

Autologous Chondrocyte Implantation Patella Lesion Rehabilitation Guideline

- The following protocol has been established as a reference for rehabilitation following autologous chondrocyte implantation of the patella.
- This is to serve only as a guideline. Individual cases will vary. The emphasis of this protocol is to preserve the stability of the surgical procedure and return the patient to an optimal level of function. Although time frames have been established, it is more important that goals are reached at the end of each phase prior to progression to the next.
- It is important to avoid excessive loading and sheering through the graft site to ensure proper healing. Information regarding the specific location of the implantation site on the patella should be obtained from the surgeon.
- Pain and swelling need to be carefully monitored throughout the rehabilitation process. If either occurs, the activity needs to be identified and appropriately adjusted to lessen the irritation. Ignoring these symptoms may compromise the success of the surgery and the patient's outcome.
- ROM guidelines with active knee extension strengthening in the below protocol have been written without specification to the lesion site. Please refer to the following specific guidelines to avoid excessive stress on the implantation site:

If lesion is on the...

Inferior Patella, avoid loading/sheering in flexion > 15°

Mid Patella, avoid loading/sheering in flexion > 40°

Superior Patella, avoid loading/sheering in flexion > 80°

Early Phase (Day 1 to Week 12)

<p>Weight Bearing</p> <p>Weeks 0-3</p> <ul style="list-style-type: none"> • Walk as tolerated with crutches and locked brace • Unlock brace for CPM and exercise only <p>Weeks 4-6</p> <ul style="list-style-type: none"> • Continue partial weight bearing with bilateral crutches • Increase brace ROM 0-30 degrees with ambulation as quadriceps control allows <p>Weeks 7-8</p> <ul style="list-style-type: none"> • Continue PWB status and may progress to one crutch if gait pattern normal and pain free with 2 crutches • Open brace to 0-90 degrees with ambulation if quadriceps control adequate <p>Weeks 8-12</p> <ul style="list-style-type: none"> • Progress to full weight bearing (FWB) and discard crutches and brace if pain free with minimal edema. Gait pattern should be normal 	<p>Range of Motion</p> <p>CPM</p> <ul style="list-style-type: none"> • Use 6-24 hours after surgery • Use in 2 hour increments for 8-10 hours/day • Weeks 0-3 setting of 0-30 degrees • For isolated patella facet defect: <ul style="list-style-type: none"> • Progress 5°/day per patient comfort • By weeks 4-6 setting of 0-90° to 110° should be attained • Can use CPM up to 6 weeks, important to use up to 4 weeks • For large patella defect or defect across midline stop at 30° CPM <p>ROM Exercise</p> <ul style="list-style-type: none"> • Active-assisted flexion ROM exercises within pain limits; passive knee extension ROM techniques only • Passive knee flexion – gravity assisted leg hangs over chair/bed to 90 degrees • Hamstring, gastroc/soleus and hip stretching • ROM goals: 0-90° at 4 weeks; 110° at 6 weeks; 120° at 8 weeks
<p>Strengthening</p> <p>Weeks 0-4</p> <ul style="list-style-type: none"> • Isometrics – quad sets and hamstring isometrics, straight leg raises in four directions (hip flexion, extension, abduction, adduction). Do exercise in brace if quadriceps control inadequate. Knee must be kept straight. Can add resistance above the knee • Consider use of biofeedback or electrical stimulation for muscle reeducation <p>Weeks 4-12</p> <ul style="list-style-type: none"> • Please refer to above (introduction) ROM specifications regarding quad strengthening in regards to lesion site • Progress QS, SLR, hip strengthening as tolerated, can add resistance below the knee if quad control adequate • Weeks 6-12 begin ISOMETRIC closed chain exercise (foot in fixed position) starting with very light resistance. Example – sitting in chair and lightly pushing on floor or on wall at varying angles. It is important to avoid compression stress through the implantation site • Closed chain leg press/stair master with limited knee motion 20-30 lbs with flexion less than 30 degrees • Sidelying knee extension 0-45 degrees • At weeks 6-12 may begin weight shifting activities with involved leg extended if FWB 	<p>Cardiovascular/Walking Activities</p> <ul style="list-style-type: none"> • Choose at least one for 25-40 minutes 3 times/week: Cycle with uninvolved extremity; upper body ergometer <p>Edema Control</p> <ul style="list-style-type: none"> • Ice, elevation, edema modalities and edema massage as needed (avoid non-steroidal anti-inflammatory medication) <p>Goals to be met at the end of Early Phase</p> <ul style="list-style-type: none"> • Minimal pain • Partial to full weight bearing without pain and gait deviations, use of device as needed (crutch or cane) • Minimal edema • Good quad set, SLR without extension lag • Pain free tolerance to exercise

