

Microfracture Chondroplasty

1. Defined
 - a. An arthroscopic procedure in which the area of chondral lesion is impacted with a tool to generate bleeding from the subchondral bone. This is repeated over the entire area of the lesion. The penetration of the subchondral bone eventually leads to the generation of fibrocartilagenous tissue covering the lesion.
2. Goals
 - a. Based on the 4 biological phases of cartilage healing: Proliferation, Transitional, Remodeling, and Maturation.
 - b. Protect healing tissue
 - c. Control post-operative pain and swelling
 - d. Improve post-operative range of motion
 - e. Improve functional strength, stability, and neuromuscular control
3. Rehabilitation Principles
 - a. Be aware of compromised and/or repaired tissue
 - 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 as long as 360 days
 - 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. Eliminate inflammation as the cause of pain and neuromuscular inhibition
 - e. Ensure return of appropriate joint arthrokinematics
 - f. Apply techniques in loose packed unidirectional and progress to close packed and multidirectional based on tissue healing and patient response
 - g. 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
 - h. Encourage life-long activity modification, patellar femoral protection program, low impact aerobic, etc
 - i. 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
4. Post op functional guidelines
- a. Dependant on functional range and strength, and neuromuscular control
 - b. Drive—dependant on pain medication use and which leg is surgical: consult MD for guidelines
 - c. Work—consult MD for guidelines
 - d. Sport—return at 6 months
5. Post op equipment guidelines
- a. CPM—begin immediately, starting at 0-75 degrees typical, increase 5-10 degrees per day. Use for up to 6 weeks.
 - b. Brace—None for femoral. Elastic wrap to control swelling. Brace locked in extension for patellofemoral lesions.
 - c. Assistive device (crutch, cane, walker)—modified weight bearing for 4-6 weeks post operatively, FWB at 4-6 weeks. This is dependant on size of lesion—progress more slowly with larger lesions.
 - i. Medium to large femoral: NWB x 2 weeks, TTWB at week 3, 25% at week 4.
 - ii. Small femoral: immediate TTWB weeks 0-2, 50% week 3, 75% week 4.
 - iii. Patellofemoral: immediate TTWB with brace locked in full extension weeks 0-2, 50% week 2, 75% week 3, FWB week 4.

6. Rehabilitation Guidelines

- a. Week 0-4; Protective ROM Phase
 - i. Precautions/Limits:
 - 1. Modified WB with assistive device.
 - 2. Patellar mobilization 4-6x per day.
 - 3. PROM flexion immediately 2-3 times daily, no restrictions.
 - 4. Isometrics immediately.
 - 5. Closed chain exercises initiated at 4 weeks.

6. Open chain strengthening for femoral lesions, avoid for patellofemoral lesions.
7. Stationary bike at weeks 3-4.
- ii. Rx/Clinical Expectations
 1. Reduce pain and swelling.
 2. Restore ROM to preoperative levels or passive knee extension to 0 degrees, knee flexion to 90 degrees week 1, 105 deg week 2, 115 deg week 3, 125 deg week 4.
 3. Promote articular cartilage healing.
 4. Restore neuromuscular facilitation of quadriceps.
- b. Week 4-8; Motion Restoration Phase
 - i. Precaution/Limits
 1. FWB without assistive device by 6 weeks unless large femoral lesion 50% at 6 weeks, 75% at 7 weeks, FWB at 8 weeks.
 2. Minisquats 0-45 deg week 7.
 3. Leg press for large lesions at week 6.
 4. Lunges, wall squats, step ups week 5 for small and patellofemoral lesions, week 8 for large lesions.
 5. Patellofemoral lesions begin open chain (PPP range) knee extension.
 6. PEP bilateral 5-6 weeks.
 7. SLS on flat surface 6-8 weeks.
 8. SLS on disc or ankle arc 8-10 weeks.
 - ii. Rx/Clinical Expectations
 1. FWB and normal gait pattern restored.
 2. Full extension ROM and knee flexion ROM to 125-135 degrees
 3. MMT hip and knee 4+ to 5/5.
- c. Week 8-16: Strengthening Phase
 - i. Continue strengthening and maintenance program.
- e. Week 16+; Functional Progression Phase.
 - i. Precautions/Limits
 1. Jogging at 12 weeks for small lesion, 20 weeks for large.
 2. Directional changes at 4-5 months.
 3. Sports specific drills at 5 months.
 4. Return to sport at 3-6 months (low impact such as swimming, cycling)
 5. Return to higher impact sports at 6-12 months (running, aerobics, soccer, basketball, football)

References

- Reinold M., Wilk K., Macrina L., Dugas J., Cain E. Current Concepts in the Rehabilitation Following Articular Cartilage Repair Procedures in the Knee. *J Orthop Sports Phys Ther* 2006;36(10):774-794.
- Wilk K., Briem K., Reinold M., Devine K., Dugas J., Andrews J. Rehabilitation of Articular Lesions in the Athlete's Knee. *J Orthop Sports Phys Ther* 2006;(10):815-827.
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