

Preventing and Treating ACL Injury

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You

What should an orthopedic surgeon tell his community about ACL prevention and management?



ChatGPT



ChatGPT

An orthopedic surgeon advising their community about ACL (Anterior Cruciate Ligament) prevention and management might cover several key points. Here are some suggestions:

1. Educate on ACL Anatomy and Function:

- Explain the role of the ACL in knee stability.
- Describe how ACL injuries commonly occur during sports and physical activities.

2. Preventive Measures:

- Emphasize the importance of warm-up exercises before engaging in physical activities.
- Encourage proper techniques and form during sports to reduce the risk of ACL injuries.
- Advocate for regular strength and conditioning exercises, focusing on the muscles around the knee joint.

3. Awareness of High-Risk Activities:

- Identify sports or activities that have a higher risk of ACL injuries (e.g., soccer, basketball, skiing) and provide guidance on injury prevention strategies specific to those activities.

4. Training Programs:

- Recommend ACL injury prevention training programs, which may include agility drills, balance exercises, and neuromuscular training.

5. Equipment and Gear:

- Stress the importance of using appropriate sports equipment and protective gear.
- Advise on the proper selection and fitting of footwear.

6. Post-Injury Management:

- Discuss the importance of prompt medical attention if an ACL injury is suspected.
- Provide information on initial first aid measures (e.g., rest, ice, compression, elevation) before professional medical assessment.

7. Rehabilitation:

- Outline the stages of rehabilitation after an ACL injury or surgery.
- Stress the significance of following rehabilitation protocols and attending physical therapy sessions.

8. Return-to-Play Guidelines:

- Educate on the criteria and benchmarks for a safe return to sports after an ACL injury.
- Emphasize the importance of not rushing the recovery process.

9. Community Workshops and Events:

- Host workshops or events to engage the community in ACL injury prevention and management discussions.
- Offer hands-on demonstrations of preventive exercises and techniques.

10. Collaborate with Schools and Sports Organizations:

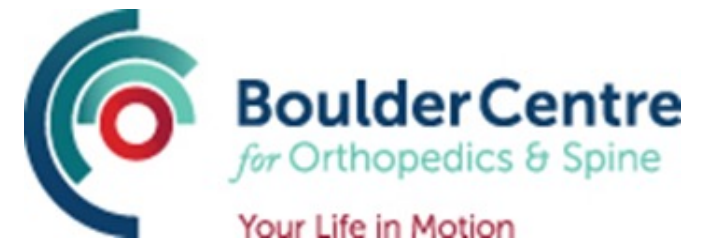
- Work with local schools and sports organizations to implement ACL injury prevention programs.
- Provide resources and support for coaches and trainers in promoting safe practices.



- Who am I?
- ACL Anatomy & Function
- ACL Injury Mechanism
- Prevention of ACL Injuries
- Diagnosis of ACL Injuries
- ACL Graft Options
- ACL Reconstruction
- Postoperative Rehab
- Hot Topics in ACL Injury
- Q&A



Who is Brian Davis, MD?



All about me!

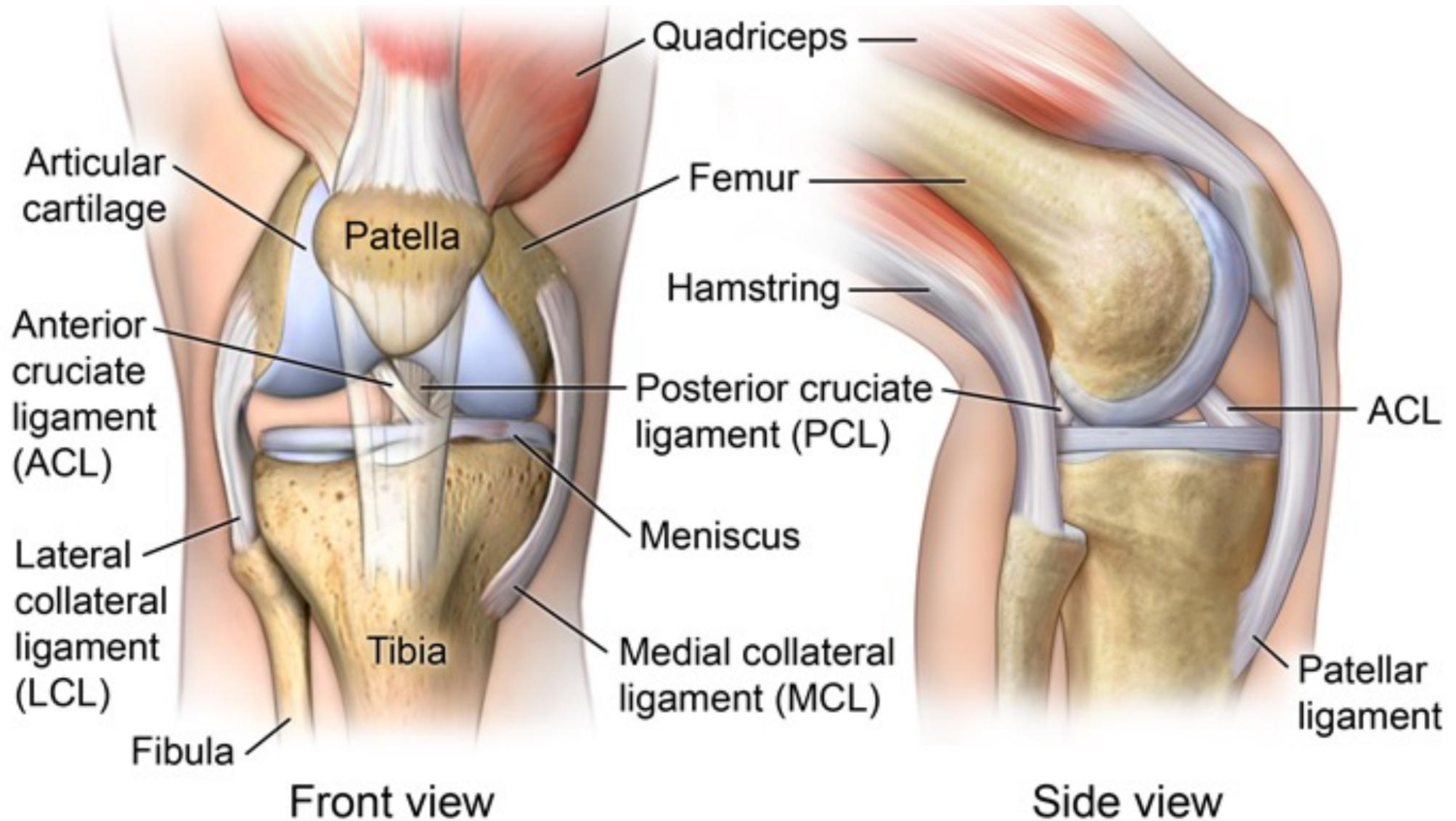


- Golden, CO native
- CSU Ram
- CU Med School
- Baylor College of Medicine (Houston, TX)
- Steadman Hawkins Clinic Denver (sports)
- Western Orthopaedics (shoulder & elbow)
- International fellowships
 - Prof. Dr. med. Ralph Hertel (Bern, Switzerland)
 - Professor Pascal Boileau (Nice, France)
- BoulderCentre for Orthopedics
- Wife & 2 kids!

ACL Anatomy & Function

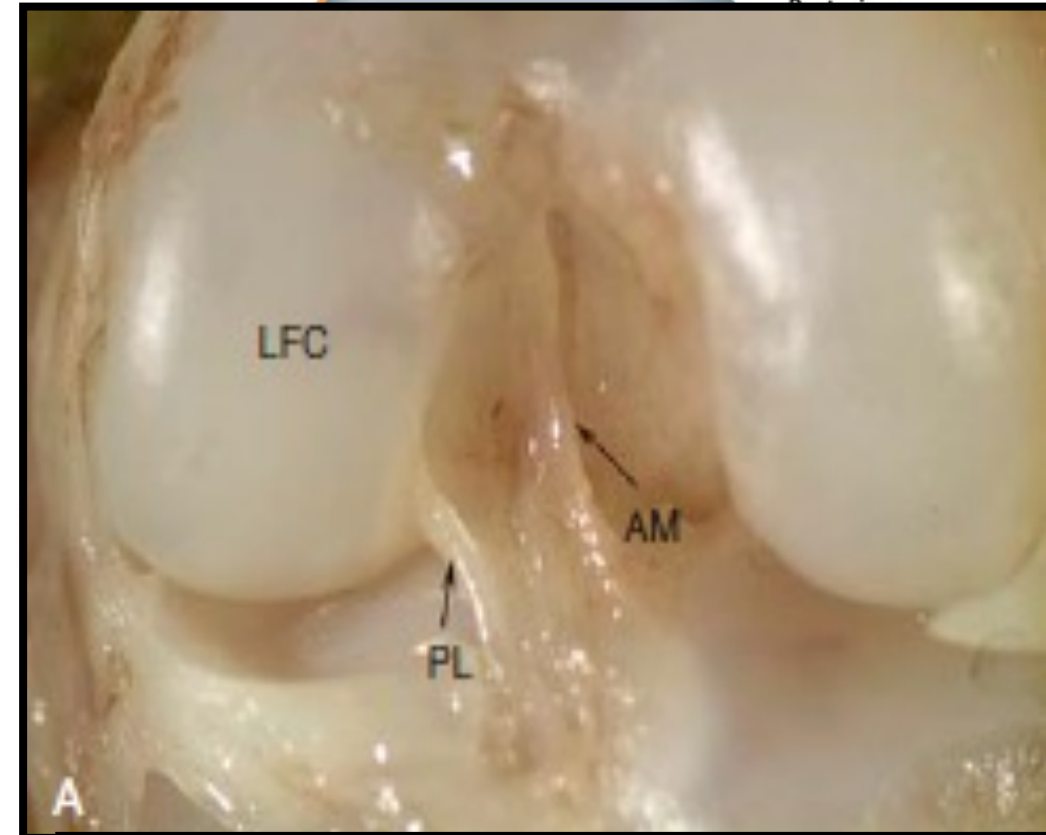


Knee Anatomy



The Anterior Cruciate Ligament

- Inside the intercondylar notch
- Starts on the lateral (outside) femur
- Ends on the anterior (front) tibia
- Composed of two bundles



