Hendricks Regional Health
ORTHOPEDICS

HENDRICKS ORTHOPEDICS
& SPORTS MEDICINE
100 Hospital Lane, Suite 300
Danville, IN 46122
317.718.4676

ACL RECONSTRUCTION WITH HAMSTRING GRAFT

1. Timelines:
    a. Follow Up with Surgeon:
        i. **2 weeks** post-op via a telemedicine visit. Please send updated PT notes to surgeon on last visit before telemedicine visit. Pt will be submitting on their own a picture of the incision via their EMR portal day before surgery. Fax therapy notes to (317) 718-2676
        i. **6 weeks** in person with the surgeon. Please send therapy notes before follow-up appt.

    b. **Suture Removal**: Therapist to remove portal sutures at days 10-14.
        i. Apply steri-strips over portal after removing sutures.

2. Defined
    a. An arthroscopic procedure where a torn or avulsed ACL is removed and replaced with a portion of the hamstring tendons. The graft is anchored with sutures or hardware through tunnels drilled in the femur and tibia.
    b. The goal of the surgery is to restore normal stability of the knee. This surgery will also decrease excess translation which could result in farther damage and early degeneration of the joint surfaces.
    c. ACL reconstruction is often combined with a partial meniscectomy or meniscus repair, and occasionally other ligamentous repairs which may change the rehab process.
3. Goals
    a. Protect the healing tissue
    b. Control post-operative pain and swelling
    c. Improve post-operative range of motion
    d. Improve functional strength, stability, and neuromuscular control
4. Rehabilitation Principles
    a. Be aware of compromised and/or repaired tissue
        i. Understand graft strain concepts in order to protect the graft.
        ii. In the first 6-12 weeks of rehab the fixation of the graft itself rather than the graft is the limiting factor.
        iii. At 12 weeks revascularization begins to occur and the graft itself is in its weakest state.
        iv. Protect the healing donor site by limiting aggressive hamstring stretches and heavy hamstring resistive training.
        v. Avoid early resistive open chain exercises (SAQ) that may shear the weak, immature ACL graft

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b. Healing tissue should never be overstressed but appropriate levels of stress are beneficial
    i. Inflammatory phase days 1-3
    ii. Tissue repair with proliferation phase days 3-20
    iii. Scar tissue most responsive to remodeling 21-60 days but occurs from 1 to 8 weeks
    iv. Final maturation taking
    v. Graft integration
        1. Revascularization begins at week 12
c. Tissue reactivity of the knee and tissue healing will dictate the rehabilitation process. Reactivity is determined by the clinical exam
    i. Level I Reactivity
        1. Resting pain, pain before end range.
        2. Aggressive stretching is contraindicated.
        3. Grade I-II mobilization for neurophysiological effect
    ii. Level II Reactivity
        1. Pain onset occurs with end range resistance
        2. Grade III and IV mobilization appropriate per patient tolerance
    iii. Level III Reactivity
        1. Engagement of capsular end feel with little or no pain
        2. Pain occurs after resistance
        3. Grade III and IV mobilization and sustained stretching is appropriate
d. Ensure return of appropriate joint arthrokinematics
e. Apply techniques in loose packed unidirectional and progress to close packed and multidirectional based on tissue healing and patient response
f. Eliminate inflammation as the cause of pain and neuromuscular inhibition
    i. Initiate early ROM with emphasis on obtaining full, early extension.
    ii. Initiate early activity of quads and hamstrings (isometric, isotonic, resistive) with e-stim and biofeedback.
    iii. Initiate early (2nd visit), closed-chain activity to provide compression across the knee
g. Identify motion complications early and begin low-load, long duration stretching activity
h. Facilitate performance of complex skills with proprioceptive and kinesthetic techniques: Low to high, sagittal to frontal, bilateral to unilateral, stable to unstable, slow to fast, fixed to unfixed surface
    i. Initiate early proprioceptive activity.
    ii. Incorporate comprehensive lower extremity (hip and calf) muscle stabilization and strengthening activities as well as core strengthening activities.
    iii. Address limb confidence issues with progression of unilateral activity.
    iv. Address limb velocity issues during gait with verbal and tactile cueing.
i. Clinical Restrictions
    i. No short arc quads
    ii. No knee extension machine less than 40 degrees of knee flexion (6 months)
    iii. No deep knee bends under body weight

