Approach to the Athlete with an ACL Tear

Primary Care Conference
11/5-11/9/25
Napa, CA

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Kaiser Permanente

I have no disclosures

Who is at Risk?

- **Active in pivoting and jumping sports**
  - **Soccer, basketball, football**
- **Females 5X higher risk**
- **Involved in competition**
- **Younger age**

ACL Tear

Cutting and Twisting Sports

Valgus and internal rotation

Making the Diagnosis

History

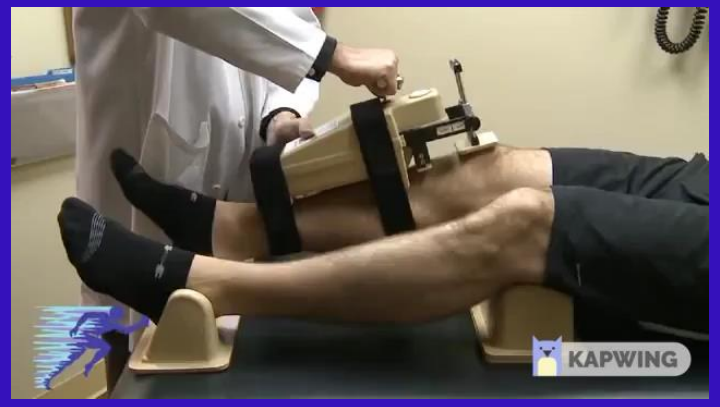
- Giving way episode
  - Rapid deceleration
  - Jumping
  - Cutting
- Often non-contact
- +/- pop
- Swelling usually within the first few hours