DeLee and Drez's Orthopaedic Sports Medicine

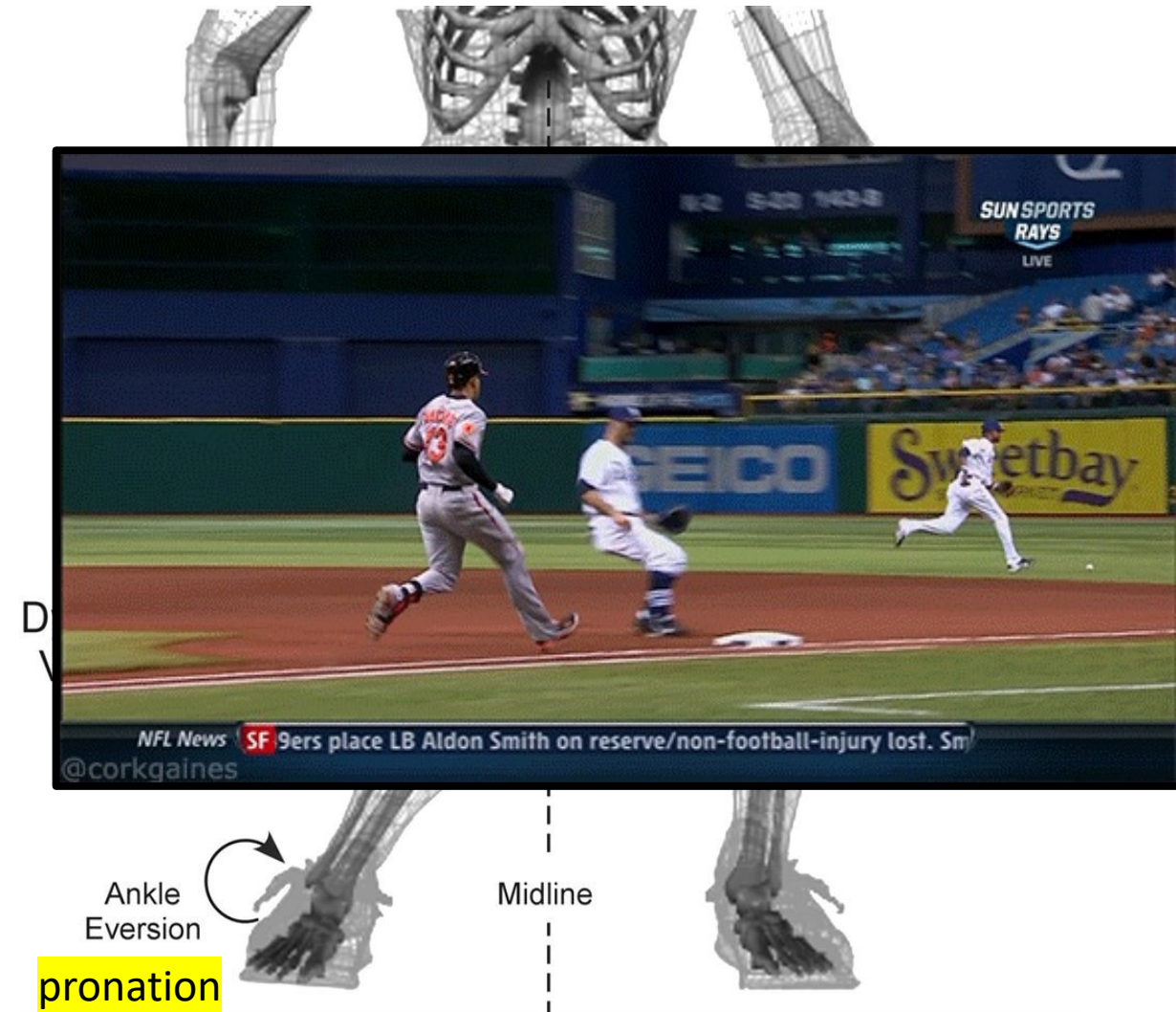


- 1) Restricts anterior-posterior (front-back) motion/translation
- 2) Prevents rotation

ACL Injury Mechanism

ACL Injury Mechanism

- 70-85% non-contact injuries
- Knee in terminal extension
- Valgus collapse
- External rotation of tibia with foot planted





- Classic history of ACL injury
 - Twisting episode on a bent knee, football tackle, or fall skiing
 - Failure of ski binding to release
 - Pop/snap felt in the knee
 - Knee gives way → fall
 - Severe pain
 - Feelings of instability when walking
 - Immediate swelling (within 1 hour)

Risk Factors for ACL Injury

- Non-modifiable
 - **Female gender** (4-6x)
 - Tibial plateau anatomy (tibial slope)
 - Family history (2x)
 - Ligamentous laxity (3x)
 - Hypermobility or “loose-jointedness”
 - Age: 15-25 at highest risk
- Modifiable
 - Landing mechanics
 - Footwear
 - Playing surface
 - Sport: soccer, volleyball, handball, basketball

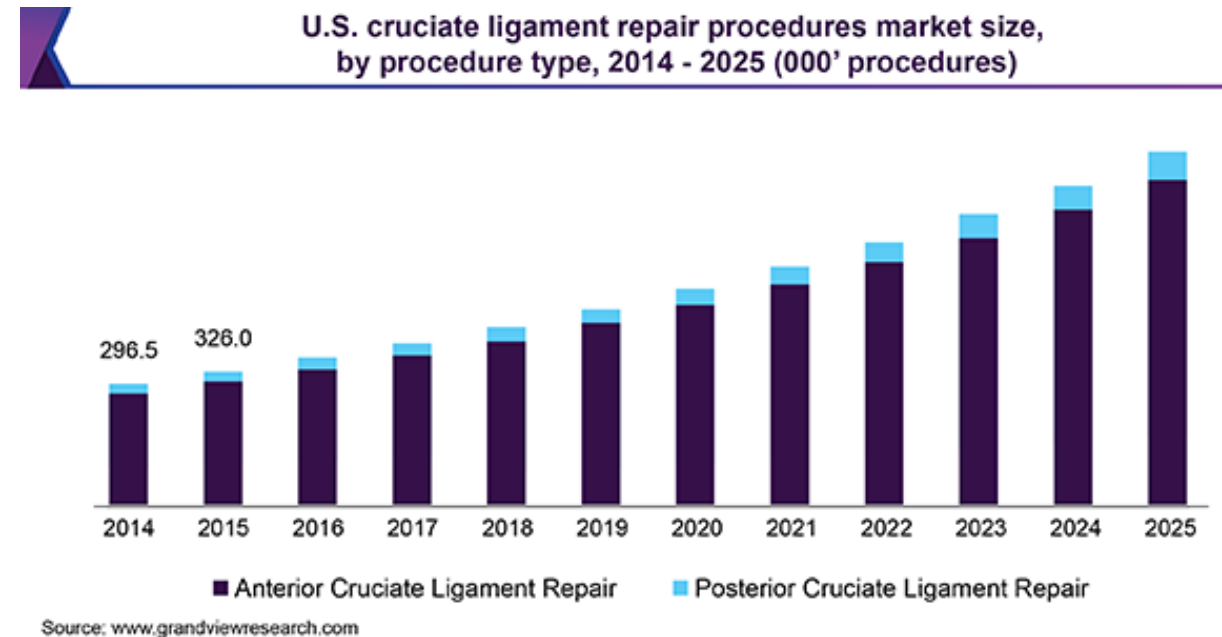


Prevention of ACL Injuries



ACL Injury Stats

- Affects >250,000 athletes in US annually
- **350,000 ACL reconstructions** are performed in US annually
- After surgery,
 - **79%** will still develop knee arthritis (>20 years after)
 - **1 in 4** athletes will have a second ACL injury
 - **Less than half** will return to sport at the same level
 - Mean **\$13,000** cost per surgery



ACL Injury Prevention

- Common themes:
 - Strength, balance, plyometrics, coaching

- FIFA 11+
- Prevent Injury & Enhance Performance (PEP)
- **52% risk reduction** in females
- **85% risk reduction** in males

FIFA 11+

PART 1 RUNNING EXERCISES - 8 MINUTES

| | | |
|--|---|--|
|  <p>1 RUNNING STRAIGHT AHEAD The course is made up of 6 to 10 pairs of parallel cones, approx. 5-6 metres apart. Two players start at the same time from the first pair of cones, jog together all the way to the last pair of cones. On the way back, you can increase your speed progressively as you warm up. 2 sets.</p> |  <p>2 RUNNING HIP OUT Walk or jog slowly, stepping at each pair of cones to lift your knee and rotate your hip backwards. Alternate between left and right legs at successive cones. 2 sets.</p> |  <p>3 RUNNING HIP IN Walk or jog slowly, stepping at each pair of cones to lift your knee and rotate your hip forwards. Alternate between left and right legs at successive cones. 2 sets.</p> |
|  <p>4 RUNNING CIRCLING PARTNER Run forwards as a pair to the first set of cones. Shuffle sideways by 90 degrees to meet in the middle. Shuffle an entire circle around one other and then return back to the cones. Repeat for each pair of cones. Remember to stay on your feet and keep your centre of gravity low by flexing your hips and knees. 2 sets.</p> |  <p>5 RUNNING SHOULDER CONTACT Run forwards as a pair to the first set of cones. Shuffle sideways by 90 degrees to meet in the middle then jump sideways towards each other to make shoulder-to-shoulder contact. Repeat 10 times on both feet with your hips and knees bent. Do not let your knees buckle inwards. Make it a full jump and synchronise your timing with your partner as you jump and land. 2 sets.</p> |  <p>6 RUNNING QUICK FORWARDS & BACKWARDS As a pair, run quickly to the second set of cones then run backwards quickly to the first pair of cones keeping your hips and knees slightly bent. Touch the ball, running two cones forward and one cone backwards. Remember to take small, quick steps. 2 sets.</p> |

PART 2 STRENGTH · PLYOMETRICS · BALANCE · 10 MINUTES

| | | |
|--|---|--|
| <p>LEVEL 1</p> <p>7 THE BENCH STATIC Starting position: Lie on your front, supporting yourself on your forearms and feet. Your elbows should be directly under your shoulders. Exercise: Lift your body up, supported on your forearms, pull your stomach in, and hold the position for 20-30 sec. Your body should be in a straight line. Try not to sway or arch your back. 2 sets.</p> | <p>LEVEL 2</p> <p>7 THE BENCH ALTERNATE LEGS Starting position: Lie on your front, supporting yourself on your forearms and feet. Your elbows should be directly under your shoulders. Exercise: Lift your body up, supported on your forearms, and pull your stomach in. Lift one leg in turn, holding for a count of 2 sec. Continue for 40-60 sec. Your body should be in a straight line. Try not to sway or arch your back. 2 sets.</p> | <p>LEVEL 3</p> <p>7 THE BENCH ONE LEG LIFT AND HOLD Starting position: Lie on your front, supporting yourself on your forearms and feet. Your elbows should be directly under your shoulders. Exercise: Lift your body up, supported on your forearms, and pull your stomach in. Lift one leg about 10-15 centimetres off the ground, and hold the position for 20-30 sec. Your body should be straight. Do not let your opposite leg do sway and do not sway or arch your lower back. Take a short break, change legs and repeat. 2 sets.</p> |
| <p>8 SIDEWAYS BENCH STATIC Starting position: Lie on your side with the knee of your foremost leg bent to 90 degrees. Support your upper body by resting on your forearm and knee. The elbow of your supporting arm should be directly under your shoulder. Exercise: Lift your supporting leg and hip until your shoulder, hip and knee are in a straight line. Hold the position for 20-30 sec. Take a short break, change sides and repeat. 2 sets on each side.</p> | <p>8 SIDEWAYS BENCH RAISE & LOWER HIP Starting position: Lie on your side with both legs straight. Lean on your forearm and the side of your foot so that your body is in a straight line from shoulder to foot. The elbow of your supporting arm should be directly under your shoulder. Exercise: Lower your hip to the ground and raise it back up again. Repeat for 20-30 sec. Take a short break, change sides and repeat. 2 sets on each side.</p> | <p>8 SIDEWAYS BENCH WITH LEG LIFT Starting position: Lie on your side with both legs straight. Lean on your forearm and the side of your foot so that your body is in a straight line from shoulder to foot. The elbow of your supporting arm should be directly under your shoulder. Exercise: Lift your supporting leg up and slowly lower it down again. Repeat for 20-30 sec. Take a short break, change sides and repeat. 2 sets on each side.</p> |
| <p>9 HAMSTRINGS BEGINNER Starting position: Travel on a soft surface. Ask your partner to hold your ankles down firmly. Exercise: Your body should be completely straight from the shoulder to the knee throughout the exercise. Lean forward as far as you can, controlling the movement with your forearms and your gluteal muscles. When you can no longer hold the position, gently take your weight on your hands, taking into a push-up position. Complete a minimum of 3-5 repetitions and/or 60 sec. 1 set.</p> | <p>9 HAMSTRINGS INTERMEDIATE Starting position: Travel on a soft surface. Ask your partner to hold your ankles down firmly. Exercise: Your body should be completely straight from the shoulder to the knee throughout the exercise. Lean forward as far as you can, controlling the movement with your forearms and your gluteal muscles. When you can no longer hold the position, gently take your weight on your hands, taking into a push-up position. Complete a minimum of 7-10 repetitions and/or 60 sec. 1 set.</p> | <p>9 HAMSTRINGS ADVANCED Starting position: Travel on a soft surface. Ask your partner to hold your ankles down firmly. Exercise: Your body should be completely straight from the shoulder to the knee throughout the exercise. Lean forward as far as you can, controlling the movement with your forearms and your gluteal muscles. When you can no longer hold the position, gently take your weight on your hands, taking into a push-up position. Complete a minimum of 10-15 repetitions and/or 60 sec. 1 set.</p> |
| <p>10 SINGLE-LEG STANCE HOLD THE BALL Starting position: Stand on one leg. Exercise: Balance on one leg while holding the ball with both hands. Keep your back upright on the ball of your foot. Remember to rest on your knees backside inwards. Hold for 30 sec. Change legs and repeat. The exercise can be made more difficult by passing the ball around your waist and/or under your other knee. 2 sets.</p> | <p>10 SINGLE-LEG STANCE THROWING BALL WITH PARTNER Starting position: Stand 3-4 m apart from your partner, with each of you carrying on one leg. Exercise: Keeping your forearms and feet in contact with the ball, throw the ball to one another. Keep your weight on the ball of your foot. Remember keep your feet just slightly flexed and try not to let it buckle inwards. Keep going for 30 sec. Change legs and repeat. 2 sets.</p> | <p>10 SINGLE-LEG STANCE TEST YOUR PARTNER Starting position: Stand on one leg, squaring your partner and at arm's length apart. Exercise: While you both try to keep your balance, each of you turns time to push the other off balance in different directions. Try to keep your weight on the ball of your foot and prevent your knee from buckling inwards. Continue for 30 sec. Change legs. 2 sets.</p> |
| <p>11 SQUATS WITH TOE RAISE Starting position: Stand with your feet hip-width apart. Place your hands on your hips if you like. Exercise: Imagine that you are about to sit down on a chair. Perform squats by bending your hips and knees to 90 degrees. Do not let your knees buckle inwards. Descend slowly from straight up more slowly. When your knee is completely straight, stand up on your feet then slowly lower down again. Repeat the exercise for 30 sec. 2 sets.</p> | <p>11 SQUATS WALKING LUNGES Starting position: Stand with your feet hip-width apart. Place your hands on your hips if you like. Exercise: Jump forward slowly at an even pace. As you jump, bend your leading leg until your hip and knee are flexed to 90 degrees. Do not let your knee buckle inwards. Try to use your upper back and hip muscles. Land gently on the ball of your foot. Repeat the exercise for 10 times on each leg and then jog back. 2 sets.</p> | <p>11 SQUATS ONE-LEG SQUATS Starting position: Stand on one leg, barely holding onto your partner. Exercise: Slightly bend your knee as far as you can manage. Concentrate on preventing the knee from buckling inwards. Bend your knee slowly. Then straighten it slightly more quickly, keeping your hips and upper body in line. Repeat the exercise 10 times on each leg. 2 sets.</p> |
| <p>12 JUMPING VERTICAL JUMPS Starting position: Stand with your feet hip-width apart. Place your hands on your hips if you like. Exercise: Imagine that you are about to sit down on a chair. Bend your legs slowly until your knees are flexed to approx 90 degrees, and hold for 2 sec. Do not let your knees buckle inwards. Then jump straight up as high as you can, landing on the ball of your feet with your hips and knees slightly bent. Repeat the exercise for 30 sec. 2 sets.</p> | <p>12 JUMPING LATERAL JUMPS Starting position: Stand on one leg with your upper body bent slightly forward from the waist, with knees and hips slightly bent. Exercise: Jump sideways to the right or left. Land gently on the ball of your foot. Bend your hips and knees slightly as you land and do not let your knees buckle inwards. Alternate your balance with each jump. Repeat the exercise for 30 sec. 2 sets.</p> | <p>12 JUMPING BOX JUMPS Starting position: Stand with your feet hip-width apart. Imagine that there is a cross marked on the ground and you are standing in the middle of it. Exercise: Jump up and land on the box. Land on the ball of your foot. Step side on, and diagonally across the cross. Jump as quickly and explosively as possible. Your knees and hips should be slightly bent. Land softly on the balls of your feet. Do not let your knees buckle inwards. Repeat the exercise for 30 sec. 2 sets.</p> |

