing swelling and pain as well as motion restoration and quadriceps stimulation. If a patient's progress is significantly delayed, please contact me or my office (via phone, email, or text message) so that I may be made aware of the patient's delayed progress. There is nothing worse than a stiff knee following this procedure. Patients should be educated regarding the importance of regaining motion within the first month – if terminal extension is not achieved early on, the patient may limp indefinitely!

If you have any questions regarding this protocol, please contact my office at 814-375-6200.

GENERAL CONSIDERATIONS

1. **In cases where the ACL is reconstructed WITHOUT a meniscal repair**, and regardless of the graft choice, patients are to be WBAT with the post-op brace locked for 4 weeks for all weight bearing activities outside of the clinic. **At 2 weeks, the brace may be unlocked with certain WBing exercises IN CLINIC ONLY for patients who have at least 0-90 deg of motion and good quad control**. To minimize joint stress, it is recommended that patients perform closed kinetich chain exercises only in 0-45 degree range with resistance less than full body weight on the injured limb (e.g., leg press, total gym, or bilateral small range squats).
2. The post-op brace will typically be **shortened/unlocked at 4 weeks** during the one-month post-op visit with me in the office. If there is inclement weather, the patient may need to lock the brace even AFTER the one-month period. A hinged knee sleeve will typically be provided at the 2-month visit with me in the office.
3. **If the ACL was reconstructed along with a meniscus repair**, the brace may either be locked at 0 degrees and the patient is to be WBAT **OR** the brace will be locked at 30 degrees while upright only and the patient is to be TTWBing for a period of time that will be determined by the surgeon. My patients will typically have unrestricted NWBing range of motion UNLESS OTHERWISE NOTED.

WEEKS 1-2 (Immediate POST-OP PHASE)

TREATMENT GOALS:

- Minimize swelling/pain
- ROM: 0-90 deg week 1, 0-110 deg week 2
- Gradual progression of WBing with brace locked (unless otherwise noted)
- Achieve quad activation and improve quad set
- Note: It is essential to monitor trunk/core for proper proximal control while doing exercises to avoid substitution.

MANUAL THERAPY:

Patellar mobilizations at every session (patient taught to do at home daily), physiologic stretching flexion/extension, gentle posterior tib-fem mobilizations to start and progress based on patient presentation

SUGGESTED EXERCISES: (High reps, low resistance with focus on proper muscle recruitment)

Isometrics (quadriceps, gluteals, hamstrings)
Ankle pumps-> heel raises
SLR's (supine with prop under heel as needed, advancing to standing next phase)
Heel slides (seated or supine); can also do flexion over end of mat table
Long sit hamstring stretch (be mindful in patients with hamstring graft)
AROM knee extension from 90 to 40 degrees
Prone hangs working up to 30 minutes/day (3x10 minutes extension stretching daily)
Prone flexion ROM assisting with opposite LE if needed
Prone TKE over ball
Prone hip extensions
Weight shifting with an active quad set
Sidelying Abduction series (straight plane ABD, circles, swings) emphasizing neutral spine
Trunk stabilization exercises in supine/prone

MODALITIES: NMES quadriceps until no lag sign with SLR, biofeedback with quadriceps exercise, cryotherapy, vasocompression

WEEKS 2-4 (ROM, EARLY Strengthening Phase)

TREATMENT GOALS:

- Achieve full knee extension both active and passive measured prone and supine. If full passive extension not achieved by 4 weeks – notify physician prior to one-month appointment.
- Flexion to 120+ degrees
- Patient is FWBing with brace locked (though may use crutch for uneven terrain or inclement weather) demonstrating good technique and no trunk compensation
- No active extensor lag with SLR
- Moving towards closed chain/proprioceptive activities within limited ROM and proper use of brace

MANUAL THERAPY:

Continue previous manual interventions. Progress intensity of mobilizations dictated by patient presentation. Add in scar/soft tissue mobilization as appropriate based on wound healing.

SUGGESTED EXERCISES: Continue and advance previous exercises as appropriate and continue to focus on **ROM work/prone hangs****

Stationary cycling (when ROM allows) with no resistance
SLR standing
Single leg standing balance progression
Wobble or BAPS board, half styrofoam roller with brace locked
Mini squats: 0-45 degrees
Band resisted: Standing TKE (closed chain, band behind proximal knee)
Side stepping (straight, diagonals, circles)
Seated hip internal and external rotation
4 way stabilization kicks (if good quad control present)
Hamstring curls (careful with Hamstring grafts)
Leg press/Total gym to 45 degrees
Open Chain knee extension: 90-45 degrees WITHOUT RESISTANCE

** Continue to progress previous exercises, however continue to educate patient so they have a clear understanding of their core home program. Activities to maintain general conditioning (upper body strengthening, cardiovascular endurance) may be initiated once post-operative pain and side effects are under control. These activities may include UBE, upper body weight lifting without stressing leg, pool therapy (after 4 weeks). HOWEVER, the patient should not shift their primary focus from rehabilitating the operative limb

MODALITIES: Continue NMES until no lag sign with SLR, cryotherapy, soft tissue mobilization about incisions when appropriately healed, biofeedback with quadriceps exercise prn.