Exam

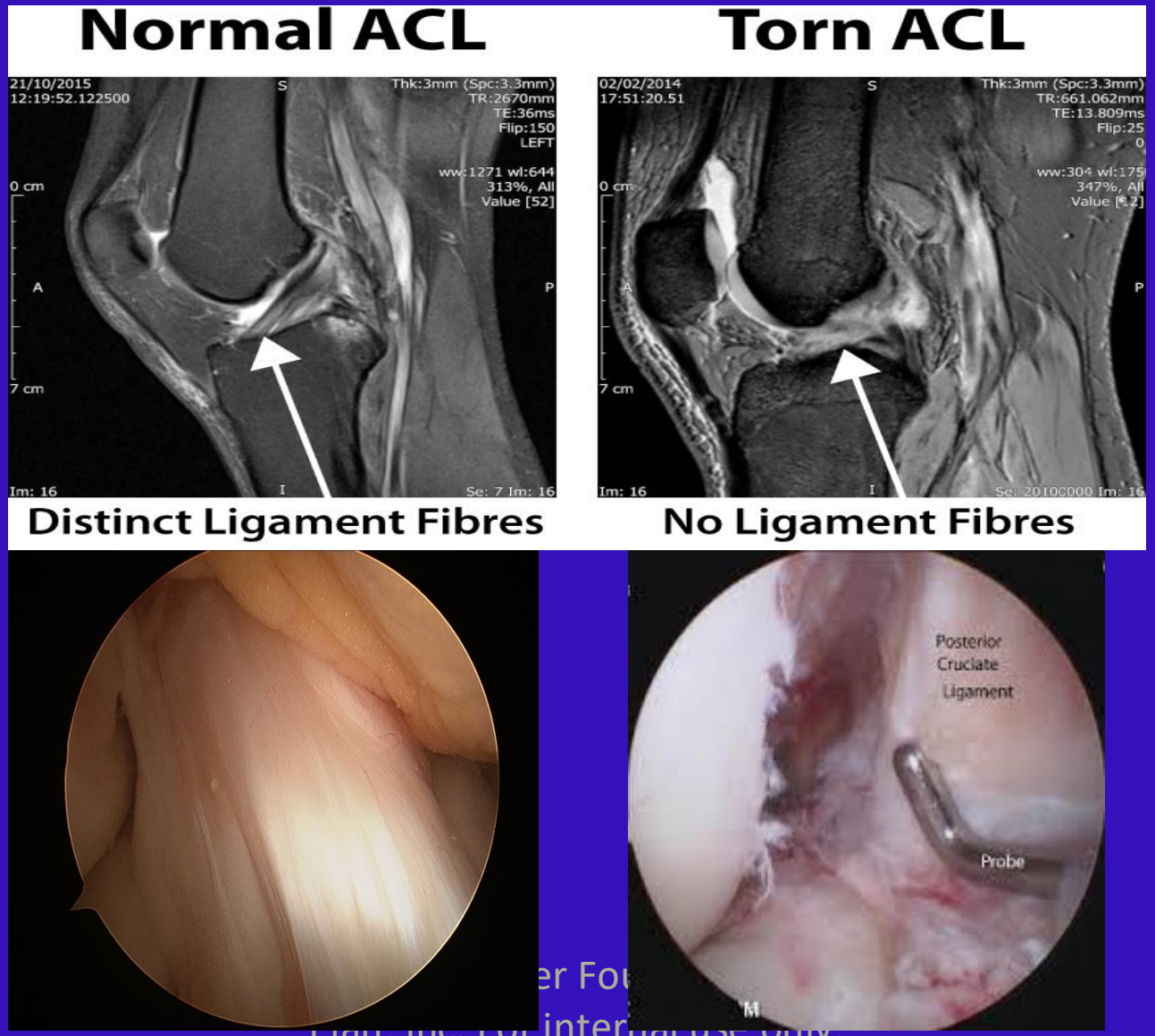
Lachman

Pivot shift

KT 1000

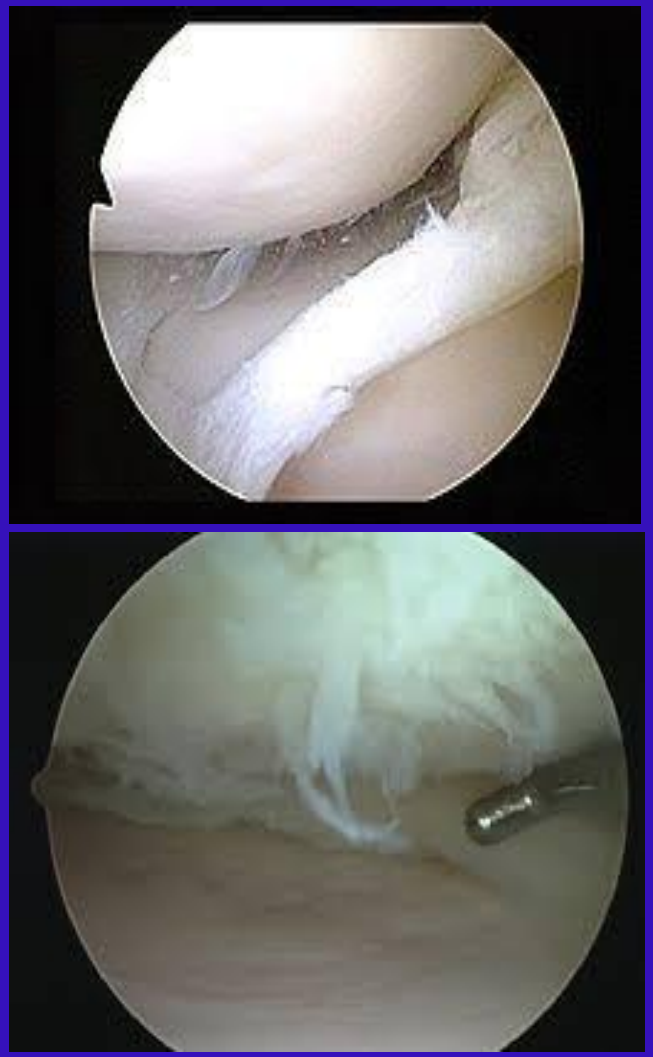


ACL Tear



What is the problem with an ACL Tear ?

- ACL tear leads to instability
- Giving way episodes lead to meniscal and cartilage injuries



Does Everyone Need a Reconstruction?

Noyes Rule of Thirds

- **1/3 will compensate well with Non-op Rx (Copers)**
- **1/3 will modify activities to avoid instability (Adapters)**
- **1/3 will require Surgery (Non-copers)**

How can we determine which 1/3 ?

The easy ones

- Sedentary

- Elite Pivoting and Twisting Sport athlete

Predicting the Risk of Instability

Hours/Yr of Level 1 and 2 sports

Laxity

KT 1000 Man Max	<50	50-199	>200
<5	Low	Low	Moderate
5-7	Low	Moderate	High
>7	Moderate	High	High

Fithian Am J Sports Med

Decision-Making for Non-op Rx

- Timed Hop test > 80% compared to normal leg
- 0-1 giving way episodes
- KOOS ADL's > 80
- Global Rating of Knee Function > 60%

- 93 patients enrolled
- 39/93 Qualified for Non-op Rx
- 12/93 Succeeded
- 15% of all comers may be copers

A subject performing the Hop Test

Kelly-Fitzgerald KSSTA 2008

Does Everyone Need a Reconstruction?

