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Rehabilitation Guidelines for Osteochondral Autograft Transplantation (OATS) Procedure

The OATS procedure involves transplantation of plugs of bone with overlying articular cartilage from areas of relatively no weight bearing to weight bearing areas of the knee which have articular cartilage loss. The rehabilitation guidelines are presented in a criterion based progression program. Specific time frames, restrictions and precautions are given to protect healing tissues and the surgical repair/reconstruction. General time frames are also given for reference to the average, but individual patients will progress at different rates depending on their age, associated injuries, pre-injury health status, rehab compliance and injury severity. Injury severity refers to the size and location of the articular cartilage lesion, as well as the number of plugs used to fill the lesion.

Specific attention must be given to impairments that caused the initial problem. For example if the patient is s/p medial compartment OATS procedure and they have a varus alignment, post-operative rehabilitation should include correcting muscle imbalances or postures that create medial compartment stress

PHASE I (Surgery to 6 weeks)

APPOINTMENTS	Meet with physician at 1 week post op Begin physical therapy 3-5 days post op, meet 1x/week
REHAB GOALS	<ol style="list-style-type: none"> 1. Protection of the post surgical knee 2. Restore normal knee range of motion and patellar mobility 3. Eliminate effusion 4. Restore leg control
WEIGHT BEARING	<ul style="list-style-type: none"> • Week 1-3 = non-weight bearing • Week 4-6 = touchdown to 25% WB (0-6 weeks – locked ELS brace)
RANGE OF MOTION EXERCISES	<ul style="list-style-type: none"> • Full Knee Extension <ul style="list-style-type: none"> ◦ Knee extension on a bolster ◦ Prone hangs • Passive Knee Flexion <ul style="list-style-type: none"> ◦ Supine wall slides ◦ Assisted hell slides ◦ CPM Machine

	<ul style="list-style-type: none"> • Week 1-2 = 0-90 degrees • Week 3-4 = 0-110 degrees • Week 5-6 = 0-125 degrees • Biking (week)4 – use contra-lateral leg to create ipsilateral PROM <p>NOTE: ROM exercises should be carried out frequently throughout the day with high repetitions to help remodel and contour the healing cartilage. The optimal goal during the first 6 weeks is to do 4-6 hours of ROM exercises per day</p>
SUGGESTED THERAPEUTIC EXERCISE	<ul style="list-style-type: none"> • Quad sets • SLRs • 4 way leg lifts in standing with brace on for balance and hip strength • patellar mobilizations • Soft tissue mobilization
CARDIOVASCULAR EXERCISE	Upper body circuit training or UBE
PROGRESSION CRITERIA	<ol style="list-style-type: none"> 1. 6 weeks post-op 2. Trace to no effusion 3. Full knee extension

PHASE II (begin at 7-12 weeks)

APPOINTMENTS	Meet with physician at 1 and 2 months post-op Physical therapy 1x every week
REHAB GOALS	<ol style="list-style-type: none"> 1. Single leg stand control 2. Normalize gait 3. Good control and no pain with functional movements, including step up/down, squat, partial lunge (staying less than 60 degrees of knee flexion and avoiding excessive WB at position of the lesion)
PRECAUTIONS	<ol style="list-style-type: none"> 1. Avoid post activity swelling 2. Avoid loading knee at deep flexion angles 3. No impact activities until 12 weeks post-op
WEIGHT BEARING	Begin progressive WBAT with axillary crutches and no brace
SUGGESTED THERAPEUTIC EXERCISE	<ul style="list-style-type: none"> • Weight shifting • Begin pool program – gait drills and initiation of protected WB strengthening exercises • Double leg balance • Stationary bike • Gait drills (start with pool) • Protected weight bearing hip and core strengthening • Stretching for patient specific muscle imbalance

	<ul style="list-style-type: none"> • Quad strengthening – closed chain exercises short of 60 degrees knee flexion
CARDIOVASCULAR EXERCISE	Non-impact endurance training; swimming (stiff knee flutter kick), deep water run, upper body circuits
PROGRESSION CRITERIA	<ol style="list-style-type: none"> 1. Normal gait on level surfaces 2. Full range of motion 3. No effusion 4. Ability to carry out functional movements without unloading affected leg or pain, while demonstrating good control 5. Single leg balance greater than 15 seconds

PHASE III (begin after meeting Phase II criteria ~ 4 months)

APPOINTMENTS	Meet with physician at 14-16 weeks post-op Physical therapy 1x every 1-2 weeks
REHAB GOALS	1. Good control and no pain with sport and work specific movements, including impact
PRECAUTIONS	<ol style="list-style-type: none"> 1. Post activity soreness should resolve within 24 hours 2. Avoid post activity swelling 3. Avoid knee pain with strengthening
SUGGESTED THERAPEUTIC EXERCISE	<ul style="list-style-type: none"> • Functional leg strengthening <ul style="list-style-type: none"> ◦ Squats ◦ Lunges – all 3 planes ◦ Step backs ◦ Retro step ups ◦ Single leg press • Single leg balance and proprioception progression • Hip and core strengthening <ul style="list-style-type: none"> ◦ Mini band drills ◦ Physioball • Stretching for patient specific muscle imbalances
CARDIOVASCULAR EXERCISE	Non-impact activities; stationary bike, elliptical, Nordic track, swimming
RETURN TO SPORT/WORK CRITERIA	1. Dynamic neuromuscular control with multi-plane activities, without pain or swelling

PHASE IV (begin after meeting Phase III criteria ~ 6 months)

APPOINTMENTS	Meet with physician at 14-16 weeks post-op Physical therapy 1x every 1-2 weeks
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REHAB GOALS	1. Good control and no pain with sport and work specific movements, including impact.
PRECAUTIONS	<ol style="list-style-type: none"> 1. Post activity soreness should resolve within 24 hours 2. Avoid post activity swelling 3. Avoid knee pain with impact
SUGGESTED THERAPEUTIC EXERCISE	<ul style="list-style-type: none"> • Impact control exercises beginning 2 feet to 2 feet progressing from 1 foot to other and then 1 foot to same foot • Movement control exercise beginning with low velocity, single plane activities and progressing to higher velocity, multi-plane activities • Sport/work specific balance and proprioceptive drills • Hip and core strengthening • Stretching for patient specific muscle imbalances
CARDIOVASCULAR EXERCISE	Replicate sport or work specific energy demands
RETURN TO MODERATE IMPACT SPORT CRITERIA (jogging, aerobics, etc.)	<ul style="list-style-type: none"> • 8 months post surgery • Good dynamic neuromuscular control with multi-plane activities, without pain or swelling
RETURN TO HIGH IMPACT SPORT CRITERIA (basketball, soccer, etc.)	<ul style="list-style-type: none"> • 10 months post surgery • Good dynamic neuromuscular control with multi-plane activities, without pain or swelling