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Knee Arthroscopic ACL Reconstruction

Arthroscopic ACL Reconstruction: Surgery & Recovery Guide

An **arthroscopic ACL reconstruction** is a **minimally invasive procedure** used to replace a torn anterior cruciate ligament (ACL) in the knee. The procedure uses either an **autograft** (patient's own tissue) or an **allograft** (donor tissue) to reconstruct the ACL.

Surgery Process

1. Preoperative Preparation

- **Medical Evaluation:** Physical exam, imaging (MRI, X-ray).
- **Prehab (Optional):** Some patients do physical therapy before surgery to strengthen the knee.
- **Anesthesia:** General anesthesia (sometimes combined with a nerve block for post-op pain).
- **Fasting:** No food or drink after midnight before surgery.

2. Surgery (Lasts 1–2 Hours)

Graft Selection

- **Autograft (Patient's Own Tissue):**
 - **Patellar tendon graft** (common, strong but may cause anterior knee pain).
 - Requires a larger incision on the front of the knee versus other grafts
 - **Hamstring tendon graft** (less knee pain, but longer recovery).
 - **Quadriceps tendon graft** (used for revision or stronger support).
 - **Talk to your surgeon about the best graft option for your knee**
- **Allograft (Donor Tissue):** Used in older or less active patients; avoids extra incisions but has a slightly higher failure rate.

Arthroscopic Reconstruction

- **Small Incisions:** 2–3 tiny cuts (~ $\frac{1}{4}$ inch each) for the arthroscopic camera and surgical tools.
- **ACL Removal:** Torn ACL is removed.
- **Tunnel Drilling:** Small holes are drilled in the tibia (shinbone) and femur (thighbone).
- **Graft Placement:** The selected graft is **threaded through the tunnels and secured with screws or buttons**.
- **If there are other structures besides the ACL also damaged, these will also be repaired**
- **Closure:** Small stitches and surgical tape, and the knee is wrapped in a compression bandage.

Recovery Course

1. Immediate Postoperative (Same day surgery)

- **Pain Management:**
 - **Nerve block** may last **12–24 hours**.
 - Oral pain medications (NSAIDs, acetaminophen, or opioids if needed).
- **Knee Brace & Crutches:**
 - Knee brace locked in **full extension** for **1–2 weeks**.
 - **Partial weight-bearing** with crutches for **1–2 weeks**. REMAIN NON WEIGHT BEARING IF INSTRUCTED TO DO SO BY YOUR SURGEON
- **Cold Therapy:** Ice and elevation to reduce swelling.

2. Weeks 1–2 (Early Rehab & ROM)

- **PT Goals:** Reduce swelling, regain knee extension, and activate quadriceps.
- **Exercises (Passive Only):**
 - Heel slides (gentle knee bending).
 - Quadriceps sets (tightening thigh muscles).
 - Straight leg raises (to maintain strength).
- **Weight-Bearing:** Gradual increase; crutches may be discontinued by Week 2. REMAIN NON WEIGHT BEARING IF INSTRUCTED TO DO SO BY YOUR SURGEON

3. Weeks 3–6 (Progressive Strength & Stability)

- **PT Goals:**
 - Achieve **full knee extension** and **90°-120° of flexion**.
 - Improve quadriceps and hamstring activation.
- **Exercises:**
 - Stationary cycling (low resistance).
 - Bodyweight squats and lunges (as tolerated).
 - Step-ups and balance exercises.
- **Brace Discontinuation:** Typically around Week 4–6 (depends on surgeon's protocol). WEIGHT BEARING MAY BE ALLOWED AT 6 WEEKS IF YOU HAVE BEEN INSTRUCTED TO DO SO BY YOUR SURGEON.

4. Weeks 6–12 (Strengthening & Controlled Activity)

- **PT Goals:**
 - Restore **full knee motion** and **strengthen stabilizing muscles**.
 - Begin **light impact activities** (jogging, agility drills).
- **Exercises:**
 - Leg presses, resistance bands, and single-leg balance work.
 - Light jogging around **Week 10–12** (if cleared by PT).