KANON Trial

- **RCT 121 patients (Sweden)**
- 62 patients Rehab + ACLR
- 59 patients Rehab + optional surgery

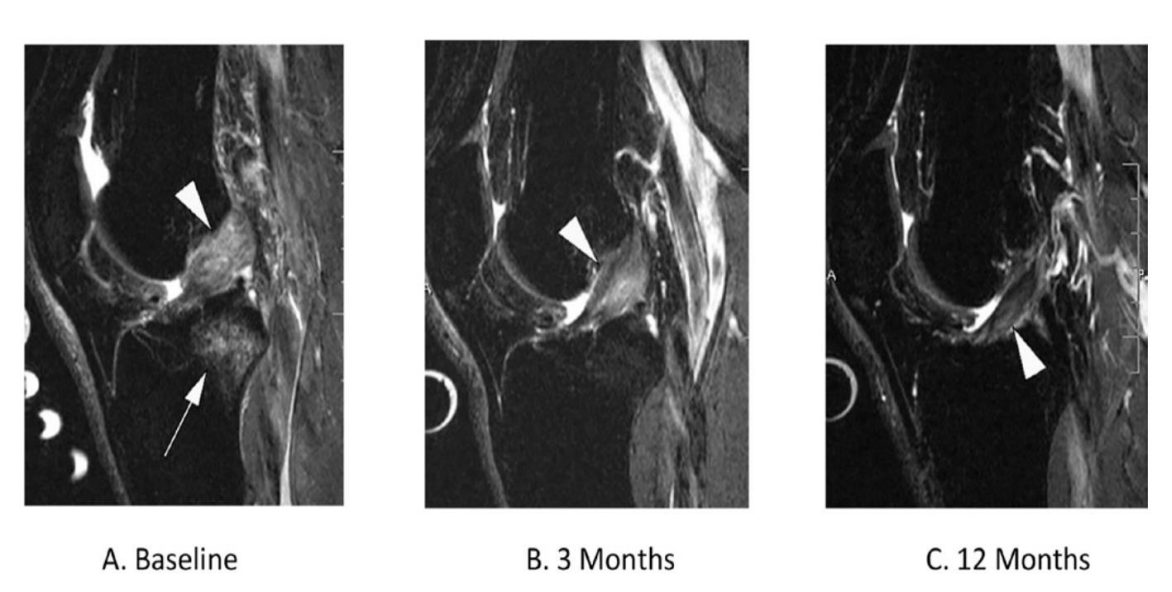
Frobell NEJM 2010
BMJ 2013

- **No difference in Knee Osteoarthritis Outcome Score (KOOS)**
  - Both groups improved
- **Surgery in 37% at 2 years and 51% by 5 years**
- **Better knee stability in ACLR group**
- **Fewer subsequent meniscal operations in the ACLR group**

ACL's Can Heal

KANON Study follow-up

Healed	Nonhealed
16 (30%)	14



Filbay SR, *et al*. *Br J Sports Med* 2023;

Cross Bracing (3 mos)

Healed	Nonhealed
72 (90%)	8

Risks
- Stiffness
- DVT/PE
- Failure 14%
- MRI healing ≠ Stability

Filbay SR, *et al*. *Br J Sports Med* 2023;

ACLR vs Non-op treatment

Covid provided non op cohort
3 yr f/u

	ACLR (N=41)	NON-OP (N=41)
Tegner	8.0 ± 1.0	5.5 ± 0.9
IKDC	90.9 ± 3.8	65.0 ± 8.1
KOOS Sport/Rec	92.4 ± 7.6	66.6 ± 6.1
Med Men Tear	5%	63%
Instability	5%	88%

Porter OJSM 2025r

Posttraumatic OA after ACL Injury
Machine learning comparison
Surgery vs Non-op Management

7.5 yrs	ACLR	NON-OP
N	975	220
PTOA	215 (22%)	140 (64%)
TKA	25 (3%)	50 (23%)

