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Femoral Condyle MACI Cartilage Restoration Surgery Rehabilitation Protocol

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NOTES:

- These are guidelines for the trained therapist.
    - Note that swelling is common in transplants up to 9 months post-op.
    - Continued improvement in comfort occurs for 2-3 years before maximal outcome is achieved.

- This is complex surgery with a delicate graft – it is critical to review the operative report (may be obtained from the office) to **ensure not to overload the graft at any point throughout the rehabilitation process**.

- Attaining the goals of each phase are important prior to progressing to the next phase. If at any point the range of motion is not achieved within 20 degrees of goal by the time period suggested in the protocol, please contact my office.

- Primary goals include restoration of normal gait, full ROM, improvement in strength and endurance and restoration of neuromuscular control.

- **Please note**: the protocol starting on page 4 is SPLIT between femoral condyle MACI surgeries and Patellofemoral MACI surgeries. It is **critical** that the appropriate protocol is followed depending on the location of the MACI surgery (my additional guidelines below are **femoral condyle-specific** MACI surgeries). If both femoral condyle and patellofemoral MACI is performed, follow the less aggressive guideline at each stage and reference my MACI patellofemoral additional guidelines document.

- **Please note**: below are additional guidelines that are modifications by Dr. Ayzenberg to the MACI protocol (Yellow background protocol beginning on page 4 after these modifications). These guidelines **take precedence** over the referenced protocol.

    - **Phase I (0-6 weeks) additional guidelines:**
        - Touch down weight bearing with crutches x 4 weeks, progress to 25% WB at week 5.
        - Range of Motion
            - Goal to restore full passive knee extension immediately
            - Goal of minimum 90 degrees flexion by 2 weeks, 105 by week 3, 115 by week 4. 120 by week 6.
            - Patella mobilizations – teach patient as much as possible to do these 6x daily as well.

        - Continuous Passive Motion Machine (CPM) should be initiated 24-48 hours after surgery and should be performed **6-8** hours daily first 6 weeks: starting at 0-30 degrees motion and increasing 5-10 degrees daily as tolerated.
    - Strengthening
        - Quad sets, SLR in knee immobilizer as needed if poor quadriceps control, leg curl/heel slides, hip abduction
        - Stationary bicycle with no resistance once 90 degrees knee flexion obtained (~ 4weeks).
        - Dangle knee over side of the bed 5 times per day to achieve 90 degrees.
    - E-stim for VMO/quadriceps muscle re-education/biofeedback encouraged early after surgery if needed.
    - Gentle massage/deep friction to hamstring insertions, suprapatellar quadriceps, medial/lateral gutters, and infrapatellar fat pad region at 2-3 weeks post-op.
    - No progression to phase II until these goals and those of below protocol met.

- **Phase II (6-12 weeks) additional guidelines:**
    - 50% weight bearing with crutches week 6, full weight bearing by weeks 8-9.
    - Continue prior goals.
    - Range of motion
        - Progress ROM to 125-135 degrees by week 6.
        - May discontinue CPM if motion goals achieved by week 6.
    - Strengthening
        - Progress bilateral closed chain strengthening between weeks 6-10
        - Mini squats 0-45 degrees and calf raises beginning week 8
        - Begin open kinetic chain exercises without resistance at week 9
        - Progress to unilateral closed chain exercises and begin balance activities between 10-12 weeks.
        - Begin treadmill walking between weeks 10-12 as symptoms allow.
    - Precautions
        - If defect on the anterior aspect of femoral condyle: May perform exercises in deeper range of motion flexion, but avoid hyperextension.
        - If defect on posterior aspect of femoral condyle: avoid exercises in deep flexion ROM (>45 degrees).
    - E-stim for VMO/quadriceps muscle re-education/biofeedback encouraged early after surgery if needed.
    - Gentle massage/deep friction to hamstring insertions, suprapatellar quadriceps, medial/lateral gutters, and infrapatellar fat pad region at 2-3 weeks post-op.
    - No progression to phase II until these goals and those of below protocol met.

- **Phase III (3-6 months) additional guidelines:**
    - Strengthening
        - Squats 0-60 degrees
        - Leg press 0-90 degrees
        - Progress loading during balance exercises

  - Precautions
    - If defect on the anterior aspect of femoral condyle: May perform exercises in deeper range of motion flexion, but avoid hyperextension.
    - If defect on posterior aspect of femoral condyle: avoid exercises in deep flexion ROM (>45 degrees).

- **Phase IV (6-12 months) additional guidelines:**
  - Goals: restore preoperative function, return to sport/recreation, unrestricted ADLs, maintenance of full ROM and initiation of running program
  - Strengthening
    - Continue maintenance program
    - Advance strength training and progress as tolerated
    - Emphasized single leg loading as tolerated
    - Initiate light plyometrics
  - Functional Progressions
    - Begin jogging program (earliest at 9 months)
      - Start with 2 min walk/2 min jog
    - Progress time and intensity as symptoms allow
    - Begin agility program at 9 months with emphasis on sports-specific training.
    - Low-impact sports such as swimming, cycling, skating permitted at 6 months if goals are met.
    - Medium impact sports such as running, aerobics permitted at 8 months for small lesions, 9-12 months for larger lesions.
    - High impact sports such as basketball and tennis permitted between 12-18 months if all goals met.

MACI protocol starts next – please combine with additional guidelines noted above. Remember to follow the femoral condyle-specific MACI protocol.