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# ***ACL Reconstruction and Prevention of Permanent Arthrofibrosis***

## **Introduction**

Knee motion complications and resultant arthrofibrosis have been reported following modern methods of anterior cruciate ligament (ACL) reconstruction in 1 - 10% of patients despite early rehabilitation protocols. Wide discrepancy exists among authors on the treatment of limitation of knee flexion and extension, especially with regard to when intervention is warranted postoperatively and what type of treatment should be implemented.

Historically, manipulation under anesthesia has been performed an average of 5 to 8 months postoperatively for extension deficits of  $<10^\circ$  or flexion  $<120^\circ$ . Arthroscopic lysis of adhesions has been performed 4 to 16 months postoperatively for similar losses of extension and flexion. We challenged these programs, believing that knee motion limitations should be treated much earlier postoperatively.

## **Prevention Strategies and Postoperative Rehabilitation<sup>4</sup>**

### **■ Preoperative**

- Use modalities to resolve hemarthrosis and swelling to avoid quadriceps inhibition
- Patients must regain adequate quadriceps control and full ROM (except mechanical block)

### **■ Intraoperative**

- Arthroscopic approach, limited notchplasty to avoid graft impingement, control bleeding
- Proper ACL graft placement, fixation
- Take knee through full ROM after graft placement to ensure no impingement

### **■ Postoperative : 1st week key!**

- Drain 24 hours, compression dressing, ice/elevation 1 week
- Control pain, swelling, hemarthrosis
- Immediate motion exercises (passive, active-assisted) 1st day postop:  $0-90^\circ$ , patellar mobilization,
- Voluntary quad contraction 2nd postop day
- If poor patellar mobility, assess for patella infera (serial lateral radiographs)

### **■ Knee motion goal: $0-90^\circ$ 1 week postop; $135^\circ$ 4 - 6 weeks postop**

- Concomitant posterolateral reconstruction:  $135^\circ$  12 weeks postop

### **■ All patients partial weight bearing immediate postop, full 4 - 8 weeks postop**

### **■ Progressive rehabilitation program (normal articular cartilage, no associated procedures)**

- Goal:  $0 - 135^\circ$  by 4th p.o. week
- Full weight bearing by 4th p.o. week
- Straight running, plyometrics begun p.o. weeks 9-12

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- Return full sports activities permitted after p.o. week 20
  - Delayed rehabilitation program (abnormal articular cartilage, major concomitant procedure, revision)
  - Goal: 0 - 135° by 7-8 p.o. week except posterolateral repairs (135° 12 p.o. week)
  - Full weight bearing 7-8 p.o. week
  - Straight running 6th p.o. month select individuals
  - Articular cartilage damage: avoid high impact activities

### **Treatment Guidelines for Loss of Knee Extension**

- Goal: 0° by 7th day postop
- Extension overpressure program 7th day postop if < 0°
- Hanging weights (5-9 kg) for 10-15 minutes 6-8 times a day
- Serial extension cast program 4-12 weeks postop if -10°
- Cylinder cast placed from proximal thigh to ankle
- Use either closing anterior wedge or open posterior wedge every 12-24 hours
- Cast applied from 36 to 48 hours
- Converted to night splint, worn additional 7 - 10 days
- Repeat cast program if extension loss reoccurs
- Arthroscopic lysis adhesions 6-12 weeks postop if -12°, hard endpoint

### **Treatment Guidelines for Loss of Knee Flexion**

- Goal: 90° by 7th day postop
- Flexion overpressure program 7th day postop if <90° - rolling stool, wall exercises
- Gentle manipulation under anesthesia 3 weeks postop if <90°
- Arthroscopic lysis adhesions 6-12 weeks postop if <90°, hard endpoint

### **Results of Published Studies at Cincinnati SportsMedicine**

#### **Research and Education Foundation**

**Study #1** (207 knees ACL allograft reconstruction followed 1 year postoperatively)

- 189 (91%) normal motion (at least 0-135°) without intervention
- 18 (9%) intervention (6 extension casts, 9 manipulations, 3 arthroscopic release adhesions)
- 14/18 regained normal motion (2 minor loss extension, 2 knees permanent arthrofibrosis)

#### *Summary*

98% regained full knee motion

2% permanent arthrofibrosis

1% required arthroscopic release adhesions

**Study #2** (443 knees ACL BTB autograft reconstruction followed 1 year postoperatively)

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- 413 (93%) normal motion (at least 0-135°) without intervention
  - 23 (5%) intervention (9 extension casts, 9 manipulations, 3 arthroscopic release adhesions, 2 continuous epidural anesthetic & inpatient P.T.) - all 23 regained normal motion
  - 7 (1.5%) refused treatment intervention, had mild loss extension (5°) at follow-up

*Summary*

98% regained full knee motion

2% minor limitation extension

0% permanent arthrofibrosis

<1% required arthroscopic release adhesions