Transitional Phase (Week 13 to 6 Months)

<p>Weight Bearing</p> <ul style="list-style-type: none"> Should be full weight bearing without gait deviation and without pain at 12 weeks. If pain present, continue use of device (cane or crutch) 	<p>Range of Motion</p> <ul style="list-style-type: none"> Should have full ROM by 12 weeks CPM should be discontinued
<p>Strengthening</p> <ul style="list-style-type: none"> Initiate isometric closed and open chain exercise with knee at varying angles – avoid loading at implantation site Continue SLR and closed chain strengthening per Early Phase Begin hamstring strengthening – manual resistance, PRE’s, machines, etc. Progressive resistive exercises (PRE’s) for gastroc/soleus, hips and upper quadrant Consider multi-hip for involved side unilateral weight bearing/balance/stabilization training 	<p>Edema Control</p> <ul style="list-style-type: none"> Maintain edema measures per Early Phase as needed post exercise <p>Cardiovascular/Walking Activities</p> <ul style="list-style-type: none"> Stationary bike with very light resistance only Stair master in limited arcs of motion 0-30° only Upper Body Ergometer Swimming with straight leg kick only Retrowalking on treadmill
<p>Functional/Balance Activities</p> <ul style="list-style-type: none"> Balance training on involved leg – eyes open, eyes closed if motor control adequate Consider use of balance/tilt board starting with bilateral weight bearing 	<p>Goals to be met at the end of Transitional Phase</p> <ul style="list-style-type: none"> Full ROM Minimal/slight edema level Pain free tolerance to exercise with adequate stability, motor control Minimal pain

Mid Phase (Month 7 through Month 9)

<p>Strengthening</p> <ul style="list-style-type: none"> Initiate closed chain dynamic strengthening (leg press, shuttle, shallow squats) in full weight bearing 0-30°. Advance knee ROM to 0-60° with bilateral closed chain knee strengthening within patient’s pain free limits. Do not progress resistance beyond body weight. 	<p>Range of Motion</p> <ul style="list-style-type: none"> Maintain full knee ROM and surrounding muscular flexibility (quads, hamstrings, gastroc/soleus, abductors and adductors)
<p>Balance/Functional Training</p> <ul style="list-style-type: none"> Progress balance/proprioceptive training (i.e., ball throws or T Band resistance in unilateral stance, tilt board/balance board, etc.) Consider slide board Consider sport cord lateral drills 	<p>Cardiovascular/Walking Activities</p> <ul style="list-style-type: none"> Continue gym cardiovascular training (Stair master – maintain knee flexion less than 60°; bike, UBE swimming) May begin forward walking on treadmill at slow to moderate pace <p>Goals to be met at the end of Mid Phase</p> <ul style="list-style-type: none"> Full pain free ROM Greater than 80% quad and hamstring strength Pain free status with exercise, no edema Minimal, occasional pain

Final Phase (Month 10 to Month 18)

Strengthening <ul style="list-style-type: none">• Advance closed chain strength training – increase resistance and decrease reps.• Progress to 90° flexion with closed chain exercises if patient pain free.• Initiate unilateral closed chain strengthening	Cardiovascular/Walking Activities <ul style="list-style-type: none">• Treadmill – progress to fast walking• Initiate slight incline 2-3° 10 month period• Jogging may begin at 12 months if pain free or per surgeon recommendation• Progress Mid Phase endurance training
Balance/Functional Training <ul style="list-style-type: none">• Initiate light plyometric activity at 12 months (vertical, horizontal jumping, bilateral jumping, etc); emphasis on eccentric control with landing. Progress as tolerated and per motor control to diagonal and unilateral plyometric training	Return to Activities/Sports <ul style="list-style-type: none">• Per surgeon guidelines, a progressive running and agility program should be incorporated beginning with straight plane running with increasing speeds• Cutting drills should begin with slow “S” cutting with progressive speeds; if stable, sharper “V” cutting may be incorporated with sport specific drills• High impact activities (basketball, tennis, etc.) may begin at 16 to 18 months or per MD guidelines• Return to sports may vary according to individual MD guidelines

Side Notes

Improper patella tracking must be corrected either prior to Carticel implantation or performed concomitantly with the Carticel implantation.