



Ligamentous injuries about the knee



Dr Justin Webb
Knee Surgeon

26th July 2023

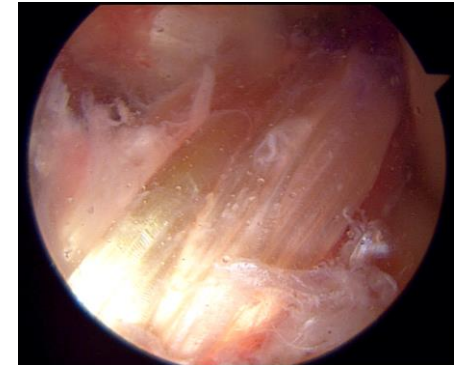
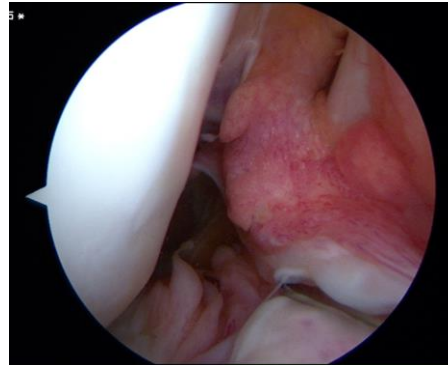
Knee Ligament injuries

- Assessment of the acute knee
- Anterior Cruciate ligament injury
- Medial ligament injury
- Posterior cruciate ligament injury
- Patella instability

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Specialist Knee Surgeon

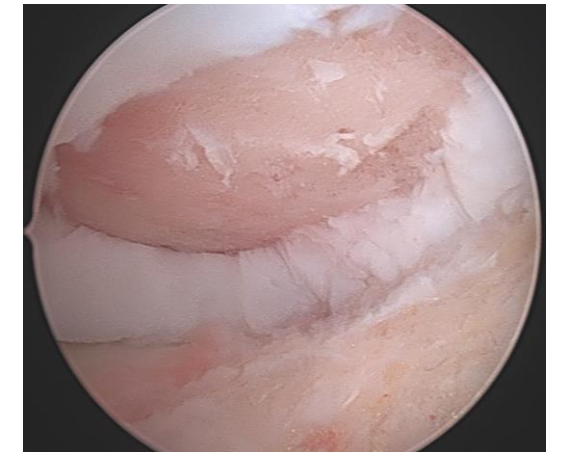
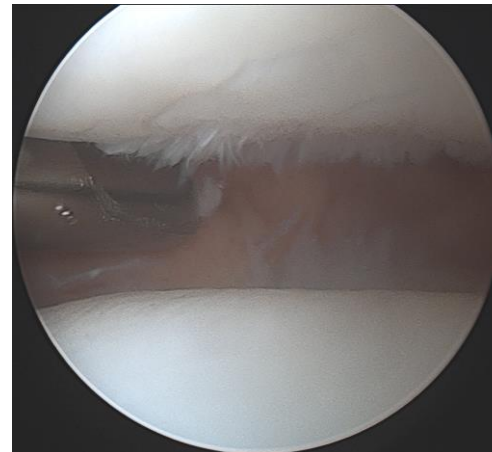
- ACL reconstruction
 - Adult – Quads/Hamstring/Patella tendon
 - Paediatric
 - Revision



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- ACL reconstruction
- Arthroscopy
 - Meniscus repair
 - Patellofemoral stabilisation
 - Chondral restoration



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- ACL reconstruction
- Arthroscopy
- Multi-ligament knee injury



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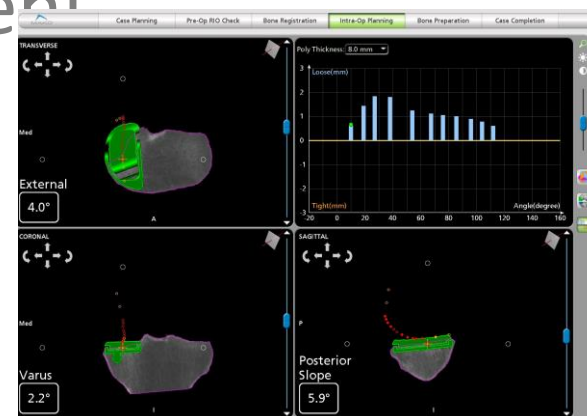
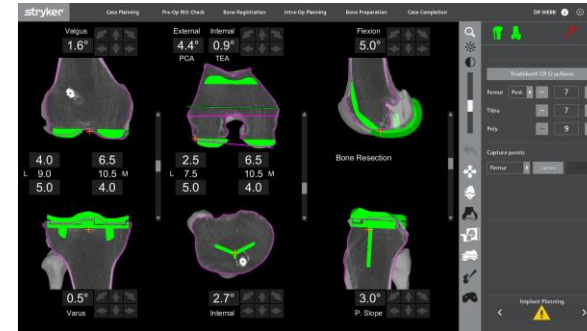
- ACL reconstruction
- Arthroscopy
- Multiligament knee injury
- Knee Osteotomy



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- ACL reconstruction
- Arthroscopy
- Multiligament knee injury
- Knee Osteotomy
- Robotic Assisted Knee replacement
 - Partial knee replacement
 - Total knee replacement
 - Revision knee replacement



The Acute knee injury



The Acute knee injury

History

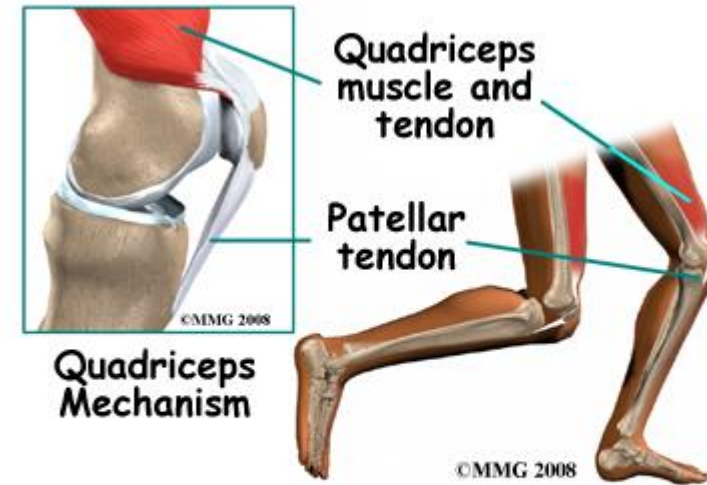
- ‘Pop’, ‘Crack’
- Knee dislocated
- Couldn’t play out game
- Swelling
 - Rapid or delayed
- Feels unstable