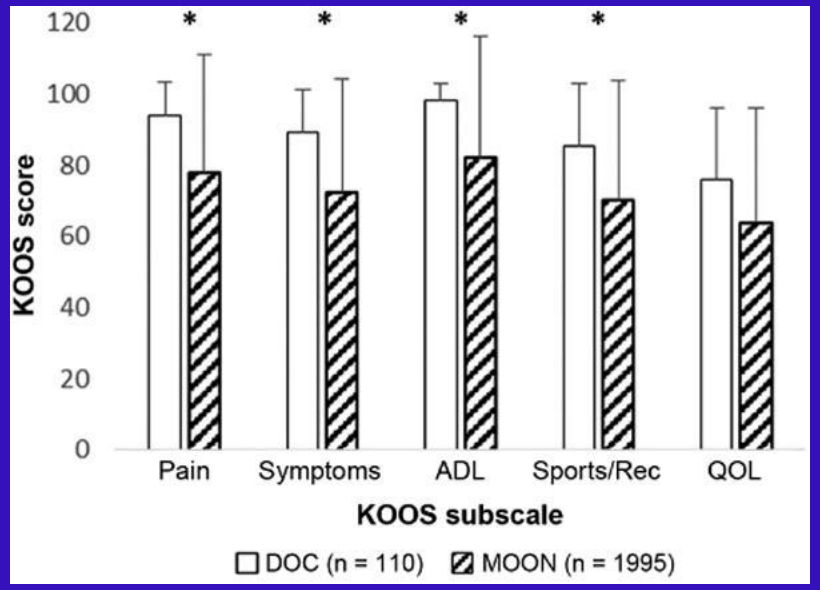
ACLR decreased rate of PTOA by 11%

Lu AJSM 2025

When is the patient ready for surgery

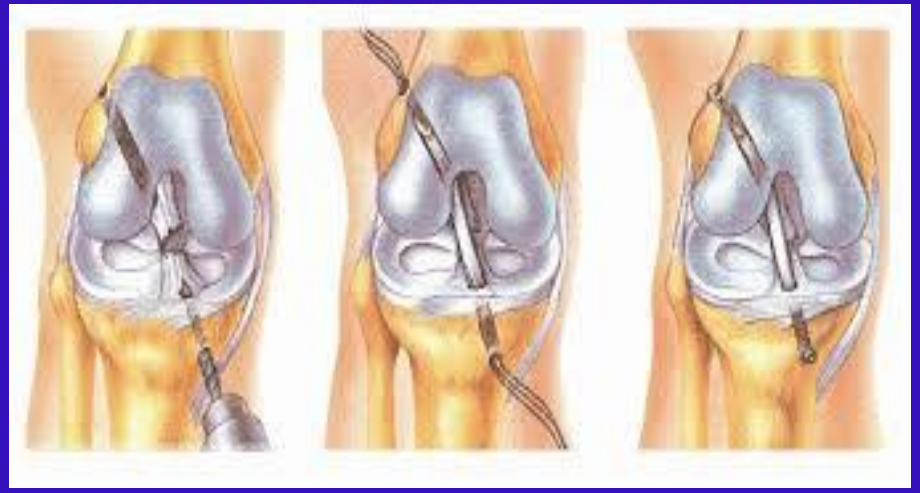
- Shelbourne
  - Full range of motion
  - No effusion

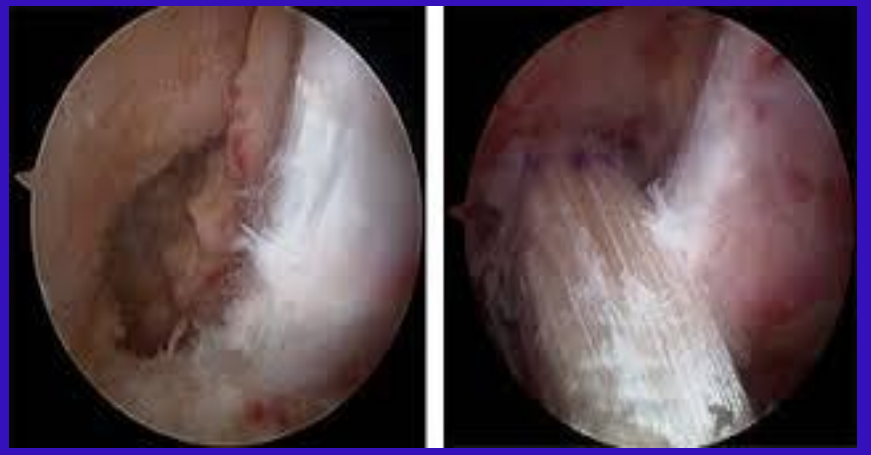
- (Delaware –Oslo cohort)
  - 10 neuromuscular training sessions
  - Better 2 yr KOOS