PART 3 RUNNING EXERCISES · 2 MINUTES

| | | |
|---|---|--|
| <p>13 RUNNING ACROSS THE PITCH Run across the pitch, from one side to the other, at 75-85% maximum pace. 2 sets.</p> | <p>14 RUNNING BOUNDING Run with high bounding steps with a high knee lift, landing gently on the ball of your foot. Use an exaggerated arm swing for each step (opposite arm and leg). Try not to let your back leg cross the middle of your body or let your knees buckle inwards. Repeat the exercise until you reach the other side of the pitch, then jog back to recover. 2 sets.</p> | <p>15 RUNNING PLANT & CUT Jog 4-5 steps, then plant on the outside leg and cut to change direction. Accelerate and sprint 5-7 steps at high speed (80-90% maximum pace) before you decelerate and do a low plant to cut. Do not let your knees buckle inwards. Repeat the exercise until you reach the other side, then jog back. 2 sets.</p> |
|---|---|--|

ACL Injury Prevention

- Start at an **early age** → fewer ACL injuries
- Correct faulty **biomechanics**: knee valgus is a strong indicator of ACL injury risk
- **Compliance**: >66% → 82% reduced ACL injury rate
- **Frequent** participation: 20-30 mins several times per week
 - Starting in preseason and continuing throughout the season
- Verbal or visual **feedback**
- Exercise variety: **Plyometrics, balance, strengthening**





2002

Anterior cruciate ligament injuries in the National Football League

Epidemiology and current treatment trends among team physicians

James P. Bradley, M.D. • John J. Klimkiewicz, M.D. • Michael J. Rytel, M.D. • John W. Powell, Ph.D., A.T.C

2012

An Analysis of Specific Lower Extremity Injury Rates on Grass and FieldTurf Playing Surfaces in National Football League Games

2000-2009 Seasons

Elliott B. Hershman,^{*†} MD, Robert Anderson,[‡] MD, John A. Bergfeld,[§] MD, James P. Bradley,^{||} MD, Michael J. Coughlin,[¶] MD, Robert J. Johnson,[#] MD, Kurt P. Spindler,^{**} MD, Edward Wojtys,^{††} MD, and John W. Powell,^{‡‡} PhD, ATC, for the National Football League Injury and Safety Panel^{§§}
Investigation performed at the National Football League Injury and Safety Panel, NFL, New York, New York

2016

Anterior Cruciate Ligament Injuries in National Football League Athletes From 2010 to 2013

A Descriptive Epidemiology Study

Christopher C. Dodson,^{*†} MD, Eric S. Secrist,[‡] BS, Suneel B. Bhat,[†] MD, Daniel P. Woods,[§] MD, and Peter F. Deluca,[†] MD

- **No significant difference** in ACL injury rate on grass versus AstroTurf
- **67% higher incidence** of ACL injury on FieldTurf versus grass
- **No significant difference** in ACL injury rate on grass versus FieldTurf

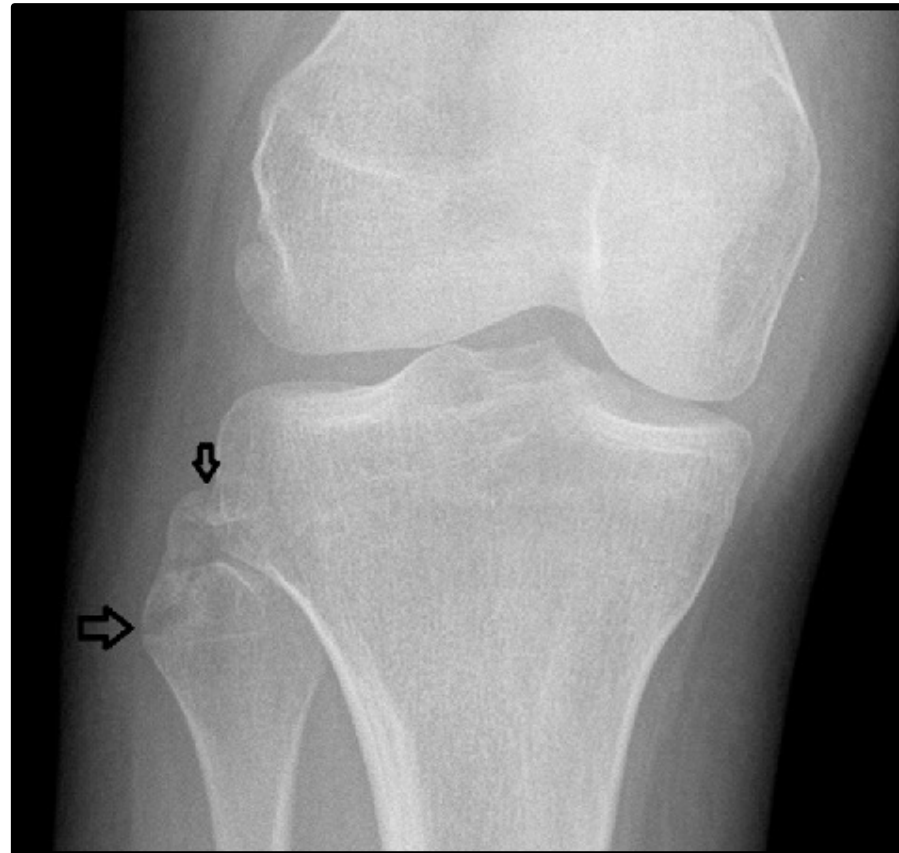
• **Bottom Line: The debate continues. 1st and 2nd generation turf is associated with higher injury rates. 3rd generation turf has similar injury rates to grass.**

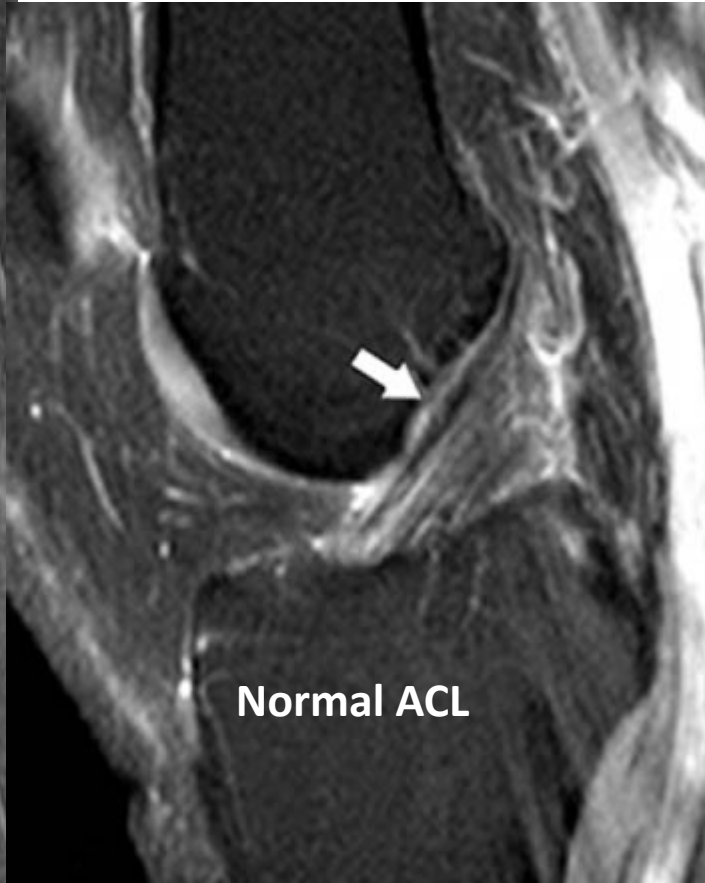
Diagnosis of ACL Injuries

- Exam
 - Anterior Drawer
 - Lachman
 - Pivot Shift
- X-rays
- **MRI**



“Are X-rays necessary, doc?”