The Acute knee injury

Painful instability

- Quadriceps inhibition



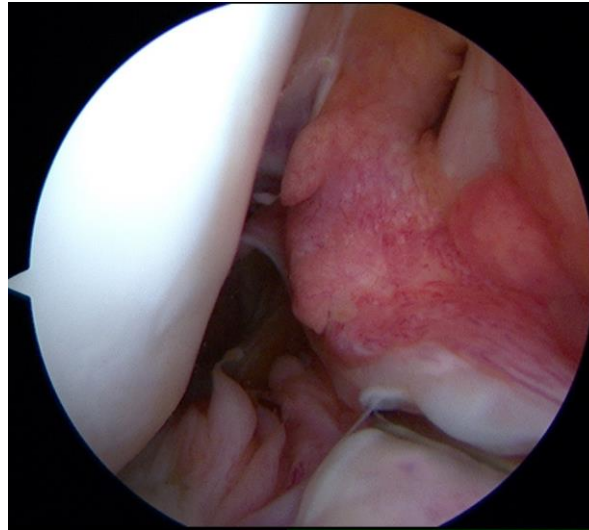
The Acute knee injury

Painful instability

- Quadriceps inhibition

Painless instability

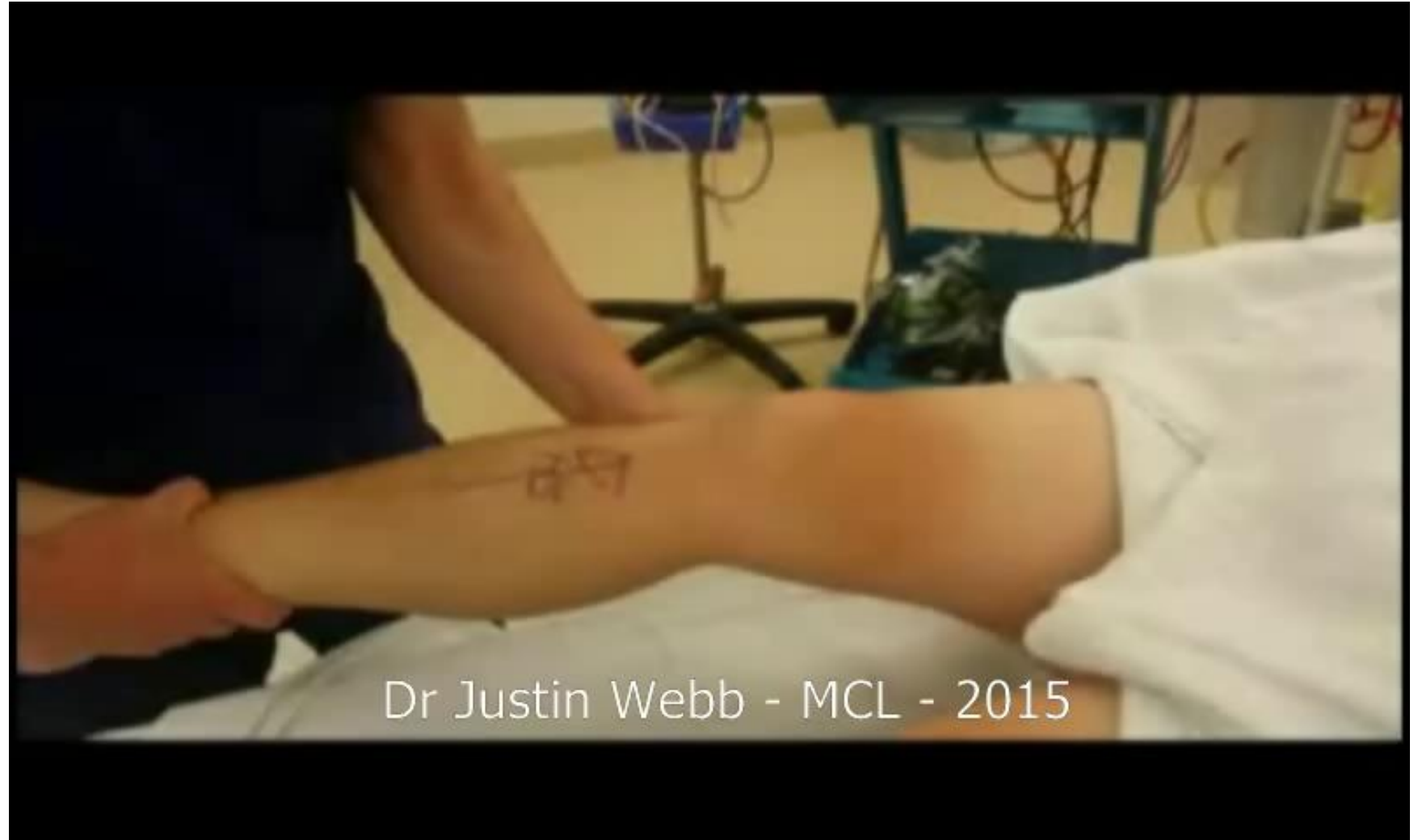
- Structural injury



The Acute knee injury

Examination

- Difficult early



The Acute knee injury

Examination

- Difficult early



Dr Justin Webb - LCL - 2015

The Acute knee injury

Examination

- Difficult early



Dr Justin Webb - Lachmann - 2015

The Acute knee injury

Examination

- Difficult early



The Acute knee injury

Imaging

- X-ray



The Acute knee injury

Imaging

- X-ray
- MRI



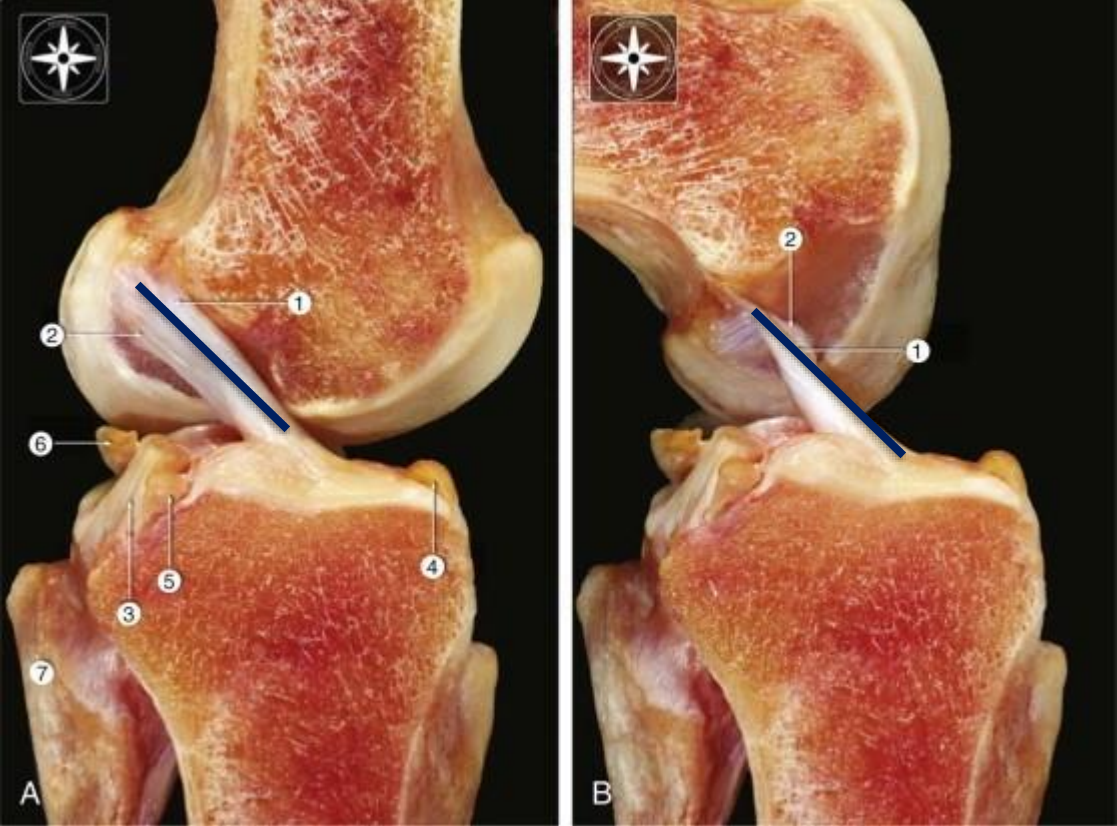
The Acute knee injury

Initial Management

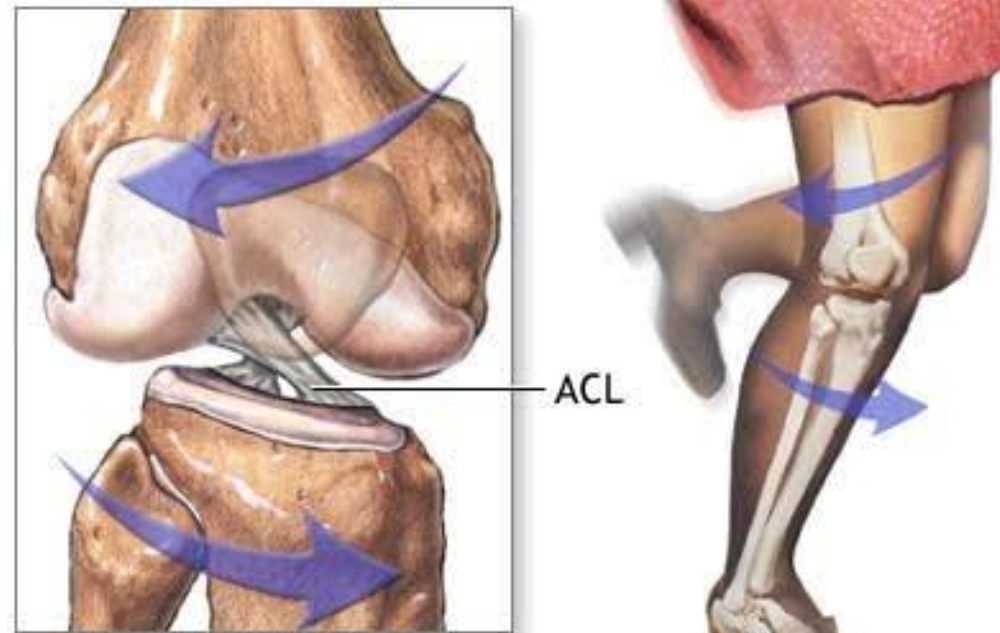
- Rest, ice, elevation
- Immobilisation
 - Brace - Collateral ligament
 - Crutches to support gait
- Early Referral



Anterior Cruciate Ligament



Anterior Cruciate Ligament



ACL injuries occur when bones of the leg twist in opposite directions under full body weight

Anterior Cruciate Ligament



Anterior Cruciate Ligament

Majority Non-Contact

- Grounded foot
- Hyper-extension/Pivot

Female risk 2-5x

- AFLW – 9x

Increasing Adolescent Incidence

Research

Increasing rates of anterior cruciate ligament reconstruction in young Australians, 2000–2015

David Zbrojkiewicz^{1,2}, Christopher Vertullo^{1,3}, Jane E Grayson⁴

The known Rupture of the anterior cruciate ligament (ACL) is a common and devastating injury that is largely preventable by neuromuscular agility training.

The new The incidence of ACL reconstructions in Australia is the highest in the world, and is increasing. At greatest risk are men aged 20–24 years and women aged 15–19 years, but incidence is increasing most rapidly among 5–14-year-old children. The incidence of revision ACL is increasing more rapidly than that of primary ACL reconstructions.

The implications These findings justify establishing a national ACL injury prevention program and an ACL reconstruction registry to improve outcomes for active young Australians.

Abstract

Objectives: To investigate the incidence and demographic features of anterior cruciate ligament (ACL) reconstructions in Australia by age and sex, and to determine whether the incidence has changed during the past 15 years.

Design and setting: Descriptive epidemiological analysis of longitudinal data on ACL reconstructions (July 2000 – June 2015) in the National Hospital Morbidity Database.

Main outcome measures: Population ACL reconstruction rates, by age group and sex.

Results: 197 557 primary ACL reconstructions were performed during the study period; the annual incidence increased by 43% (from 54.0 to 77.4 per 100 000 population), and by 74% among those under 25 years of age (from 52.6 to 91.4 per 100 000 population). In males, the peak incidence in 2014–15 was for 20–24-year-olds (283 per 100 000 population); for females, it was for 15–19-year-olds (164 per 100 000 population). Annual growth in incidence was greatest in the 5–14-year-old age group (boys, 7.7%; girls, 8.8%). Direct hospital costs of ACL reconstruction surgery in 2014–15 were estimated to be \$142 million. The annual incidence of revision ACL reconstructions increased from 2.49 (2000–01) to 5.65 per 100 000 population (2014–15), or by 5.6% per year; revisions as a proportion of all ACL reconstruction increased from 4.4% to 6.8%.

Conclusions: The increasing incidence of ACL reconstructions in young Australians over 15 years is worrying. The individuals at greatest risk are men aged 20–24 years and women aged 15–19 years; the rate of reconstruction is increasing most rapidly among those aged 5–14 years. Revision rates are increasing more rapidly than those of primary reconstructions.

Rupture of the anterior cruciate ligament (ACL) is a common and debilitating injury that typically results from a non-contact event in which a previously healthy individual changes direction at speed while playing a multi-directional sport. ACL ruptures were once thought to be uncommon in the skeletally immature,¹ but recent evidence suggests that the global burden of ACL injury falls increasingly on adolescents and young adults.^{2,3} The short term consequences of ACL rupture include the inability to participate in sport, reconstructive surgery, and prolonged rehabilitation.⁴ In the long term, regardless of whether or not an ACL reconstruction is performed, almost all individuals who tear an ACL are at increased risk of osteoarthritis and disability,^{4,6} and this risk is substantially increased by concurrent meniscal injury.⁴

Descriptive analyses of population-based data indicate that the incidence of ACL reconstruction in Australia is among the highest in the world.^{2,7} Recent analyses of data in Victorian injury databases have found increasing rates of sport-related hospitalisations and lower limb injuries in older children and young adults,^{3,8} but it is uncertain whether this trend applies to the entire country, is confined to younger people, or is sex-specific.

Several studies have found that neuromuscular agility and proprioceptive training programs are effective as preventive measures, averting 50–80% of ACL injuries.^{9,11} Sports injuries, particularly ACL injuries, are emerging as an internationally recognised public health problem, making it vital that the demographic features associated with an increased risk of ACL injury are characterised.

The aim of our study was to investigate the incidence and demographic features of ACL reconstructions in Australia, by age and sex, and to determine whether the incidence of ACL reconstructions has changed during the past 15 years.

Methods

Study design

Longitudinal data for ACL reconstructions were extracted from the National Hospital Morbidity Database (NHMD) of the Australian

Institute of Health and Welfare (AIHW) (<http://www.aihw.gov.au/hospitals-data/procedures-data-cubes>). The NHMD comprises confidential electronic record summaries for episodes of care provided by state and territory health authorities, including data from public and private hospitals, as well as from private surgical centres. The database affords national coverage of information on inpatient hospital treatments, with a negligible proportion of missing data (0.004% of cases per year).¹² The database collects information on the type of procedure (according to the International Statistical Classification of Diseases and Related Health Problems, 10th revision, Australian modification [ICD-10-AM]¹³ and the third to eighth editions of the Australian Classification of Health Interventions [ACHI]¹⁴), year of procedure, sex and age group of patient, and whether the procedure required day or overnight admission.

Patients who underwent a primary knee reconstruction during the period 1 July 2000 – 30 June 2015 were identified by ICD-10-AM block number 1522 (with ICD-10-AM procedure codes 49539-00, 49539-01, 49542-00, 49542-01). AIHW procedure numbers included both isolated cruciate reconstruction and cruciate reconstruction with concurrent meniscal injury. Revision knee reconstructions

Anterior Cruciate Ligament

Do all ACL injuries need reconstructing?



Anterior Cruciate Ligament

Non-operative Management

- Can be successful
- High level cutting sports possible but less likely
- Intense physical therapy program
 - Static and dynamic control, impact, jump and land, cutting
 - 3 month minimum



Anterior Cruciate Ligament

Who needs surgery?

1. Coper
 - Returns to pre-injury level of play
2. Adapter
 - Adapts activity level to knee function
3. Non-Coper
 - Persistent symptomatic instability

Anterior Cruciate Ligament

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Anterior Cruciate Ligament

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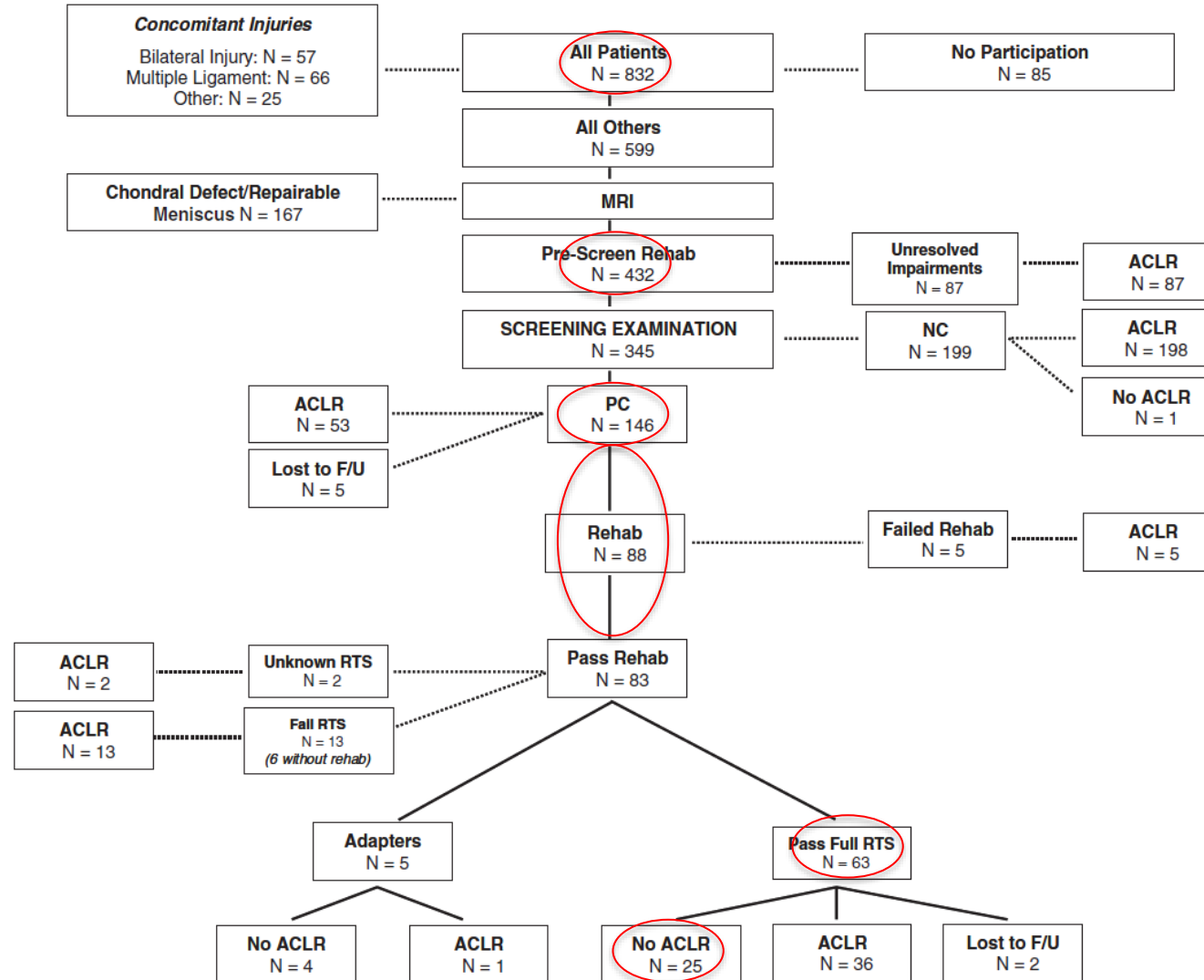
Anterior Cruciate Ligament

