

VCU Sports Medicine Clinic
Osteoarticular transfer system (OATS) protocol

All time frames are to be used as general guidelines only. Achievement of goals is the primary criteria for advancement to the subsequent phase of rehab.

Phase I Protective phase (weeks 0-6)

Goals

1. Isolated quad set in full extension
2. 0 degree active knee extension with no lag during straight leg raises
3. 0 to 120 degree of active assistive range of motion
4. Minimal knee effusion
5. Independent weight bearing with assistive device per weight bearing precautions

(Week 1)

Exercises Basic home exercise program consisting of ankle pumps, straight leg raises (supine, sitting, adduction), active assistive range of motion into flexion (heel slides), prone hangs/heel props, hamstring stretches, abduction with external rotation in side-lying position with knees bent to 45 degrees, prone knee extensions, gait training, toe touch weight bearing

Modalities Electrical stimulation, biofeedback, compression stockings (or ice, compression, elevation), continuous passive motion

Frequency Two to three times per week as indicated by evaluation

(Weeks 2-3)

Exercises Continue with above; add adduction to straight leg raise program, ankle strengthening with theraband

Modalities Continue with above modalities

Frequency Two to three times per week as indicated by evaluation

(Weeks 4-12)

Exercises Continue with above — may discontinue straight leg raises in supine/side-lying position and heel pumps, continue with stretches until full extension is achieved; add total knee extension in standing with theraband, four-way straight leg raises in standing using theraband for resistance on the operated leg, standing leg curls, stationary bike if approved by doctor, gait training **with assistive device toe-touch weight bearing until weeks 4-6 then partial weight bearing until week 8**, resisted hip external rotation, multi-hip machine, aquatic therapy (water jogging, resisted running, swimming, water aerobics)

Modalities Continue with above; may discontinue continuous passive motion if range of motion is adequate

Frequency Once or twice per week

Phase II Controlled stability phase (weeks 8-15)

Goals

1. Independent ambulation without assistive device and no deviations
2. Independent with stairs
3. Range of motion 0 to 130+ degrees
4. Single-leg balance for more than 15 seconds

Exercises Continue with above; begin gait training (partial weight bearing) and progress to full weight bearing; add stationary bike, wall slides, total gym and static single-leg stance activities

Modalities As indicated

Frequency Once or twice per week

(Weeks 11-17)

Exercises Continue with above; add elliptical trainer/Nordic track, step ups (2, 4, 6 and 8 inches) gait training (heel/toe, resisted side stepping, diagonal side stepping), leg press, static and dynamic balancing activities (BAPS, sole roll, etc)

Frequency As indicated

Phase III Functional strengthening (month 4)

Goals:

1. Increase strength to allow for functional progression
2. Improve balance and proprioception to allow for functional progression
3. Restore local muscular and cardiovascular endurance

Criteria for entering phase III

1. Satisfactory clinical exam
2. Full active/passive range of motion
3. Normal gait pattern and reciprocal stair negotiation

Exercises Begin four to six sets of 8-20 repetitions of the current weight program (Nautilus, theraband as listed in previous weeks); progress to single-leg activities and eccentric control; emphasis on closed kinetic chain activities; dynamic trunk stabilization exercise; progress to unstable surfaces for balance/coordination – slide board, Swiss ball, balance beam, fitter etc.; endurance activities – interval training; bike, stair stepper, elliptical trainer/Nordic track, slide board, treadmill walking, aquatic activities

Frequency As indicated

Phase IV Return to function (months 6-9)

Goals:

1. Normalize strength, proprioception and endurance
2. Prepare for return to sport/occupation
3. Provide confidence in performance of the knee

Criteria for entering phase IV

1. Satisfactory clinical exam
2. Girth within 1 inch or isokinetic test less than 25 percent deficit
3. Equal single-leg stance

Exercises Continue with phase III activities decreasing the number of exercises while increasing the intensity of the program; progress to a maintenance program by decreasing sets and reps, increase the load, decrease time and increase power, increase rest and recovery

Frequency As indicated

Prepare for return to sport by progressing eccentric strength for control of increased speeds, loads and directions and progress for direction, speed and variations. Recognize that impulse loading activities such as jumping need to be minimized during the early period of functional return.

Step 1: *Jog progression* – fast walk, high knee march, cariocas, figure 8, four-way reaction drill, eccentric step-offs/loading and jog

Step 2: *Double-leg jump progression* – shuttle (speed/load), jump rope (speed/duration), line jumps (direction/height/speed), box jumps (direction/heights/speed), distance jumps (direction/height/speed)

Step 3: *Sprint progression* – Increase speed of all above drills, add sport replication activity

Step 4: *Single leg hop progression* – Shuttle (speed/load), jump rope (speed/duration), line jumps (direction/height/speed), box jumps (direction/height/speed), distance jumps (direction/height/speed).

Return to sports/occupation criteria

1. Satisfactory clinical examination
2. Less than 10 percent isokinetic strength deficit for quads
3. Satisfactory completion of sport-replication activity
4. Pass single leg functional test, the average of three trials with less than 15 percent deficit
 - a. Single-leg hop for distance
 - b. Single-leg triple cross-over hop for distance (15 cm wide)
 - c. Single-leg hop for time over 6 meters
 - d. Single-leg hop for vertical height
 - e.