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iv. No heavy hamstring resistive activity for 4-6 weeks
v. No aggressive hamstring stretching for 4 weeks

j. Encourage life-long activity modification PPP 0-40, low impact aerobic, etc
k. Factors that affect the rehab process
i. Surgical approach
ii. Tissue quality
iii. Presence of concomitant pathology
iv. Age of patient
v. Comorbidities
vi. Pre and intra-operative range of motion
vii. Pain and sensitivity levels
viii. Cognitive abilities

5. Post op functional guidelines
a. Dependent on functional range of motion, strength, and neuromuscular control
b. Drive 7-14 days
i. Patient should check car insurance restriction
ii. Be aware of drug precautions
c. Work
i. Sedentary 1-2 weeks
ii. Medium to high physical demand level 8-12+ weeks
d. Golf
i. 12 weeks in functional brace
1. No limb velocity asymmetry with gait
ii. Encourage backward golfing
1. Putting, chipping, short irons, 50% swing, 75%, swing and 100% swing
2. Avoid bunkers, uneven surfaces and severe slopes
iii. Warm up properly with stretching
e. Sports
i. Jogging on the treadmill
1. Can initiate at week 12 in functional brace
2. Observe and minimize limb velocity asymmetry
3. Encourage lower impact activity
ii. Acceleration Training
1. At week 12 in functional brace
iii. Cutting and rotational activity
1. At week 24 in functional brace
iv. Return to sport
1. Tennis 5 months
2. All other sports 6 months
a. Dependent upon good quad control, full range of motion, 80% score on hop test, normal KT test (when ordered and appropriate) and 80% Isokinetic score (when ordered and appropriate)

6. Post op equipment guidelines
a. CPM
i. 4 times per day

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ii. 60-90 minute sessions
iii. Start 0-70 degrees with a 5 degree per day increase

b. Brace
   i. Locked a 0 degrees for first two days
   ii. Unlock brace 0-90 degrees post-op day 2 (typically done by MD)
   iii. DC brace at the end of week 4 (typically coincides with MD follow up appointment)
   iv. In the first four weeks patient can be out of the brace at night if full extension is achieved

c. Assistive Device (crutch, cane, walker)
   i. 2 crutches for 2 weeks, then 1 crutch for 1 week
   ii. Dependent upon adequate quad control, no observed gait deviations, and no change in pain, swelling, or effusion

d. Functional brace
   i. Fit at week 8 in MD office

7. Rehabilitation
   a. Week 1: Protective ROM phase
      i. Precautions/limits
         1. Swelling and effusion
         2. Restore range of motion
         3. Inhibit post-op muscle shut down
         4. Gait deviations
      ii. Rx/Clinical Expectations
         1. 0 degrees of extension to 100 degrees of flexion
         2. Initiate gentle scar and patellar mobilization
         3. Visible quad contraction (fair- to fair)
         4. Independent SLR without extensor lag
         5. Independent ambulation with 2 axillary crutches without deviation.
         6. Initiate passive and active knee ROM
         7. E-Stim, biofeedback, verbal, and tactile cuing for quad re-education
         8. Initiate sub-max, sub-painful isometric hamstring contraction
         9. Begin and progress bilateral closed-chain activity to improve limb confidence
         10. Begin and progress bilateral proprioceptive activity and reactive neuromuscular training (RNT)
         11. Begin and progress hip, calf and core strengthening
         12. Initiate gentle hamstring stretching
   b. Week 2: protective ROM phase Cont.
      i. Precautions/Limits
         1. Swelling and effusion
         2. ROM
         3. Muscular inhibition
         4. Poor quad control
      ii. Rx/Clinical Expectations
         1. 0 degrees of extension and 115 degrees of flexion
         2. Visible and moderate intensity quad contraction – dispense home stim unit if poor