The adapter

- Avoid instability events
- More difficult in younger, more active patients



Anterior Cruciate Ligament



Anterior Cruciate Ligament

Relationship Between Time to ACL Reconstruction and Presence of Adverse Changes in the Knee at the Time of Reconstruction

Mark Sommerfeldt,^{††} MD, MPH, FRCSC, Tom Goodine,[‡] MD, FRCSC, Abdul Raheem,[§] BA, Jackie Whittaker,^{†††} PhD, MD, and David Otto,^{††} MD, FRCSC
Investigation performed at the University of Alberta, Edmonton, Alberta, Canada

TABLE 2
 Prevalence of Meniscal Tears by Quartiles^a

| Location | First Quartile (n = 226) | Second Quartile (n = 247) | Third Quartile (n = 172) | Fourth Quartile (n = 215) |
|----------|--------------------------|---------------------------|--------------------------|---------------------------|
| Medial | 48.2 (109) | 48.6 (120) | 59.3 (102) | 78.6 (169) |
| Lateral | 46.9 (106) | 43.7 (108) | 47.1 (81) | 50.2 (108) |
| Both | 23.9 (54) | 22.7 (56) | 30.8 (53) | 37.7 (81) |
| No tear | 28.8 (65) | 30.4 (75) | 24.4 (42) | 8.8 (19) |

^aValues are expressed as % (n).

Summary of Chondral Damage by Quartiles^a

| Location | First Quartile (n = 226) | Second Quartile (n = 247) | Third Quartile (n = 172) | Fourth Quartile (n = 215) |
|-------------------------|--------------------------|---------------------------|--------------------------|---------------------------|
| Medial femoral condyle | 12.4 (28) | 17.8 (44) | 19.2 (33) | 38.6 (83) |
| Lateral femoral condyle | 4.9 (11) | 6.5 (16) | 4.1 (7) | 8.8 (19) |
| Medial tibial plateau | 0 (0) | 0.4 (1) | 0.6 (1) | 2.8 (6) |
| Lateral tibial plateau | 1.8 (4) | 0.8 (2) | 1.7 (3) | 0.5 (1) |
| Patellofemoral | 0.44 (1) | 2.43 (6) | 1.7 (3) | 1.9 (4) |

^aValues are expressed as % (n).

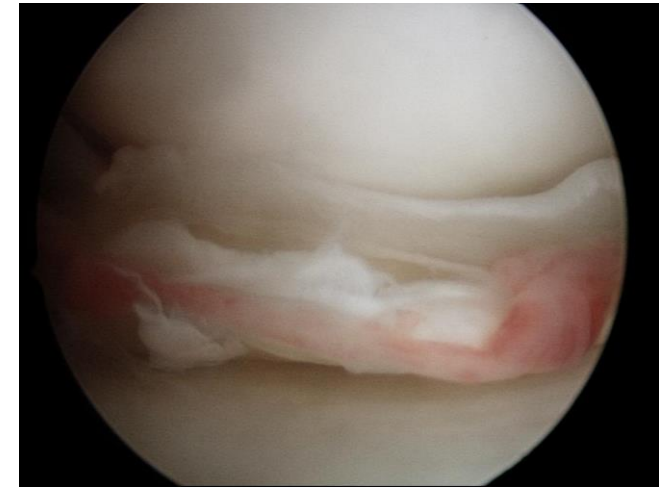
Anterior Cruciate Ligament



Anterior Cruciate Ligament

Who do I operate on?

- Other injuries needing surgery
 - Chondral or meniscus injury, other ligamentous injury



Anterior Cruciate Ligament

Who do I operate on?

- Other injuries needing surgery
- High risk patient
 - Young
 - High level sport



Anterior Cruciate Ligament

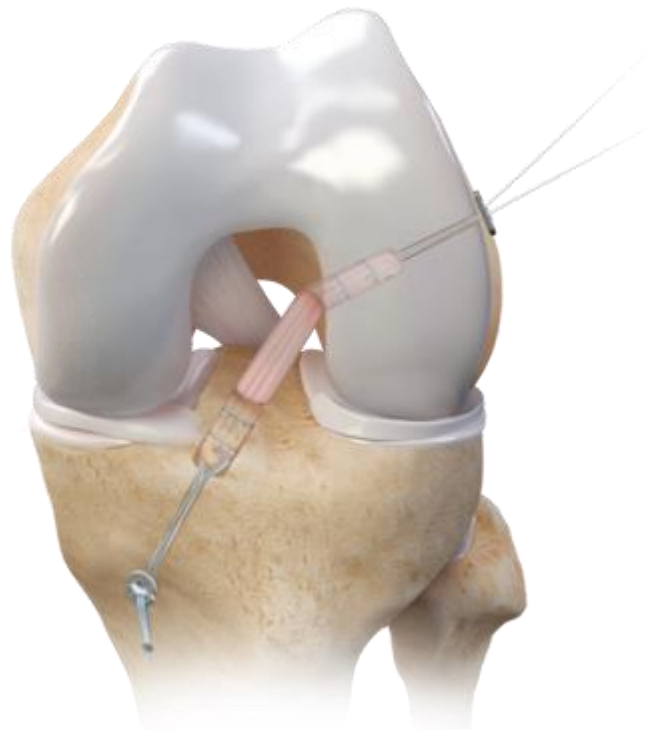
Who do I operate on?

- Other injuries needing surgery
- High risk patient
- Failed Non-operative
- Patient preference



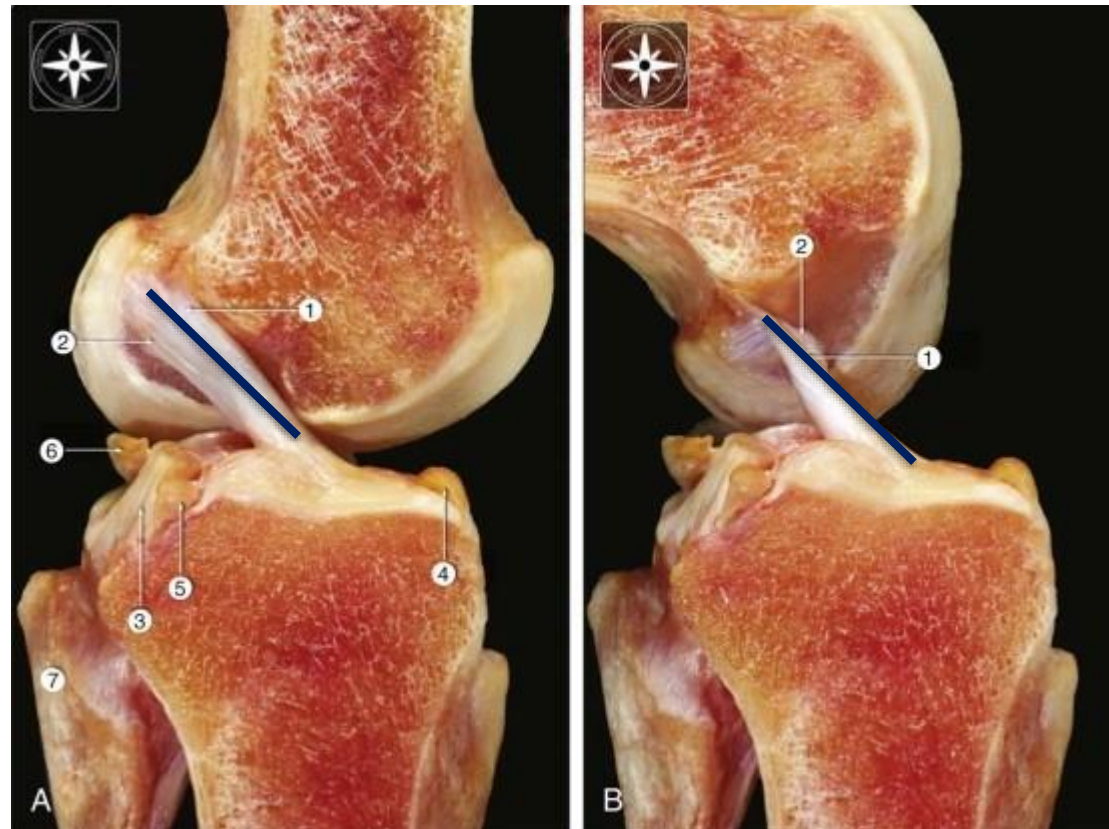
Anterior Cruciate Ligament

ACL reconstruction



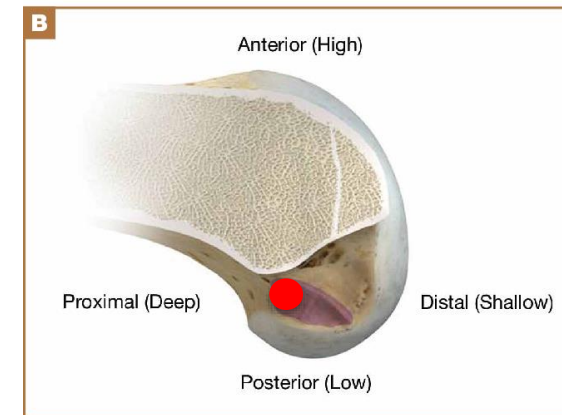
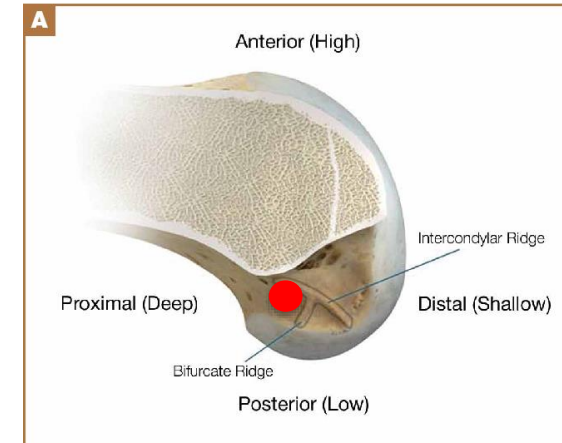
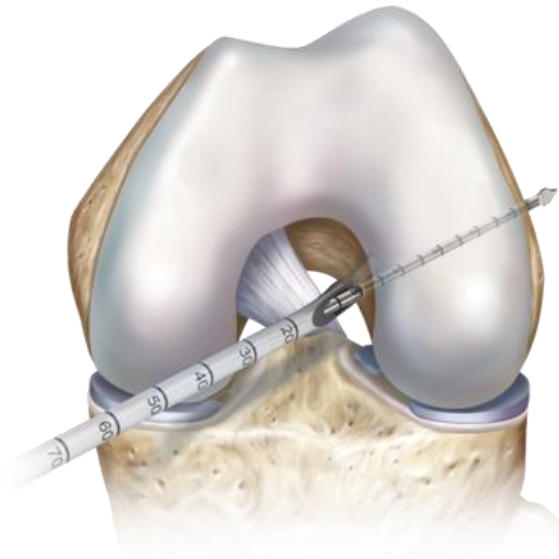
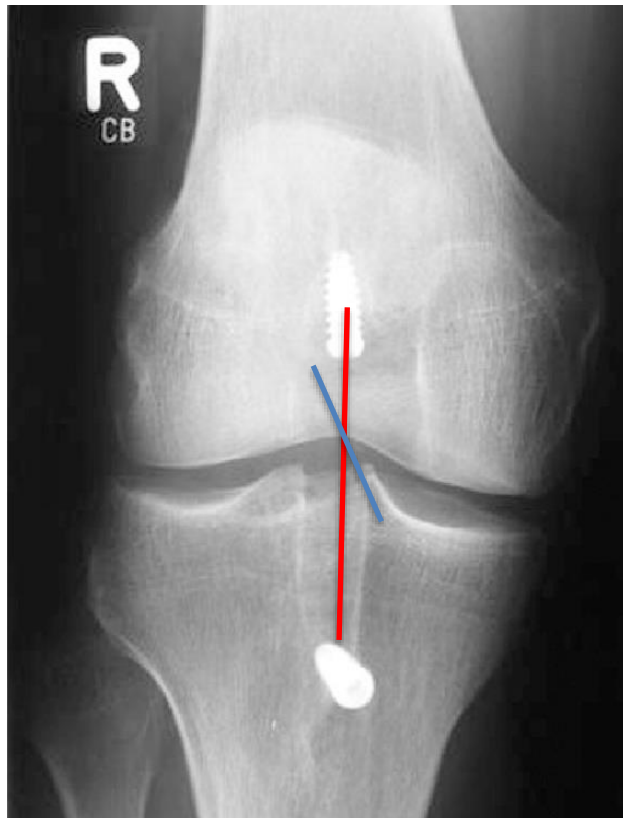
Anterior Cruciate Ligament