5. Months 3–6 (Advanced Strength & Sports-Specific Training)

- **PT Goals:**
 - Improve **speed, coordination, and endurance**.
 - Continue **plyometric training (jumping, cutting drills)**.
- **Return to Sports:**
 - **Non-contact sports (light running, biking, swimming):** Around **4–6 months**.
 - **High-impact, cutting sports (soccer, basketball, football):** Typically **9–12 months**, depending on strength and stability.

6. Full Recovery (9–12+ Months)

- **Graft Maturation:** The graft takes **9–12 months** to fully integrate and strengthen.
- **Return to Play Tests:**
 - Functional movement testing (hopping, sprinting, cutting).
 - Strength comparison to the non-injured leg (at least 90% strength).

Potential Risks

- **Graft Failure (Higher Risk in Allografts or Early Return to Sport).**
- **Knee Stiffness (Avoid by Maintaining Full Extension Early On).**
- **Infection or Blood Clots (Rare but Serious).**

Return to Sport Timeline After ACL Reconstruction

Returning to sports after ACL reconstruction is a **gradual process** that prioritizes **graft healing, strength, stability, and neuromuscular control**. The timeline varies depending on **graft type, surgical technique, rehab progression, and sport-specific demands**.

Key Rule:

- **Returning too soon (before 9 months) increases re-injury risk by up to 4x.**
- **Full return to cutting/pivoting sports typically takes 9–12+ months.**

 **Return to Sport Phases****Phase 1: Early Rehab (Weeks 1–6)**

 **Goals:** Reduce swelling, restore full knee extension, and activate muscles.

 **No running, jumping, or pivoting.**

 **Activities Allowed:**

- Walking with a normal gait.
- Stationary cycling (low resistance).
- Bodyweight exercises (quad sets, straight leg raises).

Phase 2: Strength & Controlled Movement (Weeks 6–12)

 **Goals:** Regain knee strength, improve balance, and increase range of motion (ROM).

 **No sprinting, cutting, or high-impact movements.**

 **Activities Allowed:**

- **Light weightlifting** (leg presses, hamstring curls, squats).
- **Balance & proprioception exercises** (single-leg stance, BOSU ball drills).
- **Elliptical & swimming** (low impact).

Phase 3: Jogging & Early Sport-Specific Drills (Months 3–6)

 **Goals:** Improve endurance, start controlled impact activities.

 **No cutting, pivoting, or contact sports yet.**

 **Activities Allowed:**

- **Jogging (Week 12+)** – Only if strength is at **70% of the non-injured leg**.
- **Lateral movements & agility drills (Month 4–5)**.
- **Light plyometrics (Month 5)**.
- **Controlled sport-specific drills (Month 5–6)**.

 **Phase 4: Advanced Sports Training (Months 6–9)**

 **Goals:** Restore full power, cutting, jumping, and landing mechanics.

 **No competition yet (risk of re-injury is still high).**

 **Activities Allowed:**

- **Progress to sprinting, cutting, and pivoting.**
- **Higher-intensity agility drills** (ladders, cone drills).
- **Sport-specific skills** (shooting, passing, dribbling, but NO scrimmaging yet).

Phase 5: Full Return to Sport (Months 9–12+)

 **Goals:** Achieve **≥90% quad/hamstring strength** compared to the non-injured leg.

 **Cleared for full-contact sports after passing return-to-play tests.**

 **Activities Allowed:**

- **Full team practices (Month 9–10).**
- **Gradual return to competition (Month 10–12).**
- **Full game play (after 12 months if cleared by surgeon & PT).**

 **Return-to-Sport Readiness Tests (Month 9–12)**

-  **Single-leg hop tests** (must be $\geq 90\%$ compared to non-injured leg).
-  **Isokinetic strength testing** (quad/hamstring ratio).
-  **Agility & cutting drills under fatigue** (must maintain form).
-  **Psychological readiness (confidence in knee function).**

 **High-Risk Sports (Require Closer Monitoring)**

-  **Basketball, soccer, football, rugby, tennis** – High cutting & pivoting demands.
-  **Skiing, gymnastics** – Requires strong knee stability & balance.
-  **Wrestling, MMA** – High risk of re-injury due to unpredictable forces.