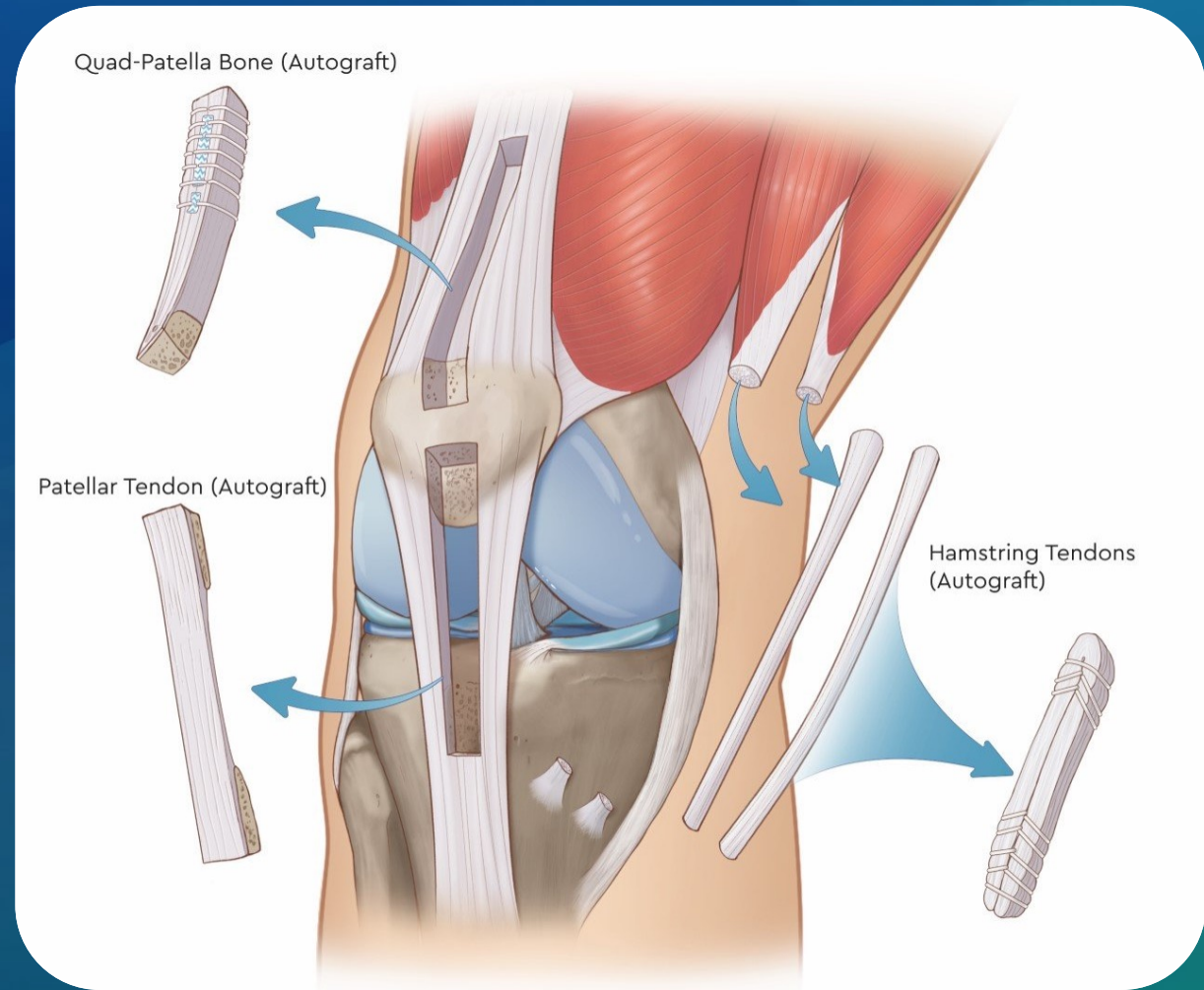


“Doc, do I need surgery?”

- You can live without an ACL, but...
 - you should limit yourself to straight (in-line), low-impact activities only
- Indications to do surgery
 - Physiologic young age with high activity level
 - especially cutting & pivoting sports/activities
 - Feelings of knee instability
 - Other knee injury (meniscus, cartilage) to address
 - Prevent cartilage or meniscal injury

- Immediate **RICE**:
 - **R**est
 - **I**ce (and anti-Inflammatories)
 - **C**ompression
 - **E**levation → **E**valuation
- Brief immobilization, protected weight bearing
- Physical therapy and guided rehabilitation
- Functional bracing & activity modification
- **Risks**: recurrent instability, cartilage and/or meniscal injury

ACL Graft Options



• Autograft (your tissue)

- Your own tissue
- More predictable healing
- No risk of disease transmission
- Lower risk of failure

versus

Allograft (donor tissue)

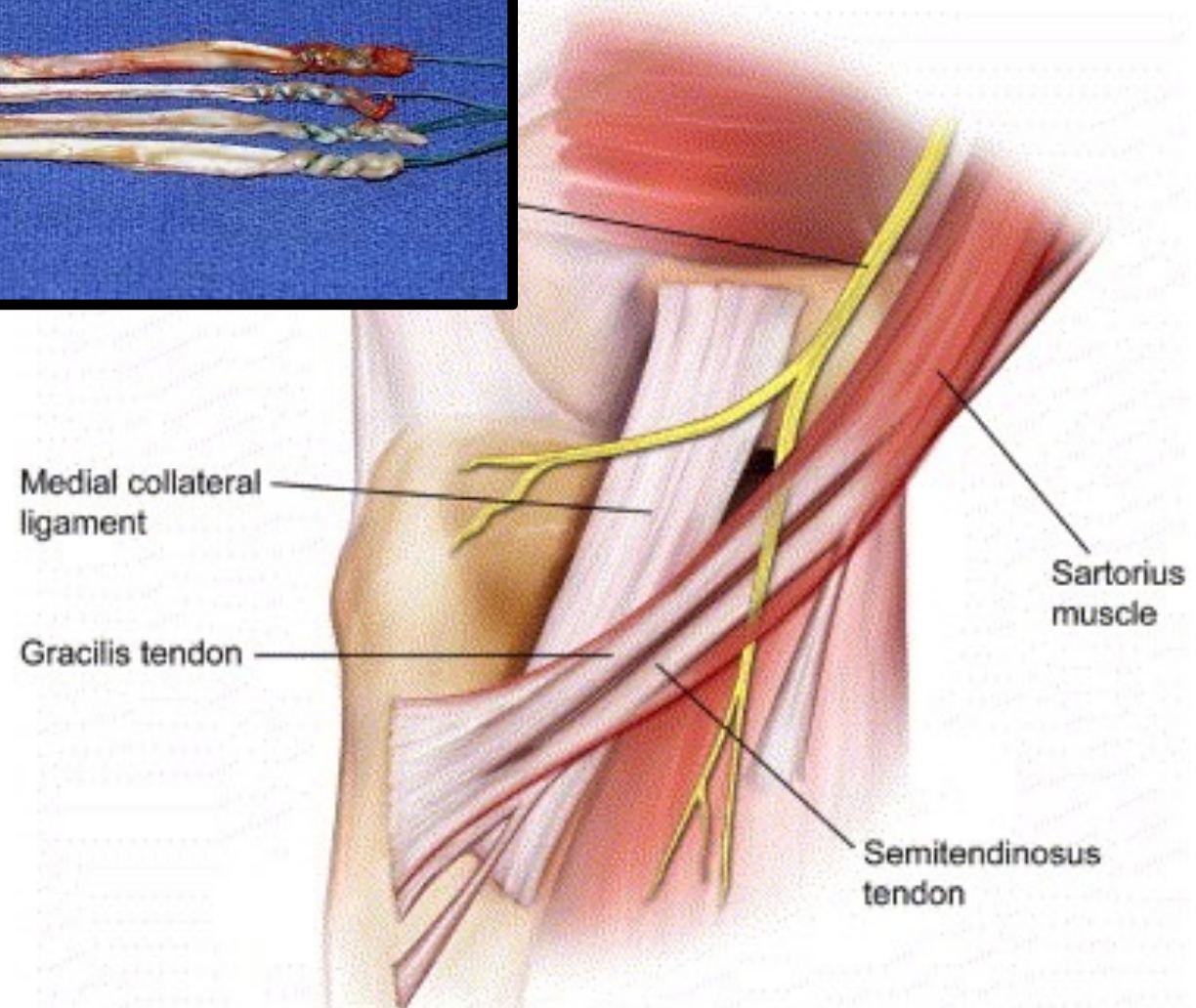
- Donor site morbidity
- More painful & slower early recovery

- No donor-site morbidity
- Smaller incisions
- Shorter surgery
- Less painful, quicker early recovery

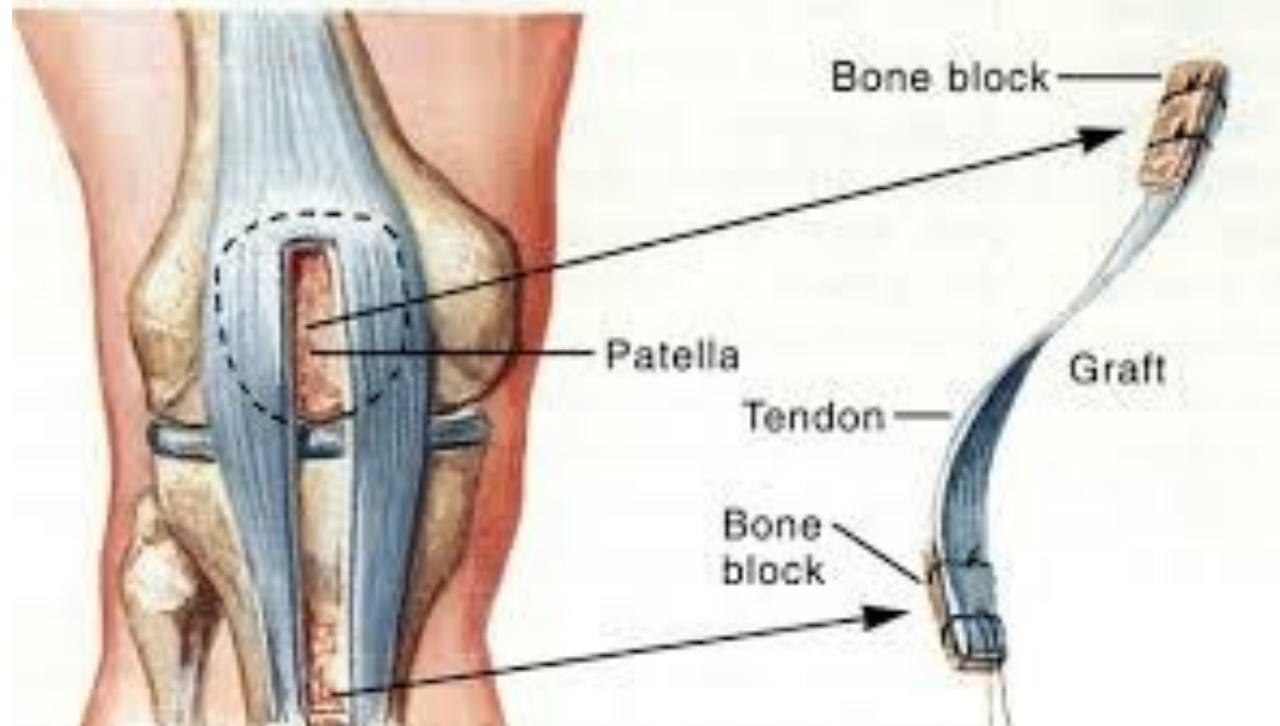
- Higher risk of failure
- Tiny risk of disease transmission

Hamstring autograft

- **Hamstring tendon (x2)**
 - **Smaller incision**
 - **Less painful**
 - **Earlier recovery**
- **Hamstring weakness**
- **May require allograft augmentation**
- **Higher failure rate in young, female athletes**
- **Risk of saphenous nerve injury**