Failla AJSM 2016

Anterior Cruciate Ligament Reconstruction (ACLR)



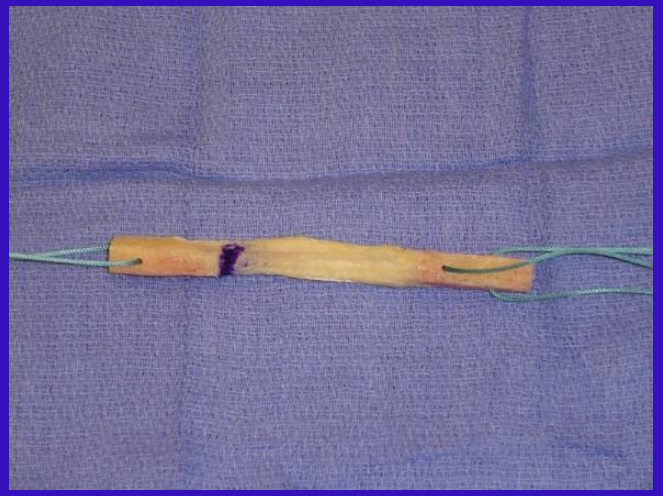


ACLR Graft Choices

Graft type

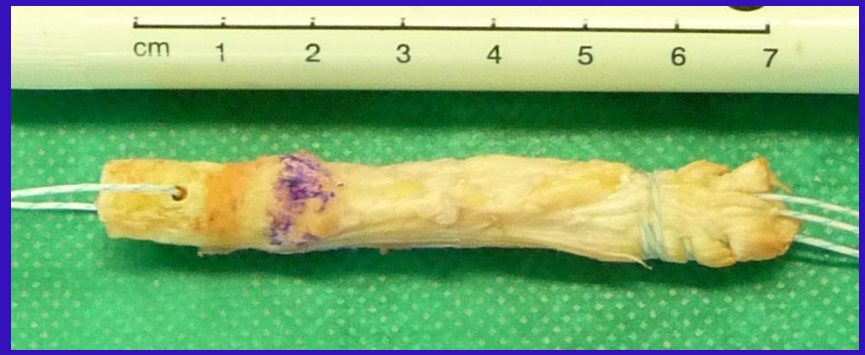
- **Autograft**
  - **Patellar tendon**
  - **Hamstring tendon**
  - **Quad tendon**
- **Allograft**
  - **Patellar tendon**
  - **Achilles tendon**
  - **Soft tissue**
    - **Tibialis**
    - **Peroneal**

Bone-Patellar Tendon-Bone (BPTB)