ACL reconstruction



Anterior Cruciate Ligament

ACL reconstruction



Anterior Cruciate Ligament

ACL reconstruction



Anterior Cruciate Ligament

ACL reconstruction



Anterior Cruciate Ligament

Rehabilitation

1. Pre-habilitation

- Knee Settled before surgery
- 4-6 weeks neuromuscular pre-conditioning

Anterior Cruciate Ligament

Rehabilitation

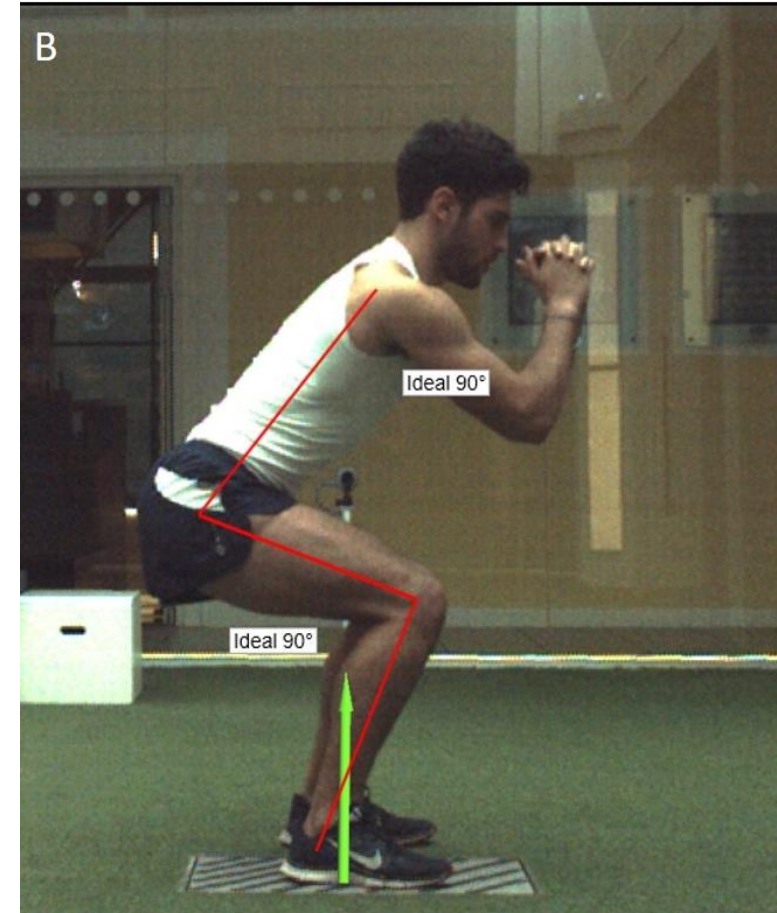
1. Pre-habilitation
2. Acute Recovery phase



Anterior Cruciate Ligament

Rehabilitation

1. Pre-habilitation
2. Acute Recovery phase
3. Strength and Coordination



Anterior Cruciate Ligament

Rehabilitation

1. Pre-habilitation
2. Acute Recovery phase
3. Strength and Coordination
4. Proprioception and Agility



Anterior Cruciate Ligament

Rehabilitation

1. Pre-habilitation
2. Acute Recovery phase
3. Strength and Coordination
4. Proprioception and Agility
5. Sports Specific Skills



Anterior Cruciate Ligament

Return to play

- ‘Goals based’ Rehabilitation
- RTP <9 months
 - Double re-injury / month

Table 1 Discharge tests and criteria used during the study period

| Six-part return to sport tests | Discharge permitted when each of these criteria was met |
|---|---|
| Isokinetic test at 60, 180 and 300°/s | Quadriceps deficit <10% at 60°/s |
| Single hop | Limb symmetry index >90% |
| Triple hop | Limb symmetry index >90% |
| Triple crossover hop | Limb symmetry index >90% |
| On-field sports-specific rehabilitation | Fully completed |
| Running t test | <11 s |

Criteria were set according to the literature at the start of the study.

Anterior Cruciate Ligament

FIFA 11+

PART 1 RUNNING EXERCISES - 8 MINUTES

1 RUNNING STRAIGHT AHEAD

The coach is in the middle of the field. Players start in a line in front of the coach. They run straight ahead for 10 seconds. They stop for 10 seconds. They repeat for 8 minutes.

2 RUNNING HIP OUT

With one foot on the line, players start in a line in front of the coach. They run straight ahead for 10 seconds. They stop for 10 seconds. They repeat for 8 minutes.

3 RUNNING HIP IN

With one foot on the line, players start in a line in front of the coach. They run straight ahead for 10 seconds. They stop for 10 seconds. They repeat for 8 minutes.

4 RUNNING CIRCLING PARTNER

Players start in a line in front of the coach. They run in a circle around the coach for 10 seconds. They stop for 10 seconds. They repeat for 8 minutes.

5 RUNNING SHOULDER CONTACT

Players start in a line in front of the coach. They run straight ahead for 10 seconds. They stop for 10 seconds. They repeat for 8 minutes.

6 RUNNING QUICK FORWARDS & BACKWARDS

Players start in a line in front of the coach. They run forward for 5 seconds. They stop for 5 seconds. They run backward for 5 seconds. They stop for 5 seconds. They repeat for 8 minutes.

PART 2 STRENGTH · PLYOMETRICS · BALANCE - 10 MINUTES

7 THE BENCH STATIC

Starting position: Lie on your back, supporting yourself on your forearms and feet. Your knees should be bent at a 90-degree angle. Your feet should be flat on the ground. Hold this position for 20 seconds. Repeat for 10 minutes.

8 THE BENCH ALTERNATE LEGS

Starting position: Lie on your back, supporting yourself on your forearms and feet. Your knees should be bent at a 90-degree angle. Your feet should be flat on the ground. Alternate legs every 10 seconds. Repeat for 10 minutes.

9 THE BENCH ONE LEG LIFT AND HOLD

Starting position: Lie on your back, supporting yourself on your forearms and feet. Your knees should be bent at a 90-degree angle. Your feet should be flat on the ground. Lift one leg and hold for 10 seconds. Repeat for 10 minutes.

10 SIDEWAYS BENCH STATIC

Starting position: Lie on your side, supporting yourself on your forearms and feet. Your knees should be bent at a 90-degree angle. Your feet should be flat on the ground. Hold this position for 20 seconds. Repeat for 10 minutes.

11 SIDEWAYS BENCH RAISE & LOWER HIP

Starting position: Lie on your side, supporting yourself on your forearms and feet. Your knees should be bent at a 90-degree angle. Your feet should be flat on the ground. Raise and lower your hip every 10 seconds. Repeat for 10 minutes.

12 SIDEWAYS BENCH WITH LEG LIFT

Starting position: Lie on your side, supporting yourself on your forearms and feet. Your knees should be bent at a 90-degree angle. Your feet should be flat on the ground. Lift one leg and hold for 10 seconds. Repeat for 10 minutes.

13 HAMSTRINGS BEGINNER

Starting position: Stand on a soft surface. Ask your partner to hold your ankles. Lift one leg and hold for 10 seconds. Repeat for 10 minutes.

14 HAMSTRINGS INTERMEDIATE

Starting position: Stand on a soft surface. Ask your partner to hold your ankles. Lift one leg and hold for 10 seconds. Repeat for 10 minutes.

15 HAMSTRINGS ADVANCED

Starting position: Stand on a soft surface. Ask your partner to hold your ankles. Lift one leg and hold for 10 seconds. Repeat for 10 minutes.

16 SINGLE-LEG STANCE HOLD THE BALL

Starting position: Stand on one leg. Hold a ball with your other hand. Hold this position for 30 seconds. Repeat for 10 minutes.

17 SINGLE-LEG STANCE THROWING BALL WITH PARTNER

Starting position: Stand on one leg. Ask your partner to hold your other leg. Throw a ball to your partner. Repeat for 10 minutes.

18 SINGLE-LEG STANCE TEST YOUR PARTNER

Starting position: Stand on one leg. Ask your partner to hold your other leg. Test your partner's balance. Repeat for 10 minutes.

19 SQUATS WITH TOE RAISE

Starting position: Stand on a soft surface. Ask your partner to hold your ankles. Squat and raise your toes. Repeat for 10 minutes.

20 SQUATS WALKING LUNGES

Starting position: Stand on a soft surface. Ask your partner to hold your ankles. Squat and walk in lunges. Repeat for 10 minutes.

21 SQUATS ONE-LEG SQUATS

Starting position: Stand on a soft surface. Ask your partner to hold your ankles. Squat on one leg. Repeat for 10 minutes.

22 JUMPING VERTICAL JUMPS

Starting position: Stand on a soft surface. Jump vertically. Repeat for 10 minutes.

23 JUMPING LATERAL JUMPS

Starting position: Stand on a soft surface. Jump laterally. Repeat for 10 minutes.

24 JUMPING BOX JUMPS

Starting position: Stand on a soft surface. Jump onto a box. Repeat for 10 minutes.

PART 3 RUNNING EXERCISES - 2 MINUTES

25 RUNNING ACROSS THE PITCH

Run across the pitch. Repeat for 2 minutes.

26 RUNNING BOUNDING

Run with a bounding motion. Repeat for 2 minutes.

27 RUNNING PLANT & CUT

Run with a plant and cut motion. Repeat for 2 minutes.