Patellar tendon autograft



- **BTB (bone-tendon-bone)**

- Bone to bone healing
- Longest history of use
- Lowest failure rates



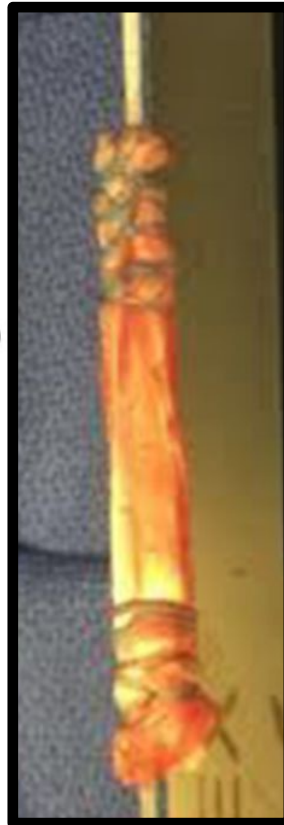
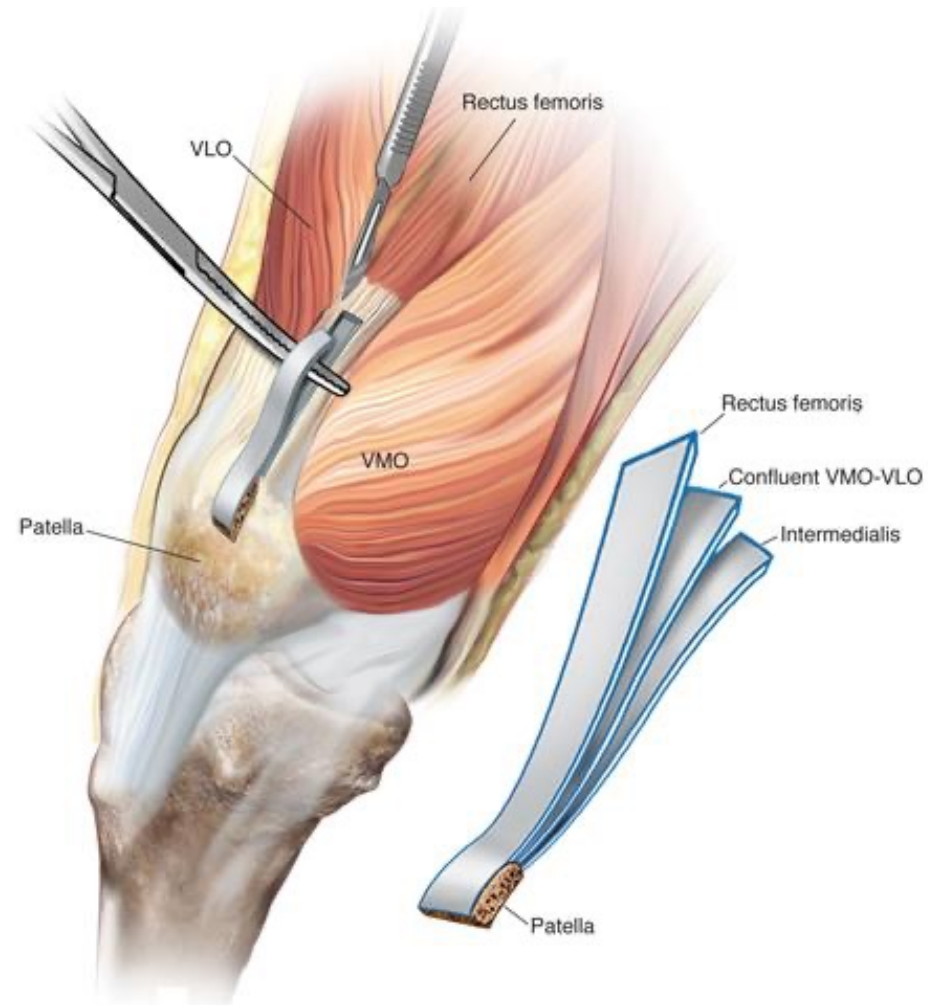
- 10-15% front of the knee pain
- Increased risk of arthritis
- Larger incision
- Longer surgery
- Early quadriceps weakness
- Risk of patella (kneecap) fracture



- **Quadriceps tendon**

- **Strong graft**
- **Smaller incision than BTB**
- **Less risk for front of the knee pain**
- **Equivalent outcomes to the other grafts**

- **Delayed quadriceps recovery**
- **Less long-term outcomes (newer option)**



Allograft Options

- Tibialis anterior/posterior
- Hamstring tendons
- Bone patellar tendon bone
- Achilles tendon
- Quadriceps tendon
- Peroneus longus



• **3x higher risk of re-tear!**

OK... but, how do I decide?

ACL Autograft Retear Risk Calculator

To estimate your risk of retearing your surgically reconstructed ACL by autograft, enter your age, weight, height, sex, sport and activity level. This calculator is valid for ages from 14 to 22 and only includes results for ACL autograft using patellar tendon or hamstring. While reconstruction using a quadriceps tendon is growing in use, there is insufficient long-term research to include it in the calculator.

Age (14-22)

Sex

MALE

FEMALE

Height and weight

Feet

Inches

Pounds

Sport

ACLtear.info



Please indicate how often you performed each activity in your healthiest and most active state during the last 12 months.

Running

Cutting

Deceleration

Pivoting

CALCULATE YOUR RESULTS

OK... but, how do I decide?

Risk Assessment for Autograft Failure (Retear) Within Six years

Normal Knee Laxity (Looseness)

| Patellar Tendon | Hamstring |
|-----------------|-----------|
| 2.4% | 4.9% |

Based on your input, each box predicts the six-year failure risk for each autograft with normal knee laxity (determined through medical examination). If the difference in retear risk is:

- Less than three percent, both graft boxes will be green.
- Between three and five percent, the higher risk graft is yellow.
- Greater than five percent, the higher risk graft is red.

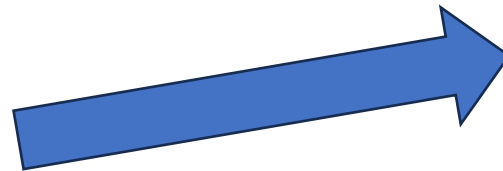
High-Grade Knee Laxity

| Patellar Tendon | Hamstring |
|-----------------|-----------|
| 5.4% | 10.8% |

Based on your input, each box predicts the six-year failure risk for each autograft with high knee laxity (determined through medical examination). If the difference in retear risk is:

- Less than three percent, both graft boxes will be green.
- Between three and five percent, the higher risk graft is yellow.
- Greater than five percent, the higher risk graft is red.

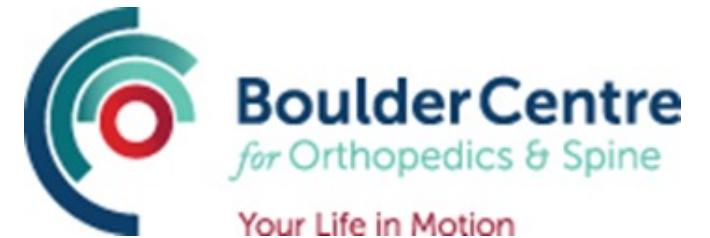
WHAT ABOUT MY OTHER KNEE?



**Risk of tearing your non-injured ACL within 6 years:
9.6%**

This predicts the probability of tearing the ACL in your opposite (contralateral) uninjured knee within 6 years.

ACL Reconstruction





- ACL reconstruction is the “gold standard”
- Often, “prehab” is necessary to optimize knee motion and reduce stiffness before surgery
- Outpatient/same day surgery
- Arthroscopic surgery
- General anesthesia +/- nerve block

ACL Reconstruction

- 1) Diagnostic arthroscopy
- 2) Manage meniscus tears, cartilage injury
- 3) Harvest/prep graft
- 4) Drill tunnels
- 5) Insert graft
- 6) Secure graft



Overview

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1. Posterior cruciate ligament

2. Medial collateral ligament

3. Lateral collateral ligament

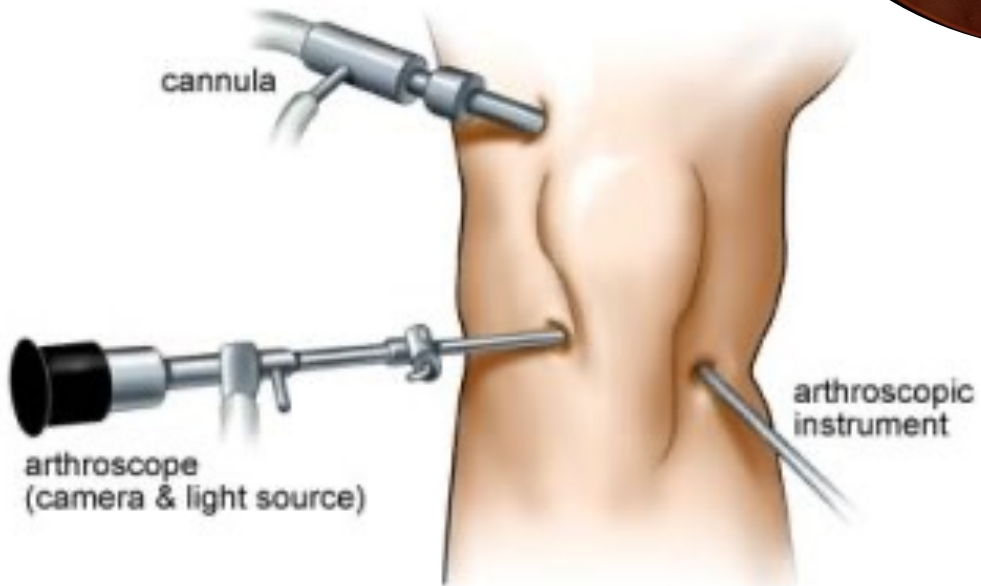
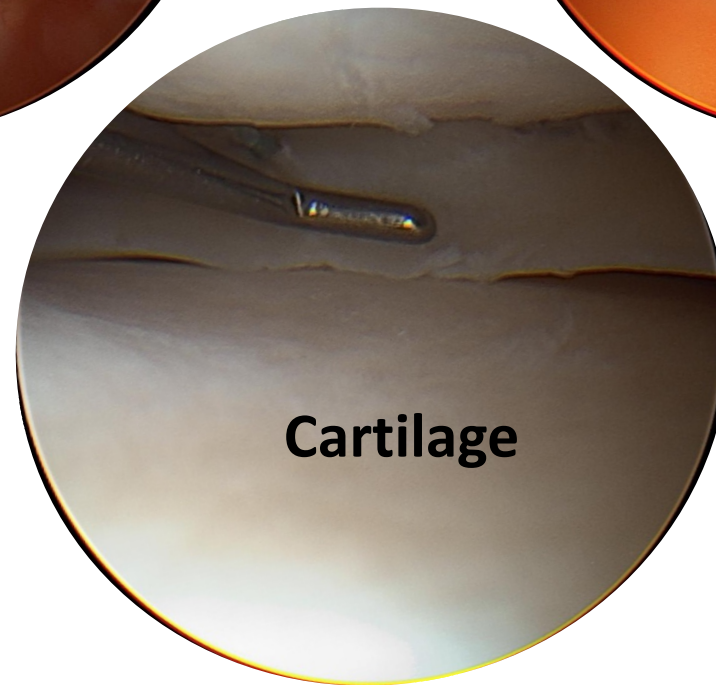
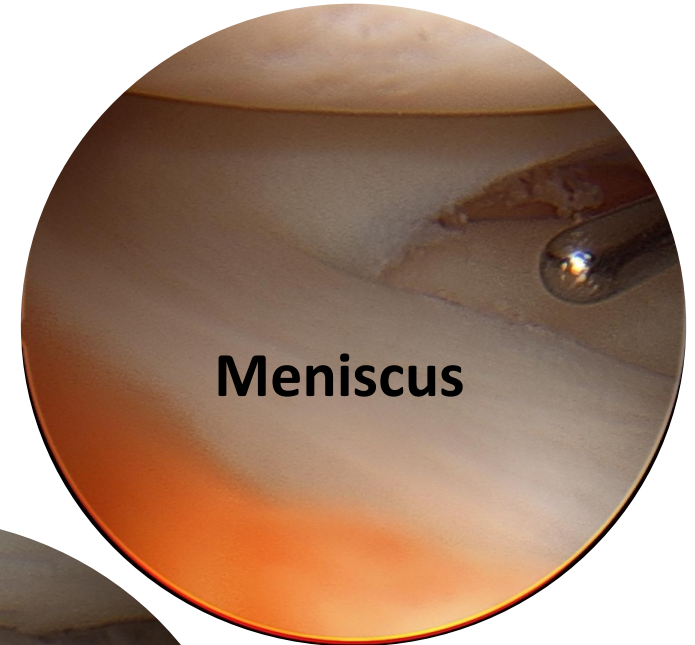
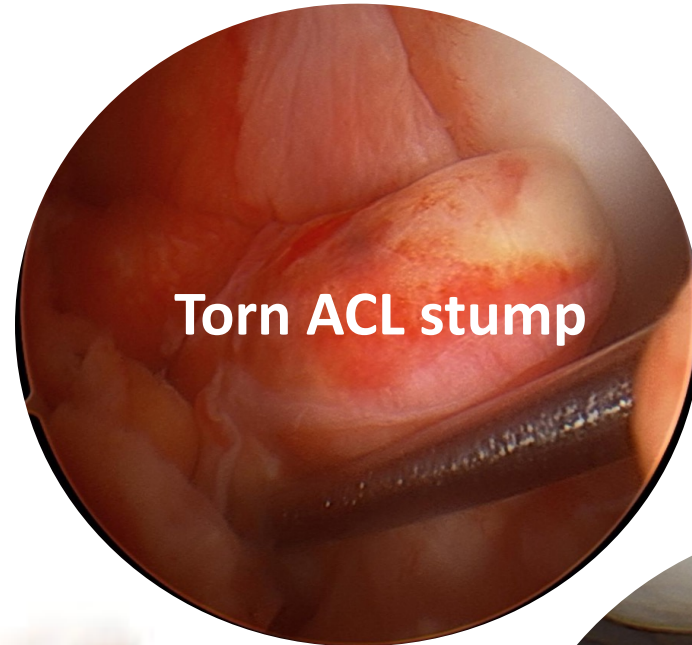
4. Anterior cruciate ligament (ACL)