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3. Ambulating with 2 axillary crutches without deviation
4. Continue patellar and scar mobilization and knee ROM
5. Initiate active hamstring activity without resistance (prone leg curl)
6. Continue lower extremity stretching program and add gentle weight bearing gastroc/soleus stretching
7. Initiate unilateral flexion activity under weight bearing (i.e. step ups)
8. Initiate knee extension from 90 degrees to 40 degrees of knee flexion with 1#
9. Progress hip, calf, and core strengthening activities

c. Week 3: ROM and Weight bearing progression phase
   i. Precautions/limits
      1. Swelling and effusion
      2. ROM
      3. Muscular inhibition
      4. Poor quad control
   ii. Rx/Clinical Expectations
      1. 0 degrees of extension without guarding and 125 degrees of flexion
      2. Visible and moderate intensity quad contraction
      3. Ambulating with one crutch without deviation
      4. Continue comprehensive lower extremity stretching
      5. Progress lower extremity and core strengthening program
      6. Continue with e-stim, biofeedback, verbal, and/or tactile cueing for quad facilitation
      7. Begin light resistance hamstring strengthening with cuff weight
      8. Progress knee extension 90-40 degrees to 2#
      9. Progress bilateral and unilateral closed chain activities to improve limb confidence, proprioception, and RNT
      10. Continue unilateral flexion activity under weight bearing
d. Week 4-7: ROM/Strengthening Phase
   i. Precautions/Limits
      1. Swelling and effusion
      2. ROM
      3. Progression dependent on quad control and limb confidence
   ii. Rx/Clinical Expectations
      1. 0 degrees of extension without guarding and full knee extension (heel to buttock)
      2. Ambulating without crutch without deviation
      3. Continue comprehensive lower extremity stretching
      4. Progress lower extremity and core strengthening program
      5. Progress bilateral and unilateral closed chain activities to improve limb confidence, proprioception, and RNT
      6. Continue unilateral flexion activity under weight bearing
      7. Progress knee extension 90-40 to 3-6#
e. Weeks 8-12: Functional Strengthening Phase
   i. Limits/ Precautions
      1. Selling and effusion
      2. ROM

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3. Progression dependent on quad control and limb confidence
4. Graft is at its weakest during revascularization

ii. Rx/Clinical Expectations

1. 0 degrees of extension without guarding and full knee extension (heel to buttock)
2. Visible and strong quad contraction but still asymmetrical
3. Ambulating without a crutch with symmetrical limb velocities
4. Continue comprehensive lower extremity stretching
5. Progress lower extremity and core strengthening program
6. Progress bilateral and unilateral closed chain activities to improve limb confidence, proprioception, and RNT
7. Continue unilateral flexion activity under weight bearing
8. Progress knee extension 90-40 to 7-11#
9. Initiate and progress basic bilateral hopping activities that require leaving the ground with emphasis on quality and short distances
10. Demonstrate symmetrical landing pattern with basic bilateral hopping activities

f. Weeks 12-16: Begin Return to Sport Training

i. Limits/Precautions

1. Selling and effusion
2. Progression dependent on quad control and limb confidence
3. Graft is still weak and should not be overstressed

ii. Rx/ Clinical Expectations

1. Visible quad contraction that is symmetrical
2. Able to demonstrate good landing with plyometric activity to include the following
    a. Good athletic posture (spine erect and shoulders back)
    b. No valgus with landing
    c. Soft landing
    d. "Stick the landing"
3. Demonstrate 80% score on the single leg hop test (those returning to competitive sports only)
4. Continue comprehensive lower extremity stretching
5. Progress lower extremity and core strengthening program
6. Progress unilateral closed chain activities to improve limb confidence, proprioception, and RNT
7. Continue unilateral flexion activity under weight bearing
8. Progress knee extension 90-40 to 10-15#
9. Initiate and progress basic unilateral hopping activities (activities that require leaving the ground with emphasis on quality and short distances)
10. Able to land with symmetrical landing pattern with basic unilateral hopping activities.
11. Initiate and progress bilateral plyometric activities including jump training from different heights and increased distances
12. Proper coordination with higher – level, single plane, dynamic agility activities.

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g. Weeks 16-24: Sport Specific Training
    i. Limits/Precautions
        1. Swelling and effusion
        2. Address any limb velocity asymmetries
        3. Poot proprioception or technique with higher – level single plane activities
    ii. Rx/Expectations
        1. Continue comprehensive lower extremity stretching
        2. Progress lower extremity and core strengthening program
        3. Progress unilateral closed chain activities to improve limb confidence, proprioception, and RNT
        4. Continue unilateral flexion activity under weight bearing
        5. Progress knee extension 90-40 to 15-23#
        6. Progress basic unilateral hopping activities to increased heights and distances
        7. Progress bilateral plyometric activities including jump training from different heights and increased distances
        8. Initiate higher-level, sports-specific, single place, agility activities (forward, retro and lateral only – no cutting activities)
h. Week 24-28: Return to Sport