COACHING

THE KNEE PROGRAM

ELITE GUIDE

KNEE: knee injury prevention for netballers to enhance performance and extend play

KEY PRINCIPLES

Good Technique - Take Off
Good Technique - Landing

WARM UP Perform all

| | |
|---------------------------------------|-------------|
| Partner Circling Jog | Full Court |
| 'A' Skip | ½ Court |
| High Knees | ½ Court |
| Butt Flicks | ½ Court |
| Calf Bounces | ½ Court |
| Side Skip and Squat | ½ Court |
| Lateral High Knees | ½ Court |
| Forward and Backward, Lateral Shuffle | ½ Court |
| Forward and Backward, Lateral Bound | ½ Court |
| Walking Lunge and Rotation | ½ Court |
| Walking Hamstrings/Gluteals | ½ Court |
| Target Stretching | 1-2 minutes |

BALANCE/LANDING Perform 4 exercises in total

JUMP AND LAND TECHNIQUE

| | |
|---------------------------|-----------|
| Double Leg and Single Leg | x10 Repts |
|---------------------------|-----------|

DOUBLE LEG ACTIVITIES

| | |
|------------------------|--------------|
| Speed Crosses +/- Ball | x2 Repts |
| Rotation 180 +/- Ball | x5 Repts L/R |

SINGLE LEG ACTIVITIES

| | |
|-------------------|--------------|
| Diagonal +/- Ball | x10 Repts |
| Land and Push | x5 Repts L/R |

REPEATED EFFORT

| | |
|------------------------|--------------|
| Repeated Speed Crosses | x2 Repts L/R |
| Tuck Jumps +/- Slalom | 2x5 Repts |

Good Technique - Deceleration
Good Technique - Change of Direction

STRENGTH Perform 1 from each target muscle

QUADRICEPS

| | |
|-------------------------|------------|
| Reverse Lunge and Drive | 2x12 Repts |
| Lunge with Partner Push | 2x12 Repts |

GLUTEALS/HAMSTRINGS

| | |
|---------------|---------------|
| Arabesque | 2x8 Repts L/R |
| Nordic Lowers | 2x8 Repts |

CORE

| | |
|-------------------|------------|
| Hand and Foot tap | 2x12 Repts |
|-------------------|------------|

AGILITY Perform 4 exercises in total

PREDICTED CHANGE OF DIRECTION

| | |
|-------------------|------------|
| Zig Zag Bound | 2x ½ Court |
| Defensive Shuffle | 2x ½ Court |

REACTIVE CHANGE OF DIRECTION

| | |
|---------------------------|-----------|
| Rotation Surprises + Ball | x10 Repts |
| Reverse Sidestep +/- Ball | x10 Repts |

DECELERATION TECHNIQUE

| | |
|----------------------------|--------------|
| Straight line Deceleration | x2 Repts L/R |
| Change of Direction | x1 Rep L/R |

NETBALL PLANE

| | |
|--|-----------------------|
| Y Drill - Dodge and Decelerate | x4 Repts |
| Y Drill - Dodge and Change of Direction +/- Ball | x2 no Ball, x2 + Ball |
| Y Drill and Pivot +/- Ball | x4 Repts |

DEFENDER

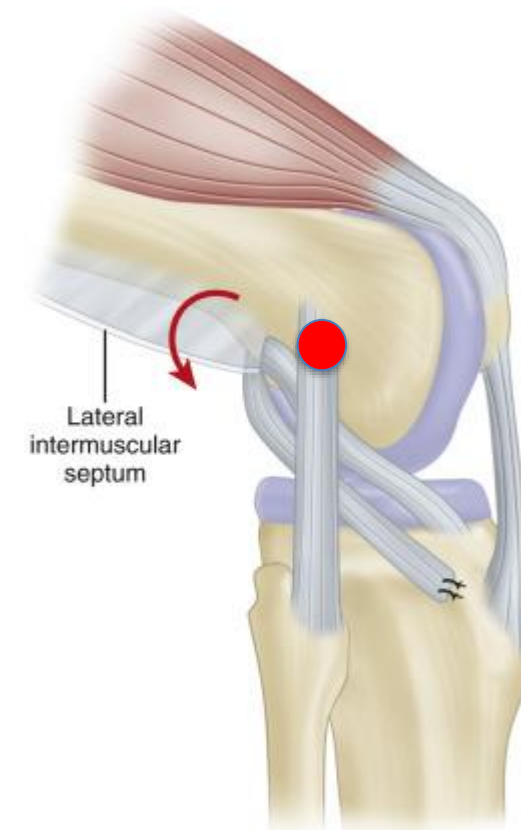
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|------------|----------|
| One on One | x2 Repts |
|------------|----------|

L/R = Left/Right F/B = Front/Back

Anterior Cruciate Ligament

Lateral Extra-articular tenodesis

- Revision ACL
- Chronic ACL
- High Risk Patient



Anterior Cruciate Ligament

ACL Primary Repair



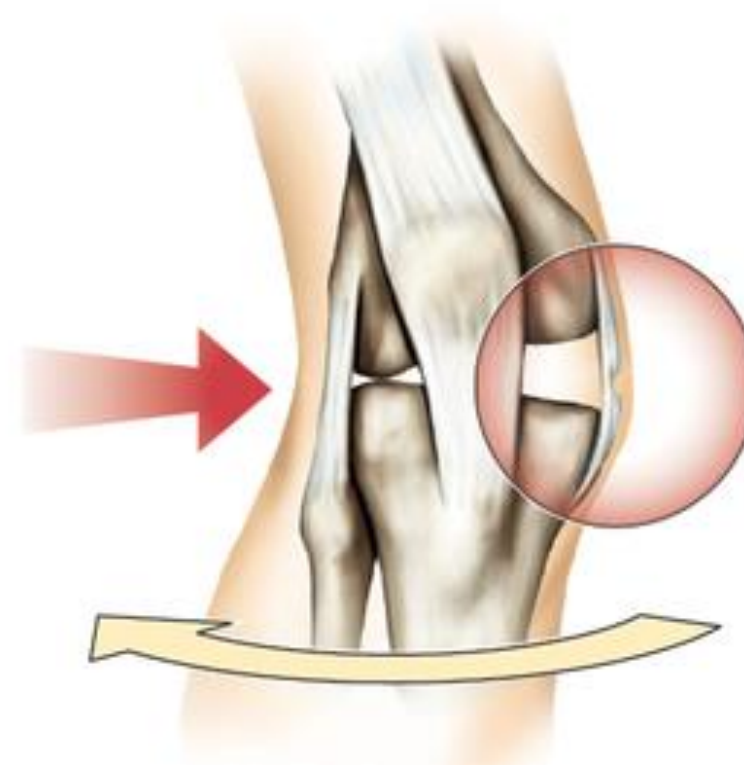
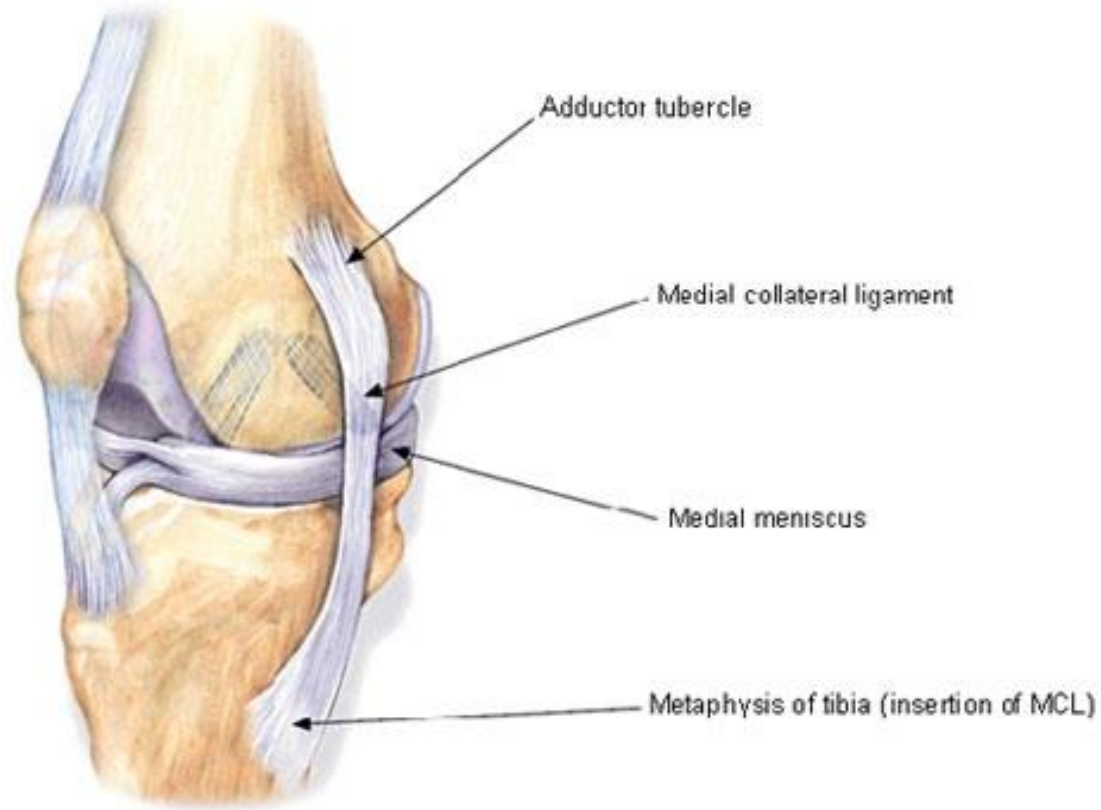
Anterior Cruciate Ligament

- Non-operative treatment should be considered
- Pre-habilitation
- Graft choice personalised to patient
- Complete Rehabilitation prior to RTP

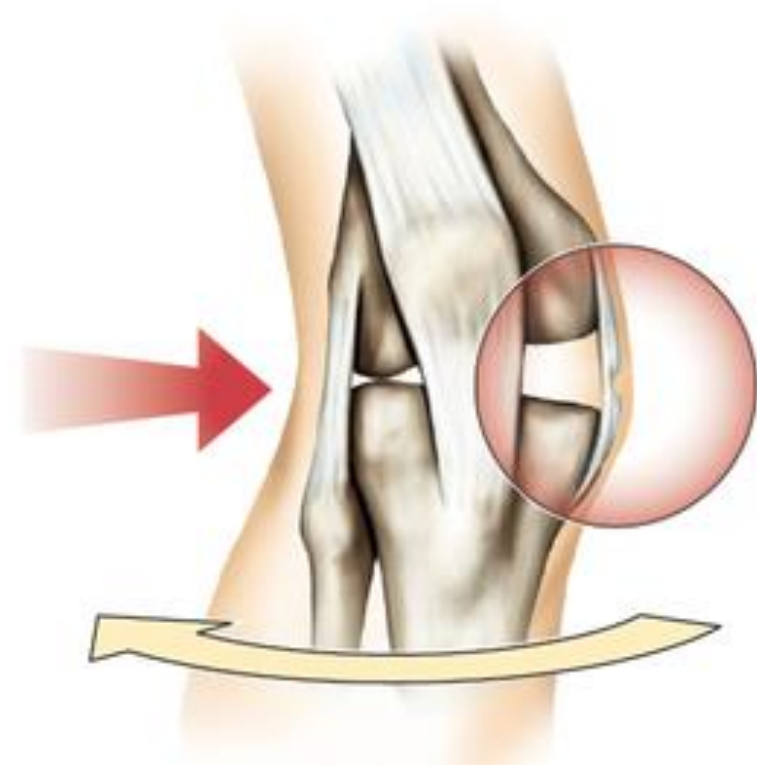
Anterior Cruciate Ligament

Questions?