Femur (Thigh bone)

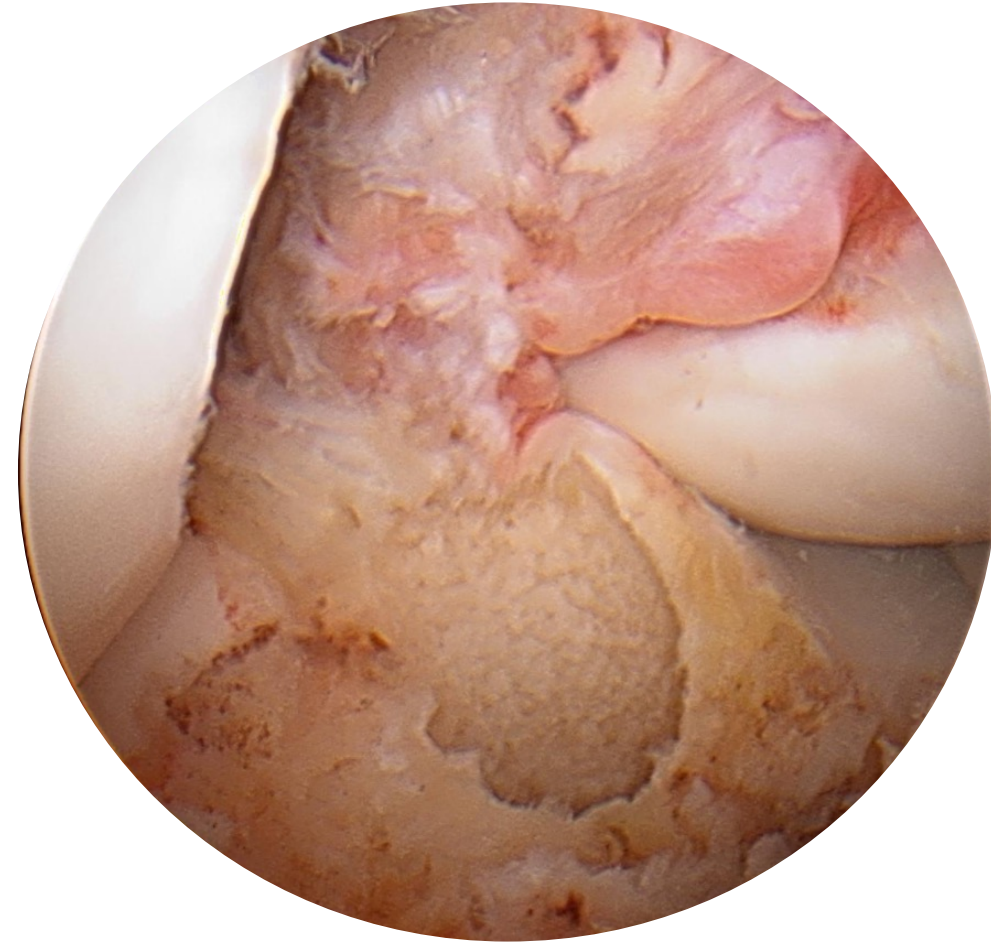
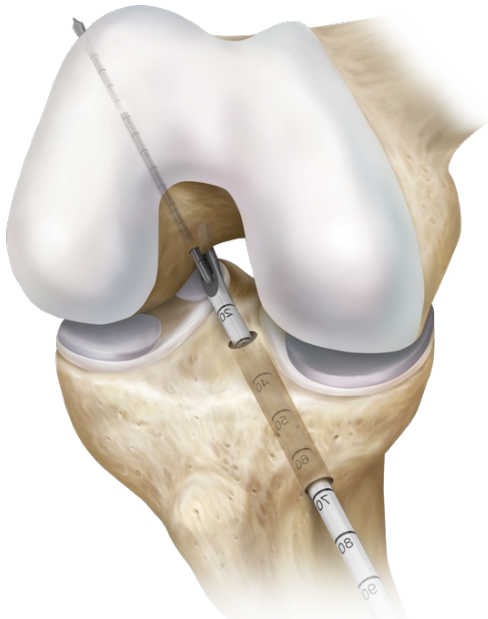
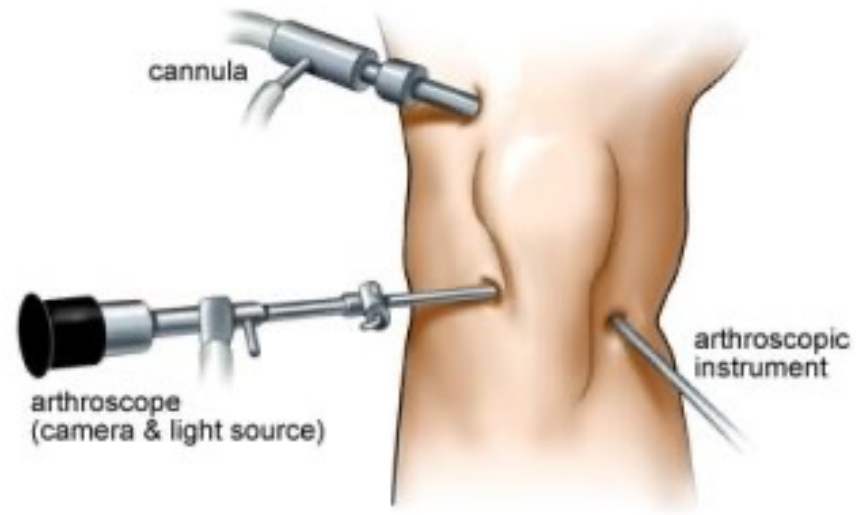
Tibia (Shin bone)