Hamstring Tendon Autograft

Quadriceps tendon Autograft

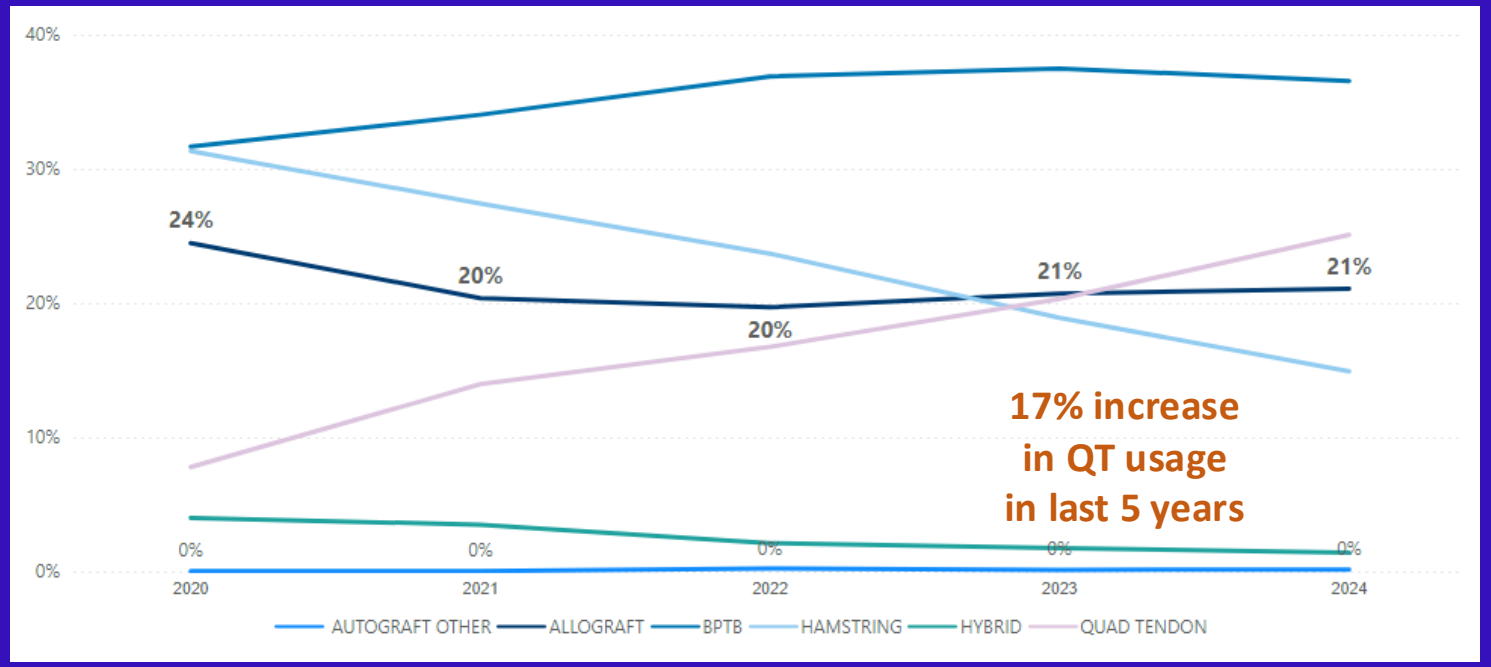


Allograft (Cadaver tissue)

Kaiser Permanente ACL Registry

Grafts utilized

2020-2024



Accelerated Rehab

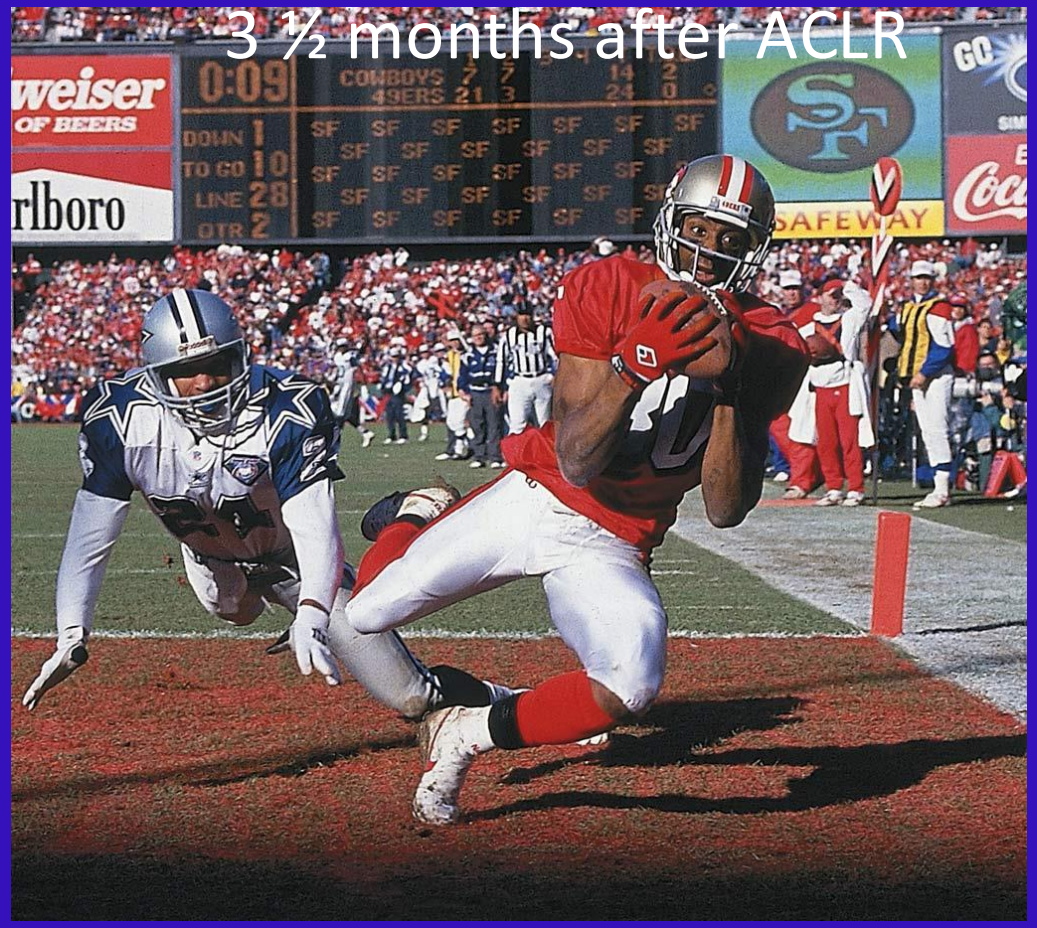
- Regaining motion is critical
  - Extension/hyperextension equal to the opposite leg