Medial Collateral Ligament



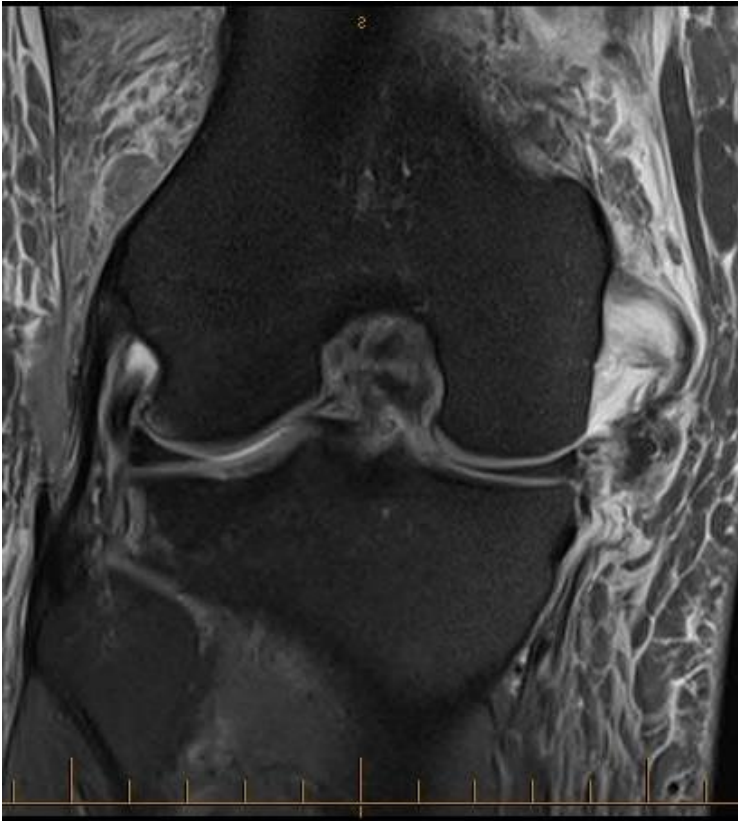
Medial Collateral Ligament



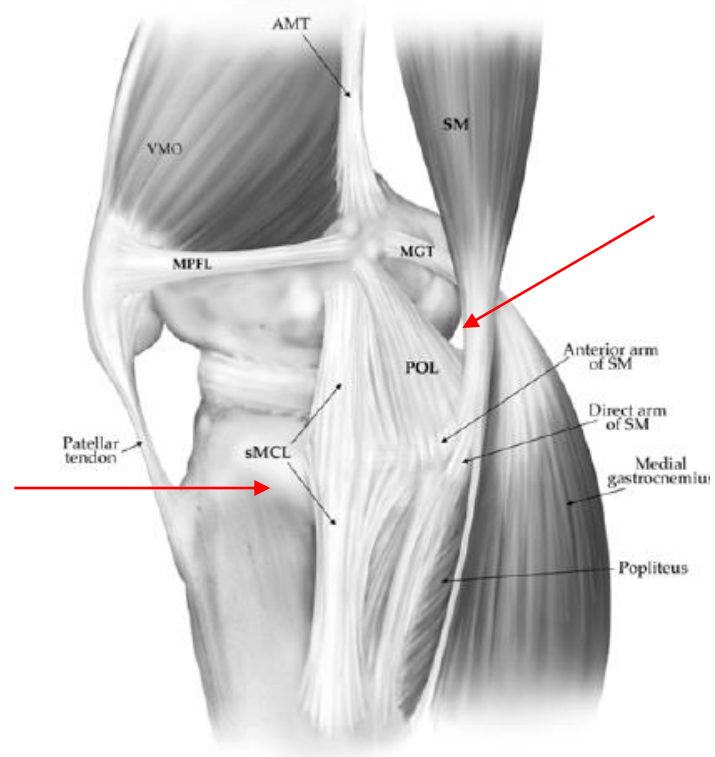
Medial Collateral Ligament



Medial Collateral Ligament



Medial Collateral Ligament



Medial Collateral Ligament

| Grade | Compare to other side | Endpoint | Distance |
|-------|---|----------|----------|
| I | Slight | Firm | <5mm |
| II | Noticeable | Soft | 5-10mm |
| III | Marked -Full Extension -30° Flexion | None | >10mm |

Medial Collateral Ligament

| Grade | Compare to other side | Endpoint | Distance |
|-------|---|----------|----------|
| I | Slight | Firm | <5mm |
| II | Noticeable | Soft | 5-10mm |
| III | Marked -Full Extension -30° Flexion | None | >10mm |

Medial Collateral Ligament

Grade I

- Almost invariably heal
- No Brace or Crutches
- Avoid impact until healed
 - 6-12 weeks
- Early Physio Referral



Medial Collateral Ligament

Grade I

- Almost
- No Bra
- Avoid i
 - 6-12
- Early P



Medial Collateral Ligament

Grade II

- Most will heal
- Brace 0-90
- Crutch Weight bearing
 - PWB → full
- Early Physio Referral
- Re-Test at 6 weeks



Medial Collateral Ligament

Grade II

- Most will heal
- Brace 0-90
- Crutch Weight bearing
 - PWB → full
- Early Physio Referral
- Re-Test at 6 weeks



Medial Collateral Ligament

Grade II

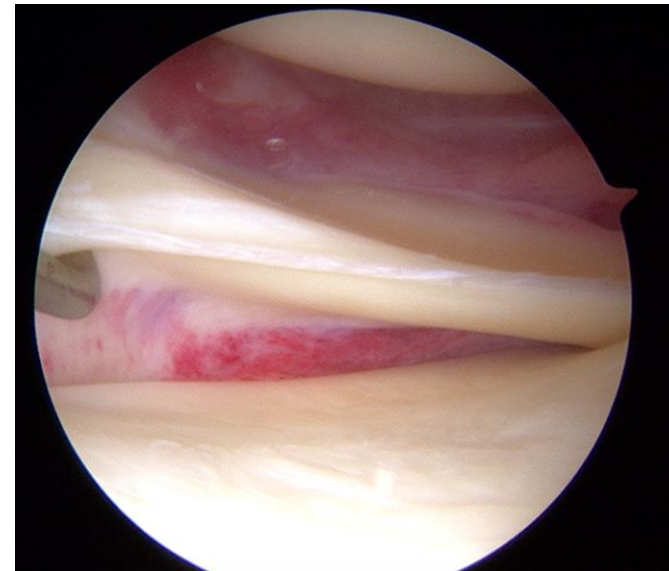
- Most
- Brace
- Crutch
– PW
- Early
- Re-Test at 6 weeks



Medial Collateral Ligament

Grade III

- Frequently combined injury
 - ACL, Posteromedial corner, PCL
- Can heal, but.....
- Generally surgery preferred



Medial Collateral Ligament

Grade III

- Frequently combined injury
 - ACL, Posteromedial corner, PCL
- Can heal, but.....
- Generally surgery preferred



Medial Collateral Ligament

Surgery

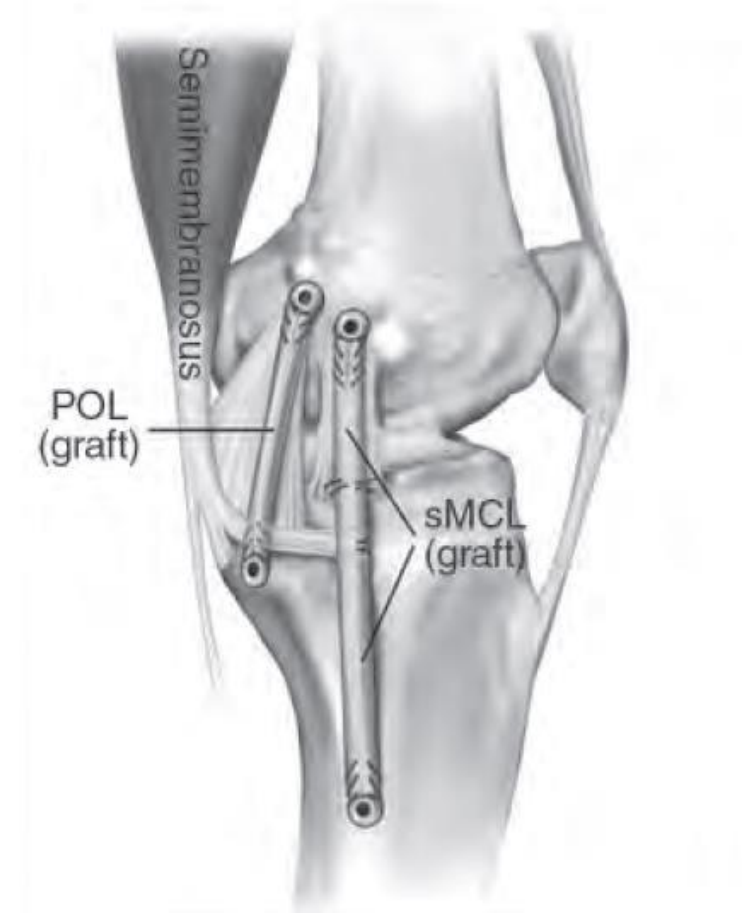
- Repair +/- Reconstruction



Medial Collateral Ligament

Surgery

- Repair +/- Reconstruction
- Hinged Brace 0-90
- NWB 6 weeks
- Commence rehab early
 - ROM
 - Quads control

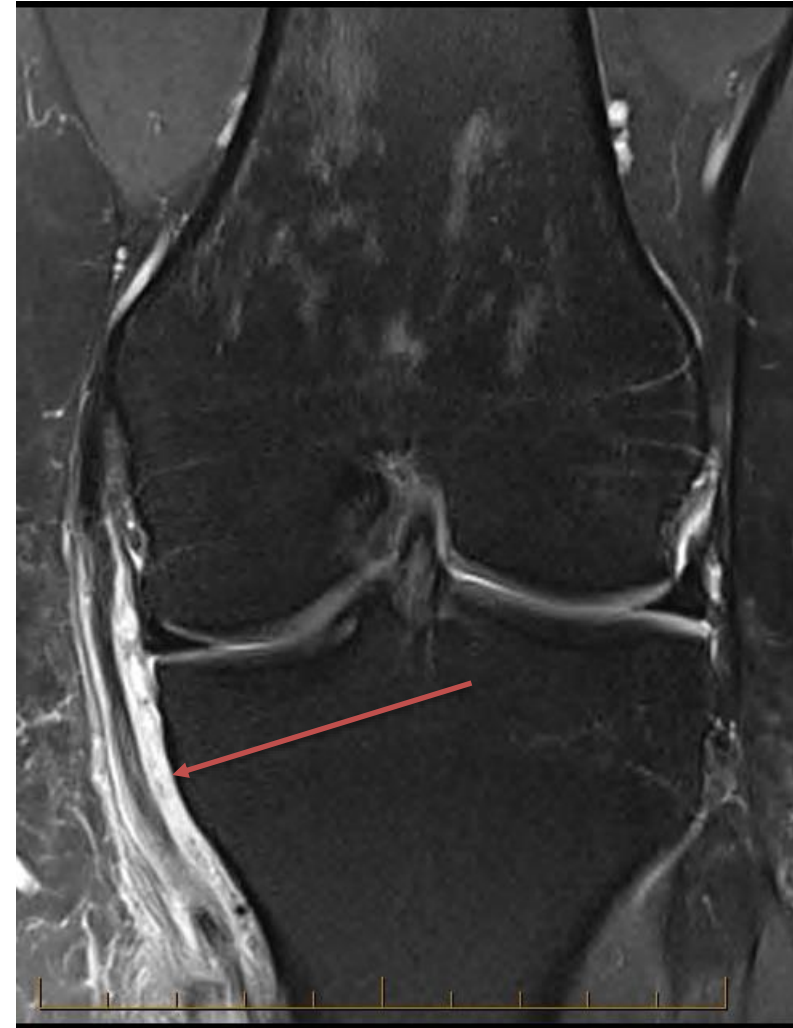


Medial Collateral Ligament

Surgery

Tibial avulsion

- Controversial
- Early repair



Medial Collateral Ligament

Surgery

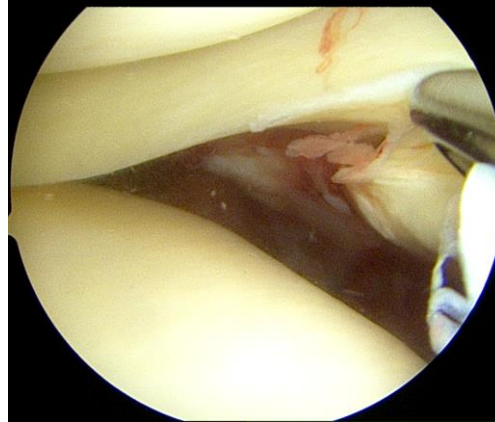
Tibial avulsion

- Controversial
- Early repair



Medial Collateral Ligament

- Most will heal
- Need to grade accurately
- If in doubt refer



Medial Collateral Ligament

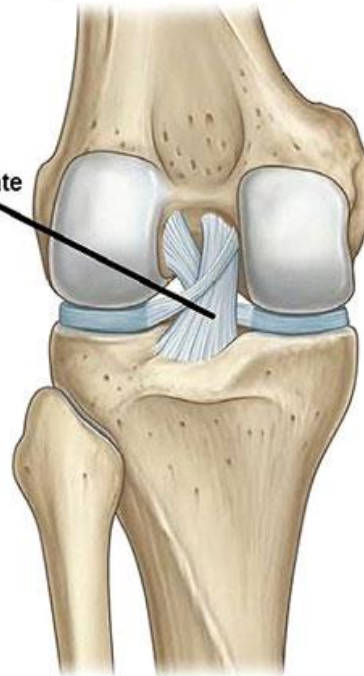
Questions?