ACL Reconstruction Patellar Tendon

ACL Reconstruction

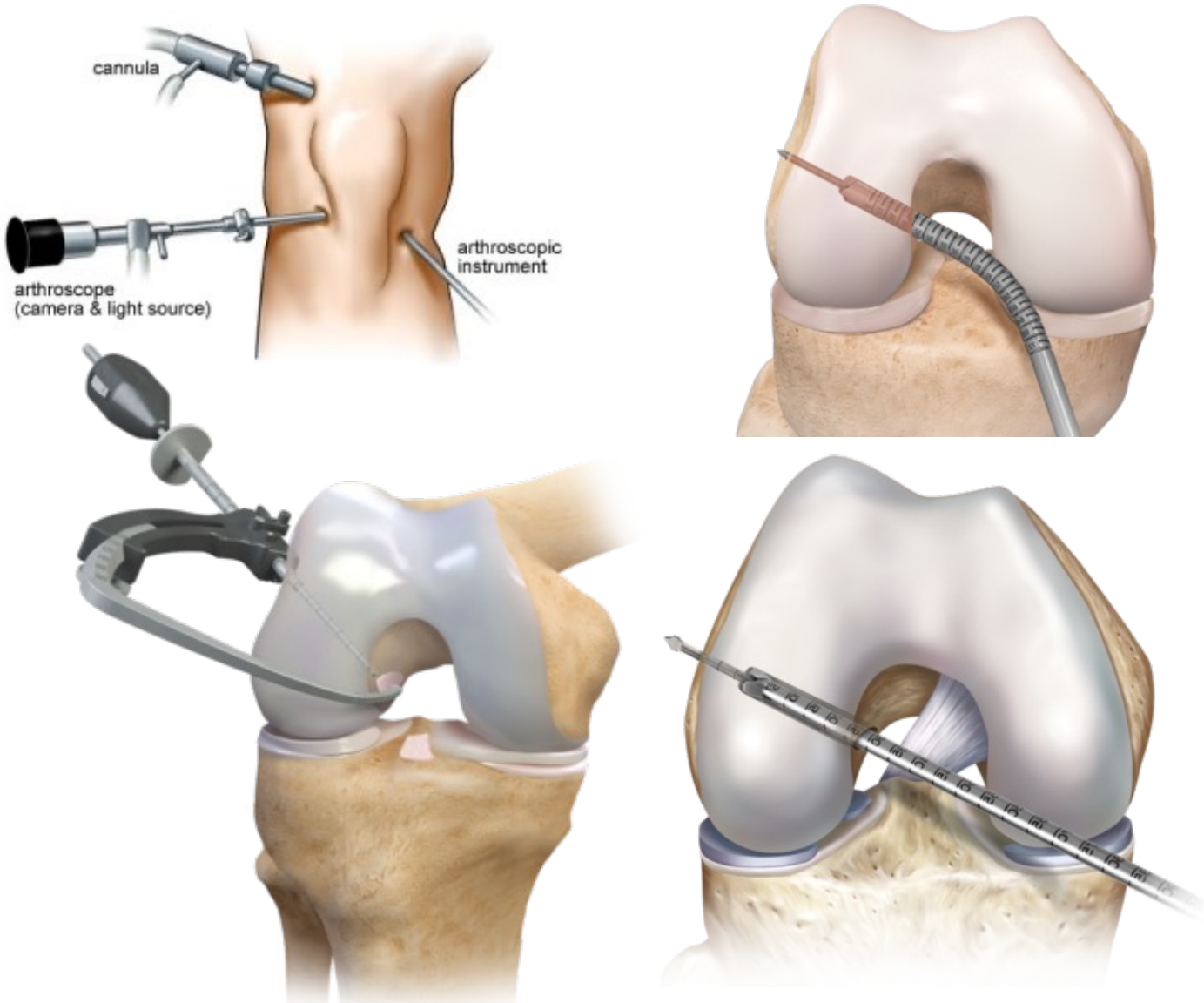


ACL Reconstruction

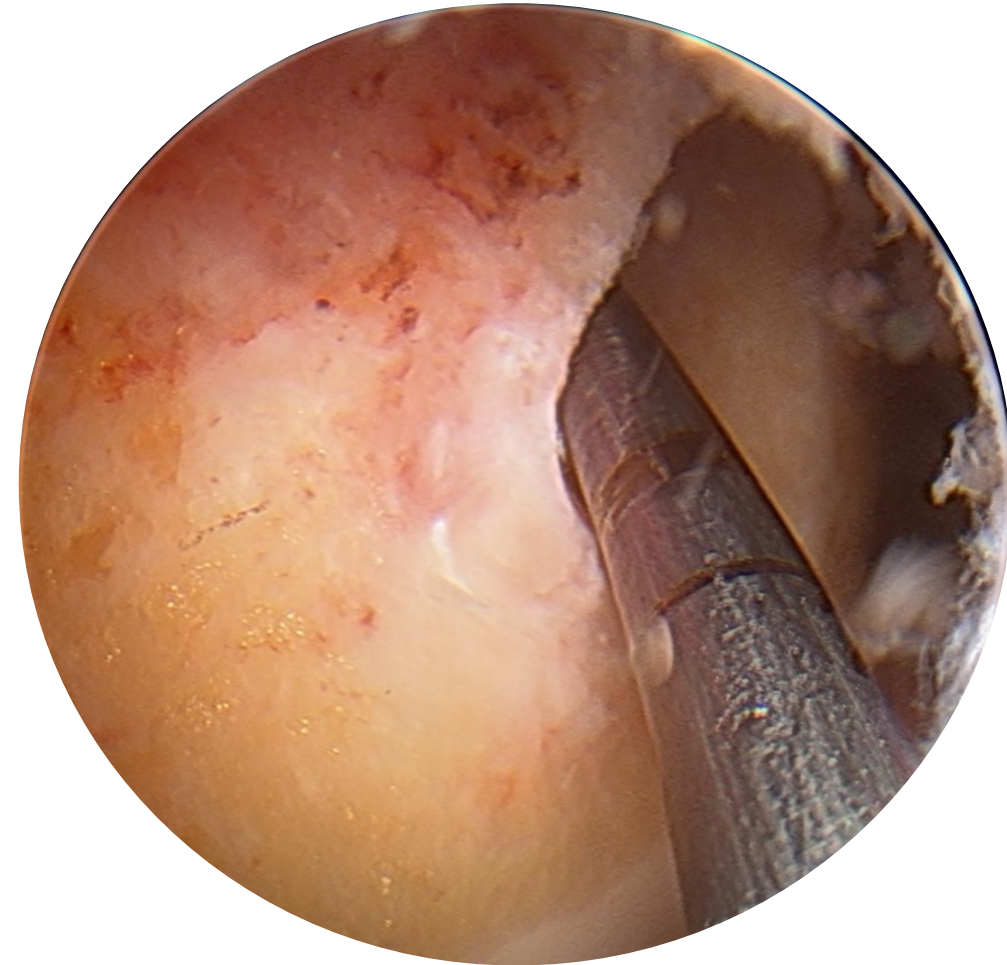


Tibial Tunnel

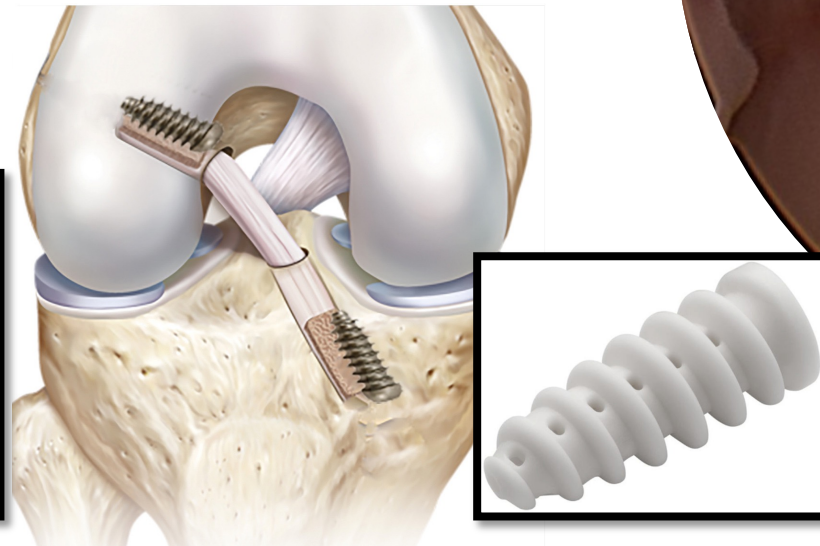
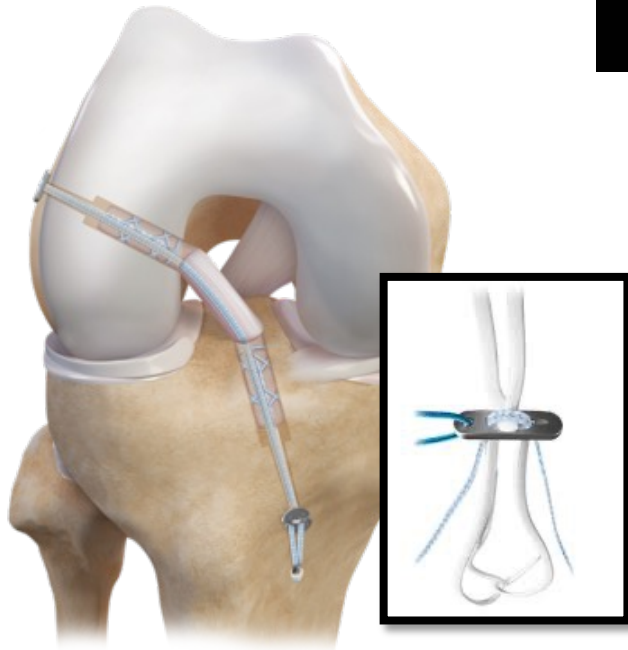
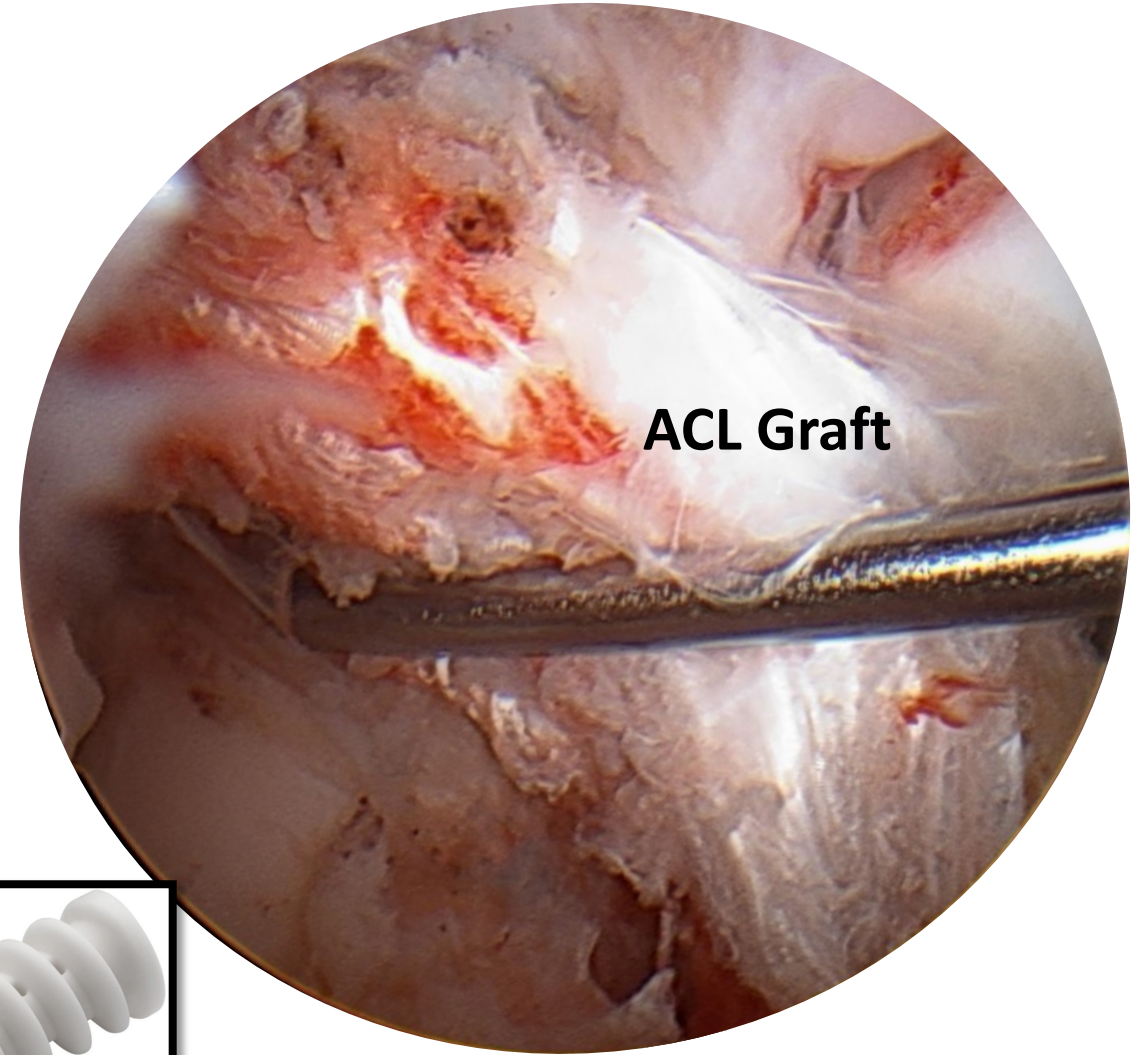
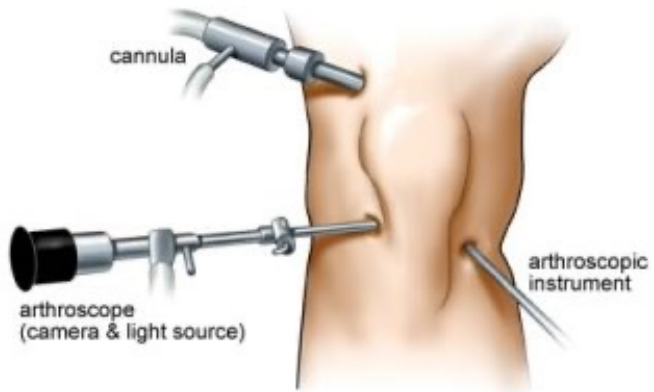
ACL Reconstruction



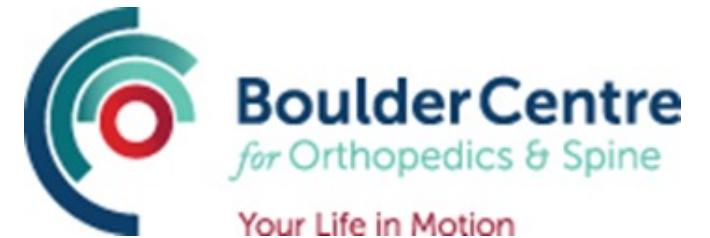
Femoral Tunnel



ACL Reconstruction



Postoperative ACL Reconstruction Rehab



Postop ACLR Rehab

- Depends on meniscus and cartilage status!
 - If meniscus or cartilage repair performed → slowed initial rehab
- For ACL reconstruction only:
 - Partial weight bearing for 2 weeks
 - Hinged knee brace for 6-8 weeks
 - Range of motion exercises for 3 months
 - Strengthening after 3+ months
 - Light-impact at 4-6 months
 - Sport-specific training/testing at 7-9 months
 - Return to sport at 12+ months





- Early Rehab Goals
 - Decrease knee swelling
 - Symmetric knee extension and flexion
 - **Quad activation**
 - Weight bearing as tolerated as soon as feasible
 - Structured rehabilitation program
 - Open communication between therapist, surgeon, and patient

Bracing



- Protects meniscal repair & MCL/LCL
- During early postop rehab, no difference in outcomes
- Inconclusive data to support knee bracing for return to sport to prevent ACL re-injury
- But, may reduce risk of subsequent knee injury **when skiing** by 2.7x

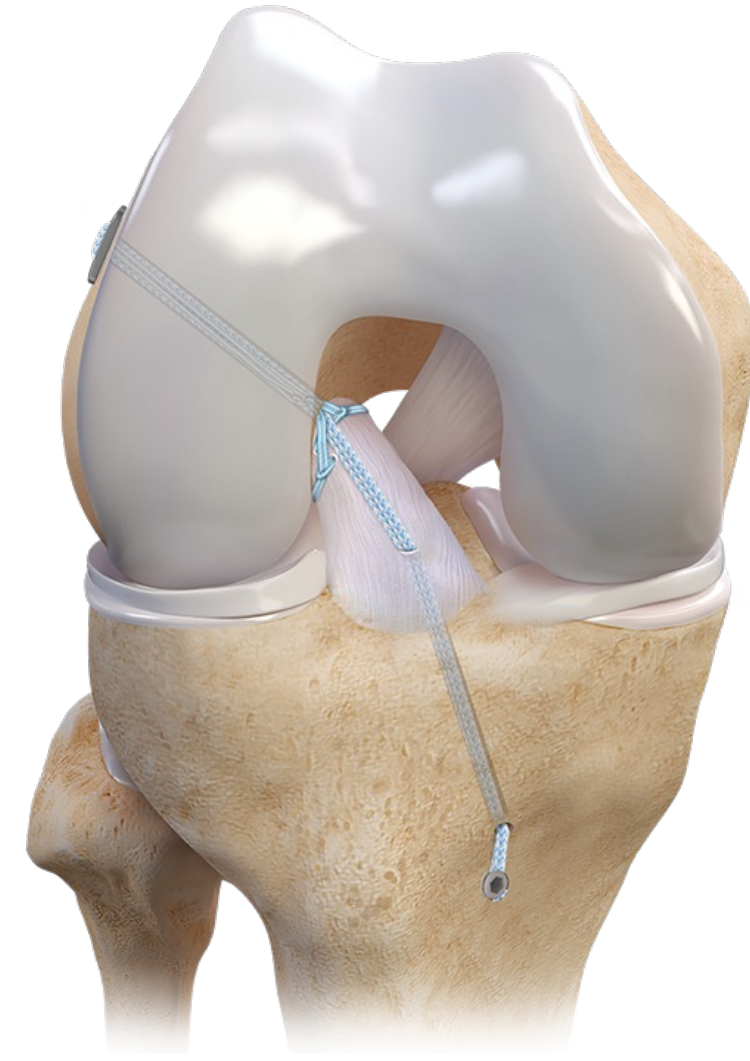
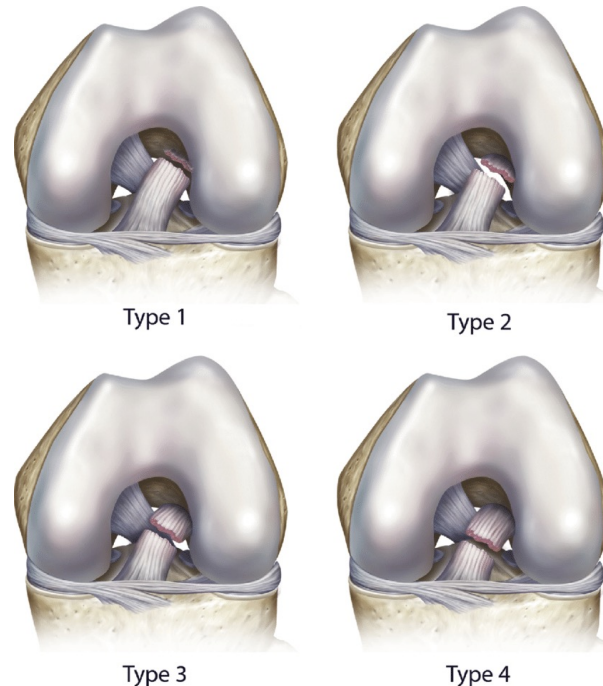
- Satisfaction
 - 85% “very satisfied”
 - 98% would have ACL reconstruction again
- Return to sport*: 87% overall
- Graft survival
 - Adults: 86%
 - Adolescents: 61%
- Complications:
 - blood clot: <1%
 - wound issues: <1%
 - deep infection: <2%
 - knee extension deficit: 1-38%
 - knee arthritis: up to 25% at 10 years
 - nerve or vessel injury
 - residual laxity
 - scarring