Shelbourne JOSPT 1992

- Week 1 Milestones
  - Full extension
  - Flexion to 110 degrees
  - Active quad contraction
  - Straight leg raise
  - Decreasing effusion

How fast is too fast

- Surgeons have big egos
- The faster my athletes get back the better surgeon I am



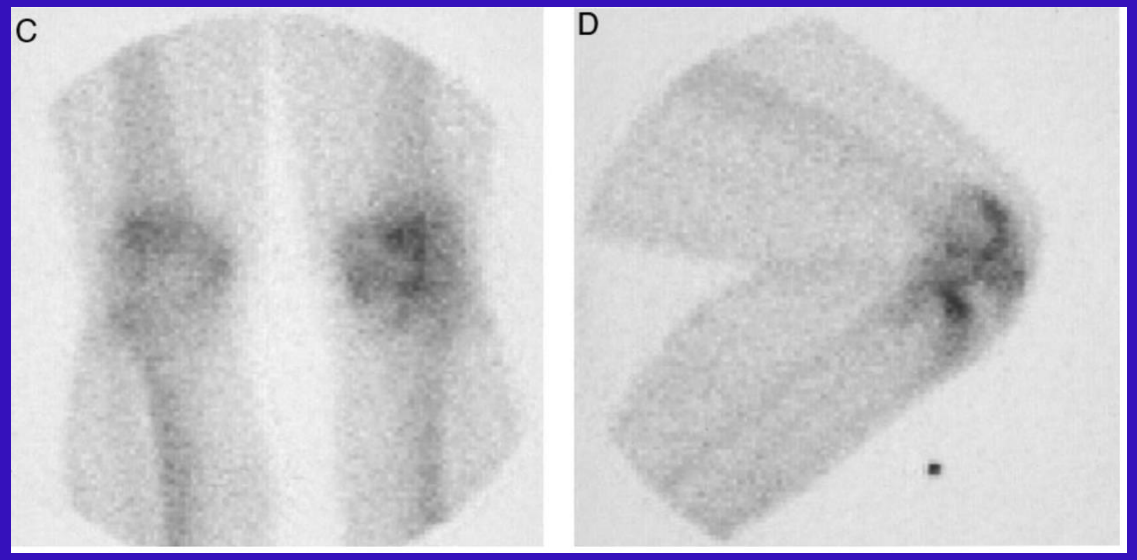
Return to Sports Criteria Delaware-Oslo ACL Cohort

- **4 X higher risk of re-injury if returning to Level 1 sport**
- **51% decrease risk of re-injury for every month RTS delayed until 9 months**
- **3% decrease in re-injury risk for every 1% increase in quadriceps strength symmetry**
- **Estimated 84% decreased risk of re-injury if 90% quadriceps strength symmetry and after 9 months**

Grindem British J Sports Med 2016

Hurry up and wait

- Pet scans and Bone scans may not return to normal for 18-24 months



- MRI changes over time

ACL Return to Sports

- **Large meta-analysis 7556 patients**
- **81% returned to some sports**
- **65% returned to preinjury level of sport**
- **55% returned to competitive sports**