Posterior Cruciate Ligament

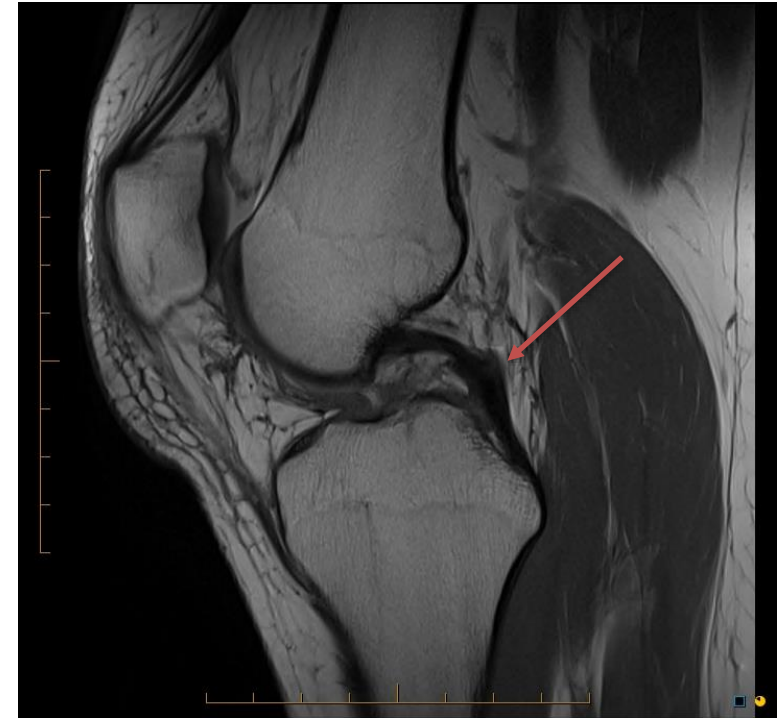
anterior view of left knee



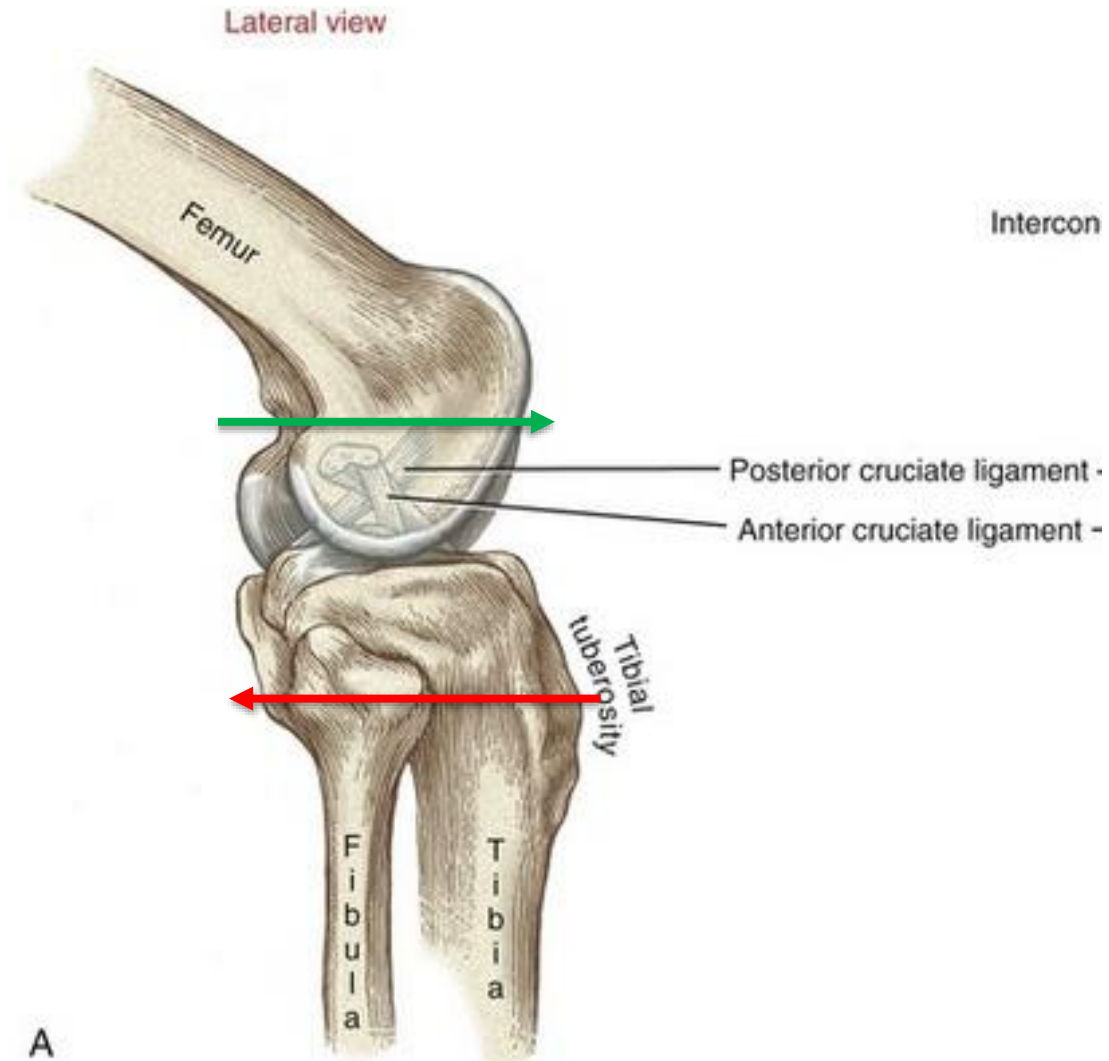
posterior view of left knee



posterior cruciate
ligament

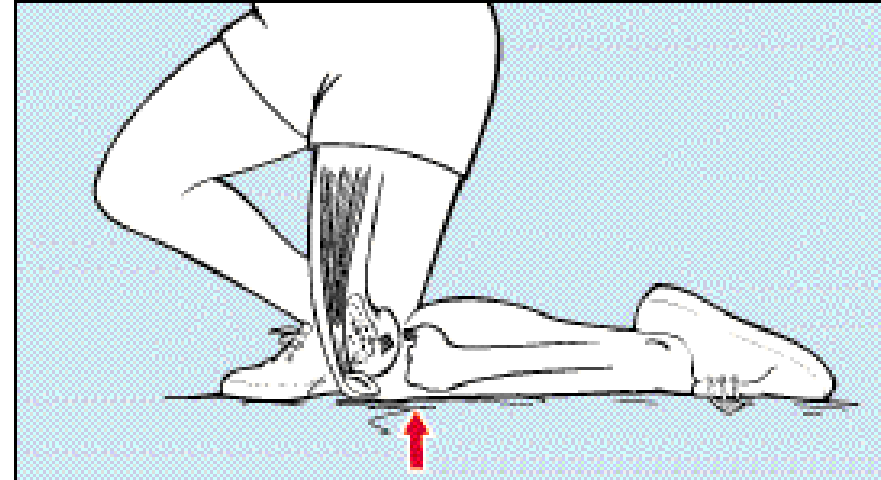


Posterior Cruciate Ligament



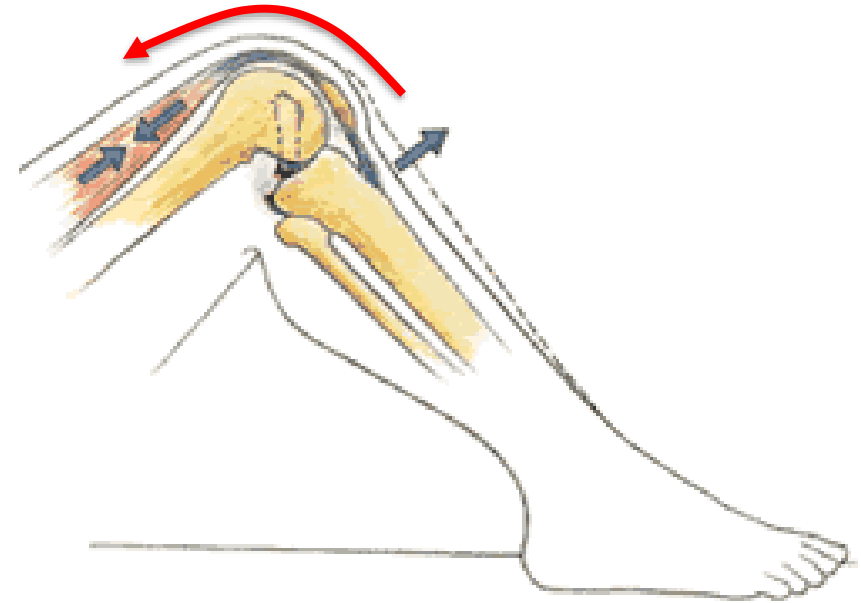
Posterior Cruciate Ligament

- Hyper-Extension
- Anterior impact
- Rarely instability
- Loss of power/acceleration

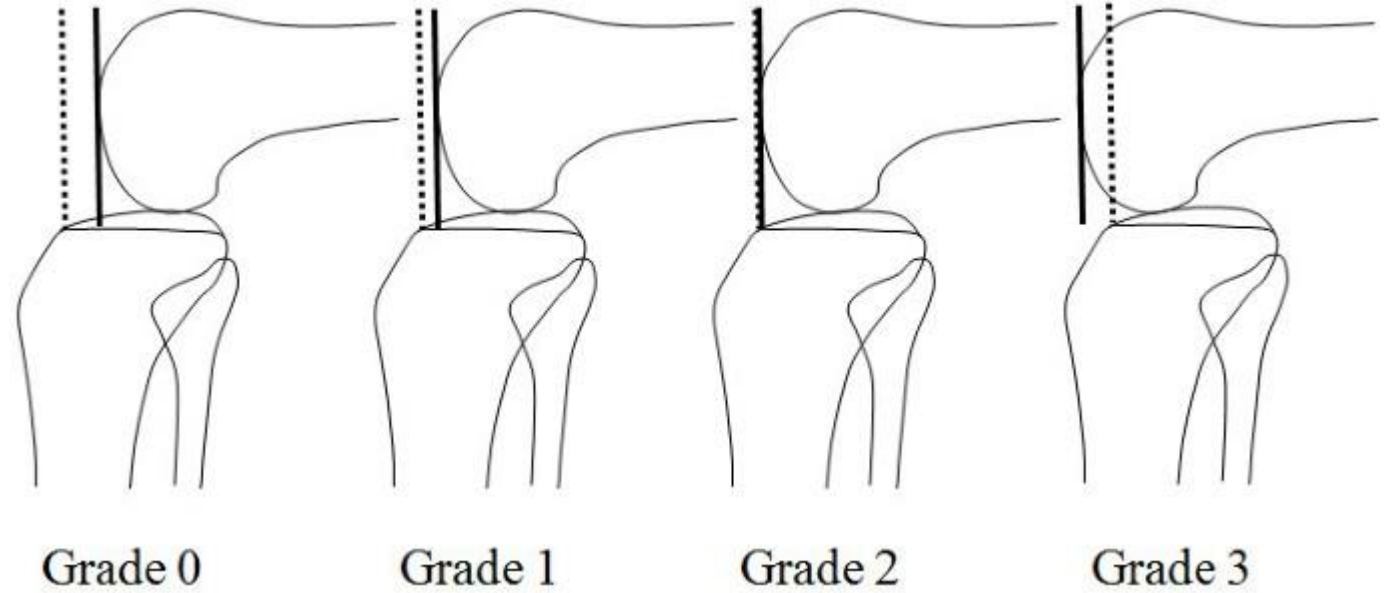


Posterior Cruciate Ligament

- Hyper-Extension
- Anterior impact
- Rarely instability
- Loss of power/acceleration



Posterior Cruciate Ligament



Posterior Cruciate Ligament



Dr Justin Webb - PCL Posterior Drawer

Posterior Cruciate Ligament

- Excellent Healing potential



Posterior Cruciate Ligament

- Excellent Healing potential
- Attempt Brace and Non-op for all isolate

Knee Surg Sports Traumatol Arthrosc
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KNEE

Posterior cruciate ligament tears: functional and postoperative rehabilitation

Casey M. Pierce · Luke O'Brien · Laurie Wohlt Griffin · Robert F. LaPrade

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Abstract

Purpose Historically, the results of posterior cruciate ligament (PCL) reconstructions are not as favourable as anterior cruciate ligament (ACL) reconstructions, and it is well recognized that nonoperative treatment and postoperative rehabilitation for PCL injuries must be altered compared to those for ACL injuries. The purpose of this article was to review current peer-reviewed PCL rehabilitation programmes and to recommend a nonoperative and postoperative programme based on basic science and published outcomes studies.

Methods To discover the current practices being used to rehabilitate PCL injuries, we conducted a search of PubMed with the terms "posterior cruciate ligament" and "rehabilitation" from 1983 to 2011. All articles within the reference lists of these articles were also examined to determine their rehabilitation programmes.