Hot Topics in ACL Reconstruction

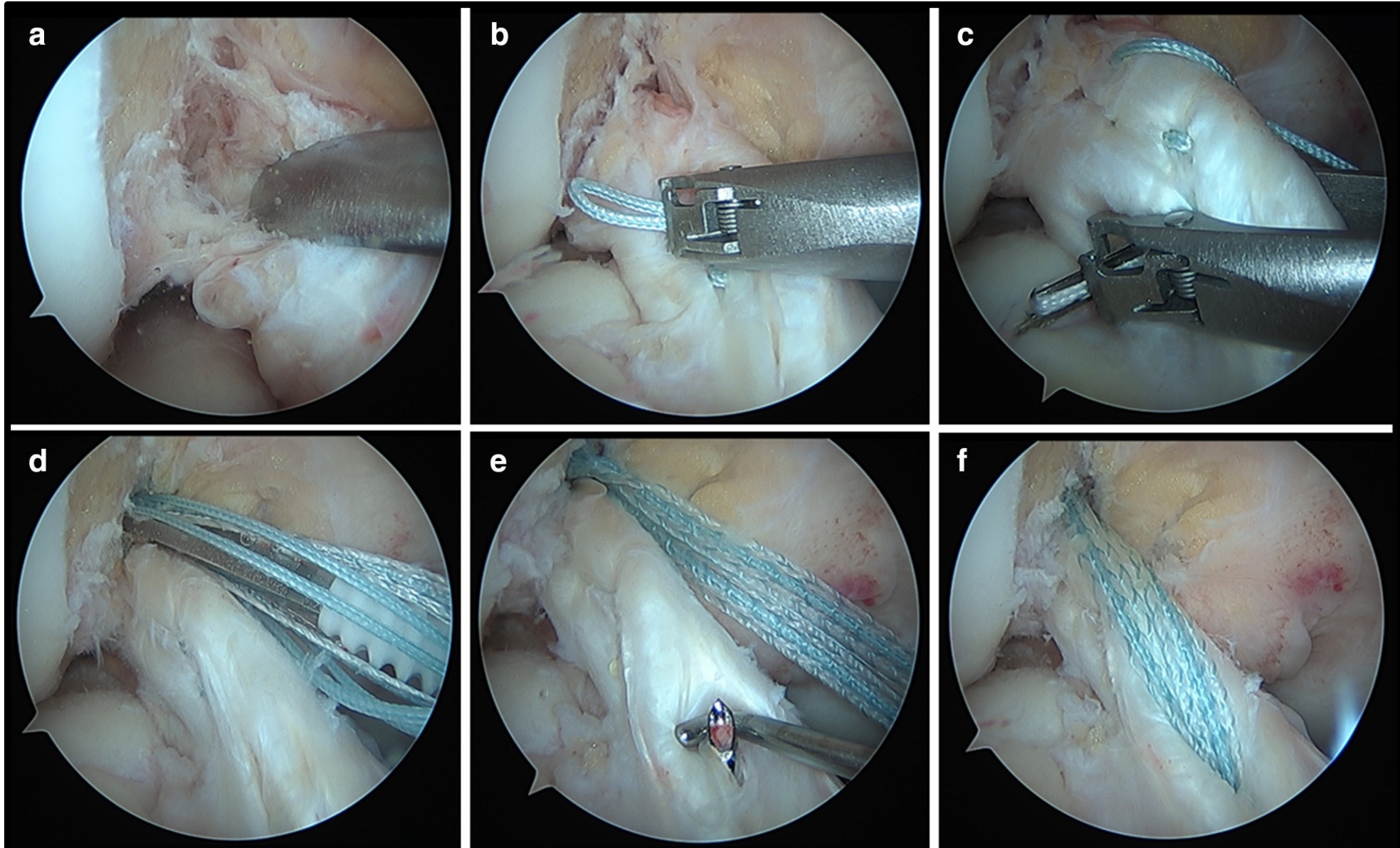


ACL Repair

- Less invasive, no graft harvest
- Best for proximal avulsions (off the femur)
- Often augmented with suture tape or “**Bridge-Enhanced ACL Repair**” implant
- Re-rupture rate: 7-20%

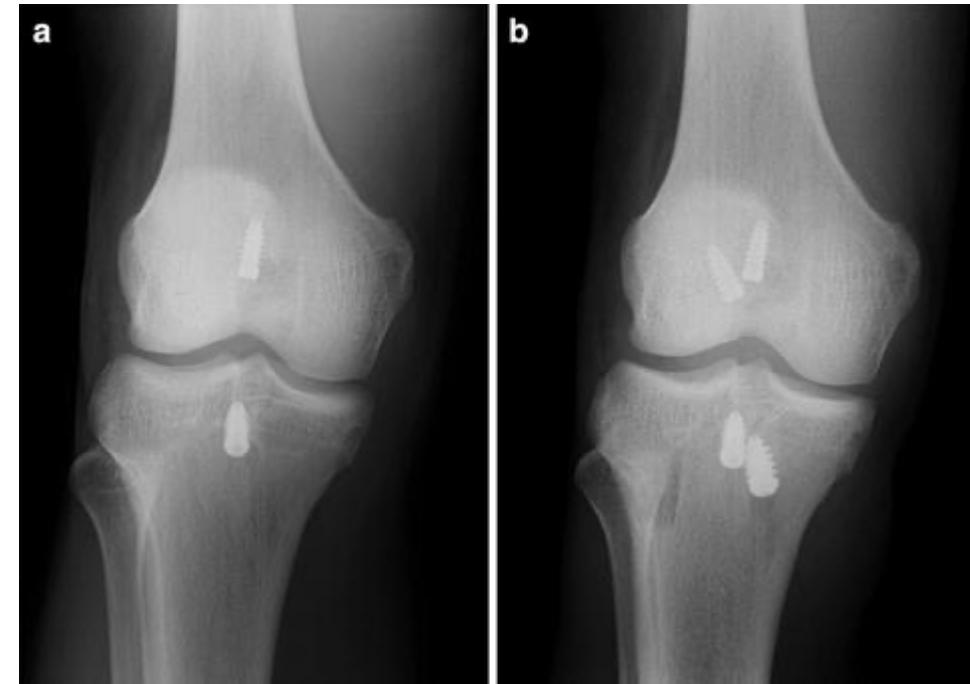


ACL Repair

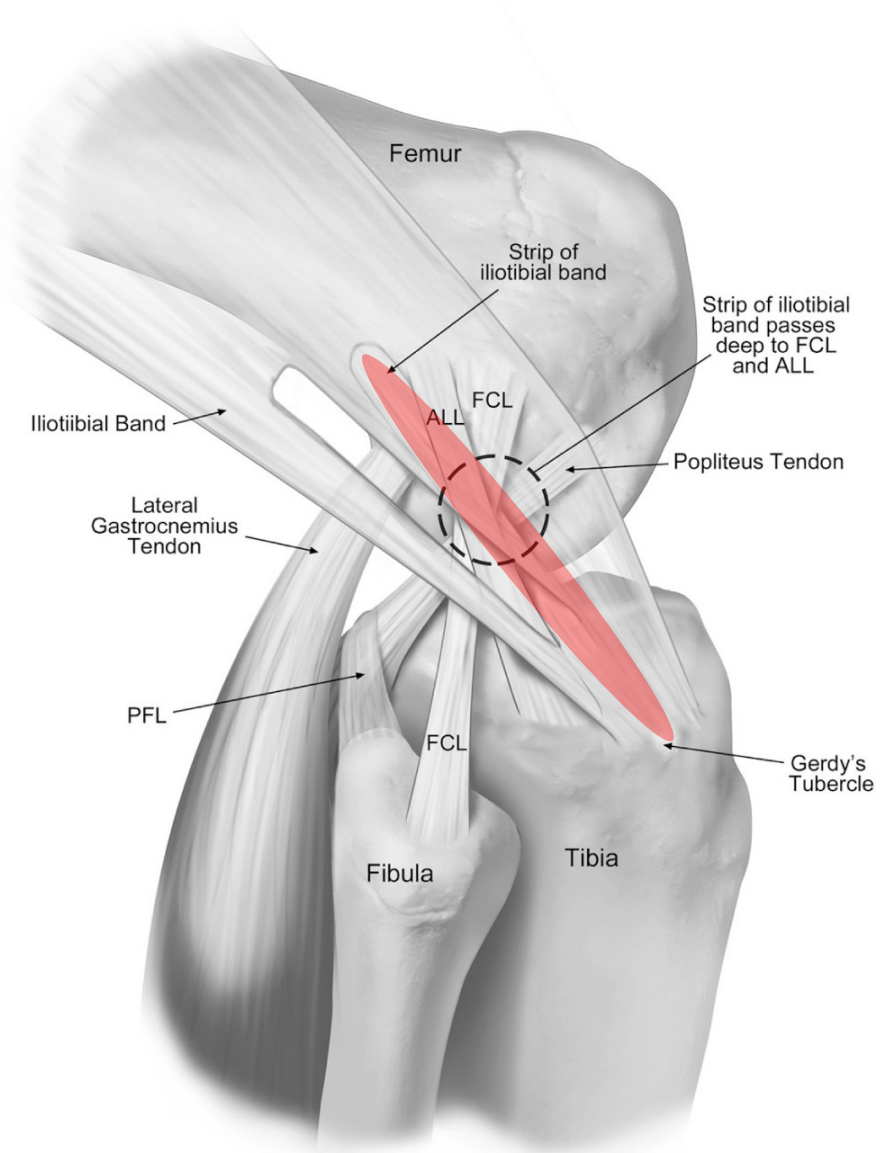


Revision ACL Reconstruction

- Graft rupture rates between 6-32%
- More likely in males
- Most common reason for revision:
 - Recurrent trauma/graft failure
 - Technical error
 - Failure of graft to incorporate
- May require 2+ surgeries
- Outcome is not as good as primary ACL reconstruction
 - Lower return to sport







- ACL reconstruction PLUS
 - Lateral extra-articular tenodesis
 - Anterolateral ligament reconstruction
- For young, hypermobile patients OR revision ACL reconstruction
 - **2.5x reduction** in graft failure rate in young patients
 - Higher rotational stability than ACL reconstruction alone
 - **Lower revision rate** (1.4% vs 5.4%)
- But, increased surgical time and morbidity

Thank you!

Questions?

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SHOULDER, ELBOW, KNEE & SPORTS MEDICINE

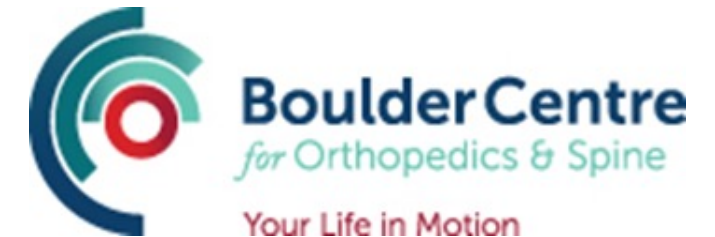


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Preventing and Treating ACL Injury

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