Arden Br J Sports Med 2014

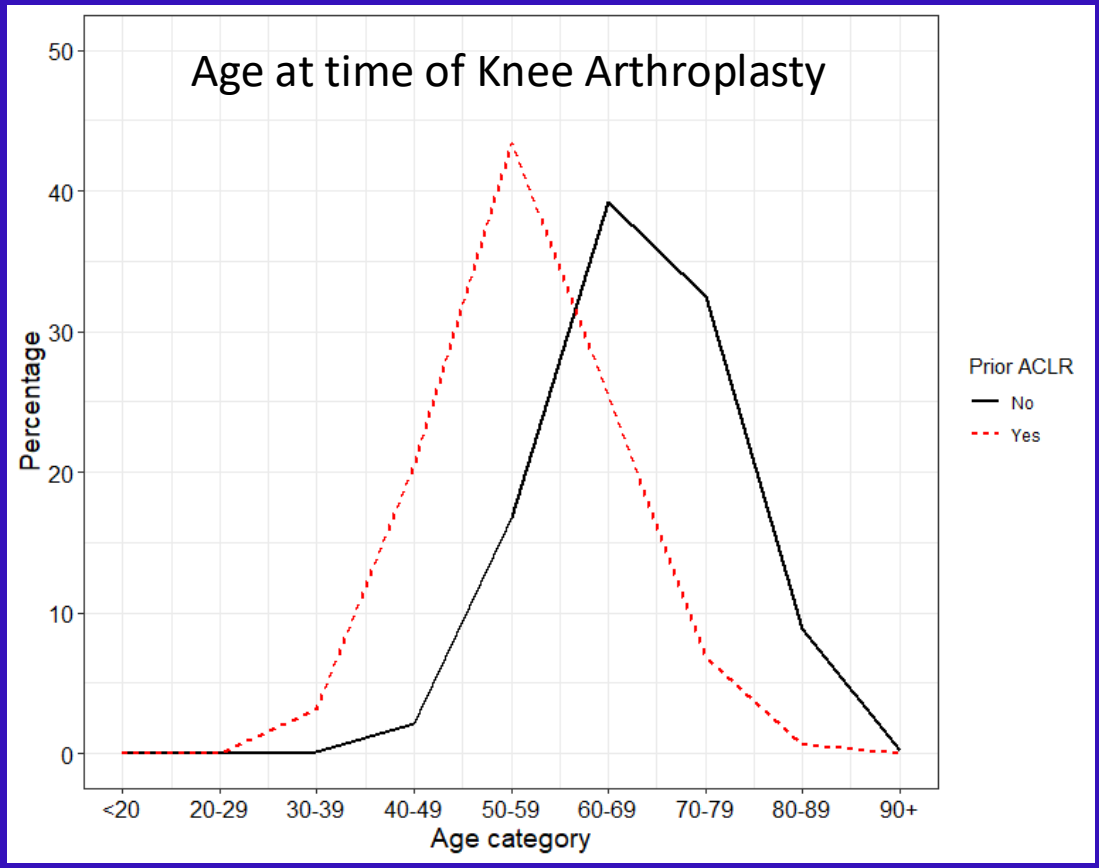
Challenges

- **Surgery doesn’t make the knee normal**
- **Osteoarthritis is increased after ACL Injury**
- **Surgery does not prevent the long term consequences of osteoarthritis**

Risk of Total Knee Replacement after ACLR

Incidence of TKA
at 15 yrs is 1.6%

Mean time to TKA 7.7 yrs



ACL Prevention Programs Are Important

- > 50,000 ACL tears per year in female high school and collegiate athletes.
- 1/100 high school female athletes
- Published studies demonstrate a 50% efficacy rate in decreasing ACL injury risk (24%-84%)

Norwegian team handball

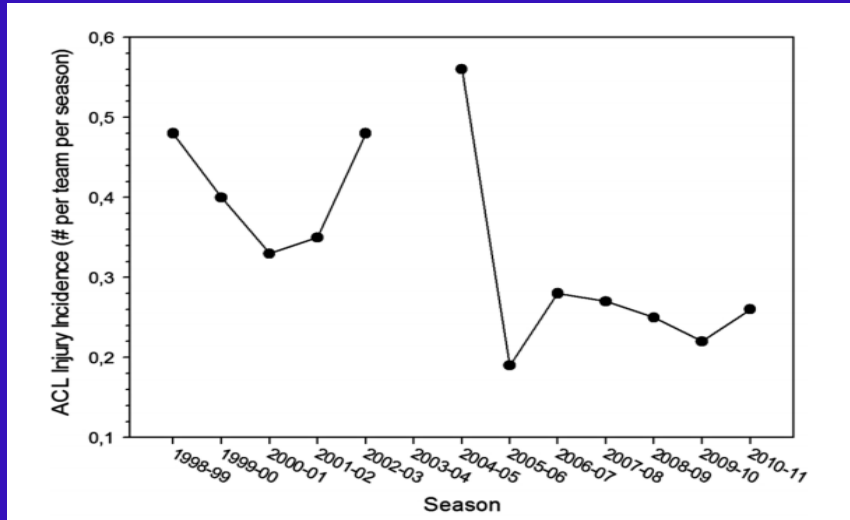


Figure 1 ACL injury incidence (# per team per season).

We need to convince parents and coaches

Thank You