WEEKS 4-12 MIDDLE STRENGTHENING PHASE

TREATMENT GOALS:

- Full flexion and symmetric to opposite side around weeks 6-8

- Normal gait and reciprocal stair management without compensation
- Fully resolve knee swelling
- Progression of independent gym/home exercise program

PRECAUTIONS:

- No impact activity, pivoting, or twisting
- No WBing Flexion > 90 deg during exercises
- Gradually increase exercise ROM and weight as dictated by patient response including swelling and soreness response. Articular soreness should be less than 12 hours without medication needed to alleviate symptoms.

MANUAL THERAPY:

Continue with mobilizations as needed to diminish soft tissue and joint restrictions to normal mobility

SUGGESTED EXERCISES:

Frequency: Alternate cardiovascular and leg strengthening days with goal of exercising 6 days/week if the patient desires to eventually participate in competitive athletics.

Cardiovascular: Bike, Stair stepper, and Elliptical. Retro Treadmill is OK if attempting to regain full extension during the stance phase of the gait cycle.

Strengthening: Important to focus on quad, hip, and core strengthening.

Squats progressing to weighted squats
Progressive step ups/downs (forward, side, back, 4-8" step)
½ Lunges and wall sits in appropriate ROM not to aggravate patellofemoral joint
Single leg balance with opposite leg reaches
One-legged deadlifts
Slide Board
Fast form walking (start in clinic with therapist and progress gradually outside of therapy)
Sport cord resisted walking forward/lateral/retro
Swiss ball, planks, and trunk stabilization exercises
90-40 degree light open chain extension (0-10# ankle weights or theraband) in CLINIC ONLY
Static balance exercises using balance cushions, BOSU ball, wobbleboard, half roller, etc

MODALITIES: Cryotherapy, others PRN

Months 3-4 – Pre-impact training, Progression to Late Strengthening Phase

Level 1 Functional Testing should be performed at this time by the clinician to assess the current strength and movement impairments the patient currently has. As many patients will have limited therapy visits – this should help dictate further treatment/HEP focus. Testing may be somewhat individualized based on what a clinic has available but should include a 4-6 inch front step down test for one minute, quad/hip/core strength assessment, trunk/LE neuromuscular control, fast walking gait assessment, and step-to and hold assessment.

SUGGESTED EXERCISES:

Continue to advance previous activities as appropriate
May start 90-40 degree ROM leg extension machine with high reps, low weight if there is no patellofemoral pain
Step to and holds
Begin two footed hopping or light jump roping.
Harvard stepping forward/side to 4-8 inch mat
Ladder drills: Starting at 50% speed and gradually progress

Alter G or underwater treadmill may be initiated at this time as well

Months 4-6 – Impact and Late Strengthening Phase

TREATMENT FOCUS: Athlete still needs to continue to focus primarily on strengthening. Patient may start a running progression with a functional progression into sports specific activities. Unless cleared by MD, patient is not to participate with hard cutting/pivoting activities. Please use swelling/soreness response to dictate their functional progression as the athlete should not be demonstrating any increase in swelling.

Running Progression: May begin walk/ slow jog interval progression starting with 1 minute walk and 1 minute jog. Progress increasing jog times by 1 minute and may keep walking time as needed (at least one minute though). When patient can jog 5 minutes straight – progress to a distance based criteria progression starting at 1 mile. When the patient is running 2 miles without difficulty, then start to add in hills and work on speed.

Hop Training: Athletes should be instructed on proper hopping/landing technique. Appropriate cues must be given to the patient to ensure they do not land stiff. They also need cues to avoid LE internal rotation or valgus upon landing.

SUGGESTED ADDITIONAL EXERCISES:

One-legged hop training
More intense two-legged hopping activities
Begin ¾ speed sprints if progressed as above on smooth surface
Carioca drills (walking-> ½ speed-> ¾ speed)
Figure 8 jogging progression
Begin functional sport specific training in controlled environment with trainer or therapist

FUNCTIONAL TESTING: Please attempt to complete functional testing prior to the last MD visit to provide objective data to assist in return to play decision-making. Please make comments on movement quality as well – especially if there are concerns.

- **HOP TESTING**: Include the following hops if possible: Single leg vertical hop, single leg hop for distance, single leg 6m timed hop, single leg triple jump for distance, single leg triple crossover hop for distance
- **One minute front step down test at 6-8 inch height**. Assess quantity and quality looking for deviations from proper body mechanics
- Hip/Core strength and control assessment (e.g., planks, one-legged bridge, etc)
- Sport Specific Testing

RETURN TO SPORTS CRITERIA (typically 6-9 months):

>90% functional hop testing (limb symmetry index) with good movement quality
>90% quadriceps strength
>90% One minute step down test with good movement quality
5/5 hip MMT including hip ER, ABD, and extensors.
Running/Agility/Sports specific activities are WNL.
Patient has confidence in leg and does not demonstrate apprehension.