Results A review of peer-reviewed PCL rehabilitation protocols revealed that the treatment of PCL injuries depends on the timing and degree of the injury. Rehabilitation should focus on progressive weight bearing, preventing posterior tibial subluxation and strengthening of the quadriceps muscles. General principles of proper PCL rehabilitation,

whether nonoperative or postoperative, should include early immobilization (when necessary), prone passive range of motion to prevent placing undue stress on grafts or healing tissue, and progression of rehabilitation based on biomechanical, clinical, and basic science research.

Conclusions An optimal set of guidelines for the nonoperative or postoperative management of PCL injuries has not yet been defined or agreed upon. Based on the current review study, suggested guidelines are proposed.

Level of evidence IV.

Keywords PCL · Treatment · Nonoperative rehabilitation · Postoperative rehabilitation · Guidelines

Introduction

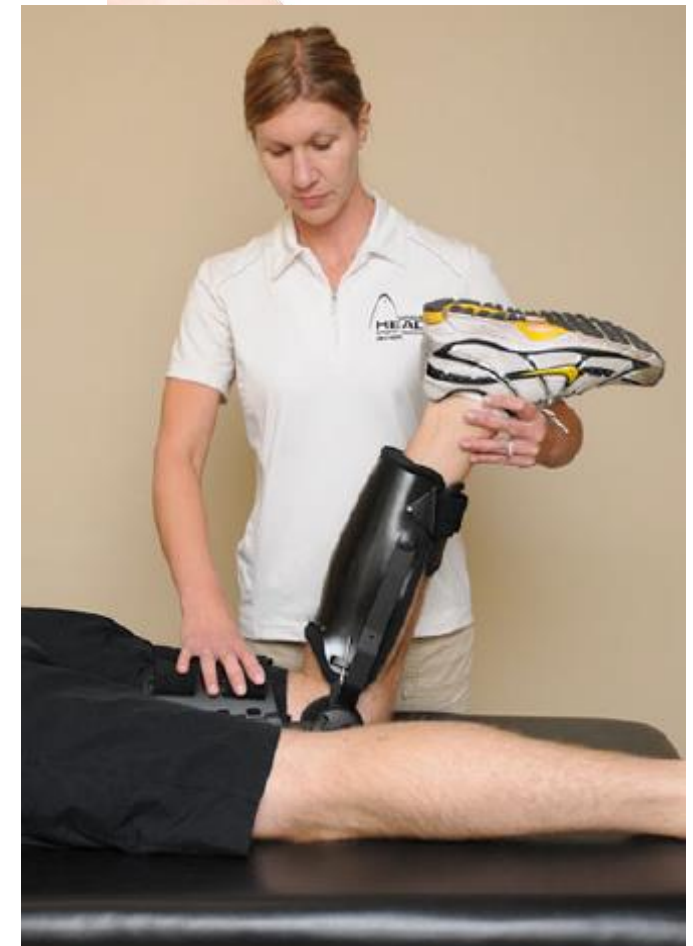
Unlike the anterior cruciate ligament (ACL), the posterior cruciate ligament (PCL) has an intrinsic ability to heal and may regain continuity following an injury; however, in a PCL-deficient knee, gravity and the forces on the joint from the hamstring muscles can potentially cause the tibia to be positioned in a posteriorly subluxed location relative to the femur [17, 25, 29, 44–47, 49]. Healing of the PCL in an elongated position can lead to chronic instability and disability [46]. The use of a cylindrical cast, which applies an anterior drawer force, has demonstrated that placing the PCL in a properly reduced position, with less posterior sag, allows for improved healing [26]. Patients who have undergone surgical reconstruction of the PCL commonly report residual posterior laxity, especially following treatment of chronic tears [2, 27, 43, 54].

Numerous studies have investigated rehabilitation protocols for patients following ACL reconstruction, but unfortunately the same cannot be said for patients with a

Knee Surg Sports Traumatol Arthrosc

Table 2 Nonoperative PCL rehabilitation protocol

| Time following injury | Specific protocol |
|--|---|
| Phase I 0–6 weeks after injury | <p>Precautions</p> <ul style="list-style-type: none"> PRICE (Protect, Rest, Ice, Compress, Elevate) protocol Avoid hyperextension (12 weeks) Prevent posterior tibial translation (12 weeks) <i>Isolated hamstring exercises should be avoided until week 12</i> Weight bearing <ul style="list-style-type: none"> Partial weight bearing with crutches (2 weeks) Range of motion (ROM) <ul style="list-style-type: none"> Prone passive ROM from 0° to 90° (Fig. 1) for the first 2 weeks, and then progress to full ROM <p>Brace</p> <ul style="list-style-type: none"> PCL Jack brace to be worn at all times, including rehabilitation and sleep (minimum of 12 weeks) <p>Goals</p> <ul style="list-style-type: none"> PCL ligament protection Oedema reduction to improve passive ROM and quadriceps activation Address gait mechanics Patient education Therapeutic exercise <ul style="list-style-type: none"> Patellar mobilizations Prone passive ROM (Fig. 1) Quadriceps activation <ul style="list-style-type: none"> Quadriceps sets Straight leg raises (SLR) once the quadriceps are able to lock joint in terminal extension and no lag is present Gastrocnemius stretching Hip abduction/adduction Stationary bike with zero resistance when ROM > 115° Weight shifts to prepare for crutch weaning Pool walking to assist with crutch weaning Calf raises and single leg balance when weaned from crutches Upper body and core strength as appropriate |
| Phase II 6–12 weeks after injury | <p>Precautions</p> <ul style="list-style-type: none"> Continued avoidance of hyperextension Prevent posterior tibial translation Limit double leg strengthening exercises to no more than 70° of knee flexion Weight bearing <ul style="list-style-type: none"> Weight bearing as tolerated (WBAT) Range of motion <ul style="list-style-type: none"> Full ROM, supine and prone ROM after 6 weeks <p>Brace</p> <ul style="list-style-type: none"> PCL Jack brace to be worn at all times <p>Goals</p> <ul style="list-style-type: none"> PCL ligament protection Full ROM <ul style="list-style-type: none"> Address gait mechanics during crutch weaning Double leg strength through ROM (no greater than 70° knee flexion) and single leg static strength exercises Reps and set structure to emphasize muscular endurance development (3 sets of 20 reps) Therapeutic exercise <ul style="list-style-type: none"> Continue PRICE protocol |



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Posterior Cruciate Ligament

Surgery

- Symptomatic Grade II+
- Most Grade III



Posterior Cruciate Ligament

Surgery

- Symptomatic Grade II+
- Most Grade III

- PCL Brace 12 weeks
- Non-Weight Bear 6 weeks



Posterior Cruciate Ligament

- Don't forget/neglect the PCL
- Early referral for bracing
- *Reconstruction is under-performed*

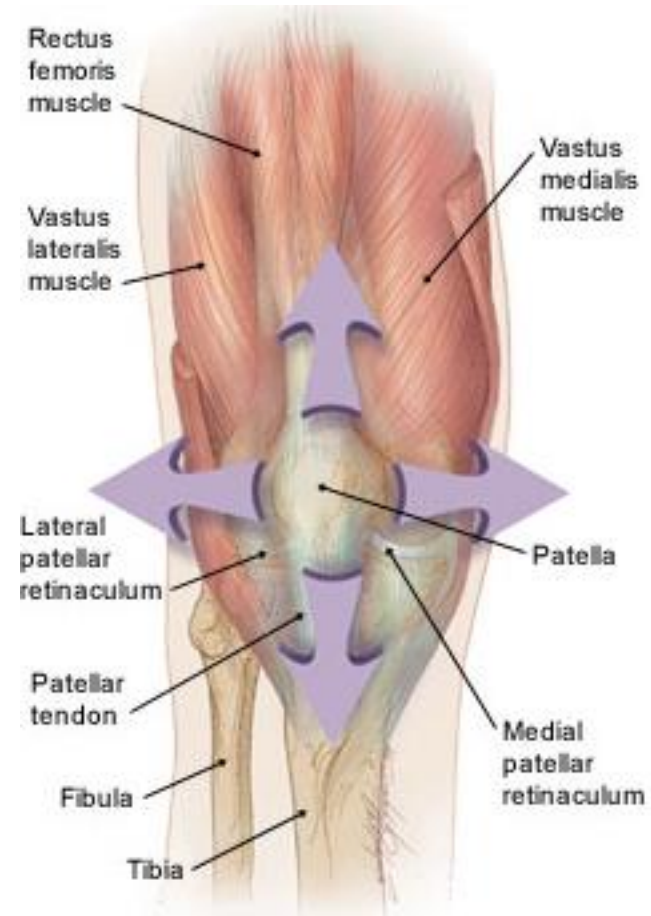
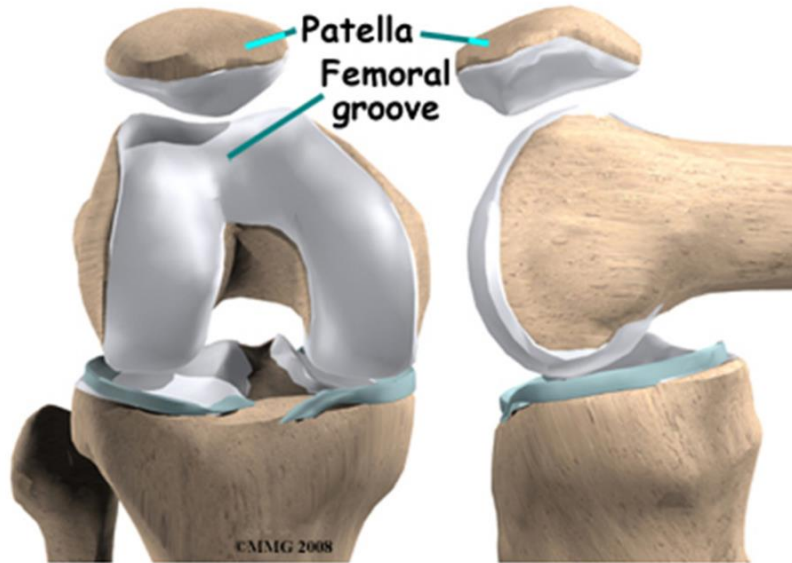
Posterior Cruciate Ligament

Questions?

Patellofemoral instability

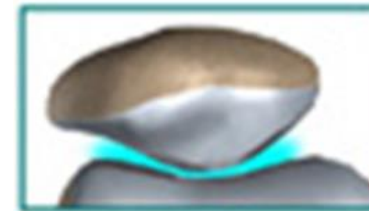


Patellofemoral instability



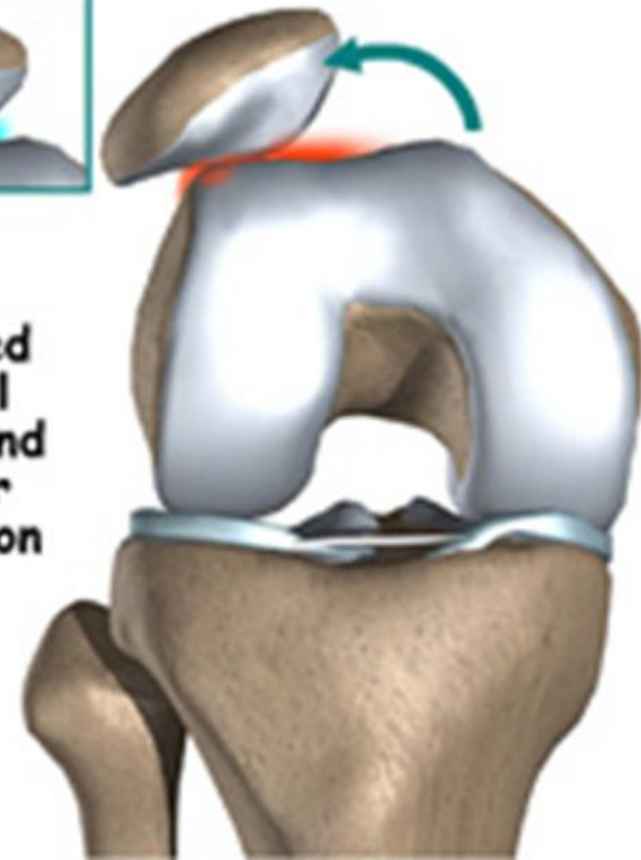
MPFL

Patellofemoral instability

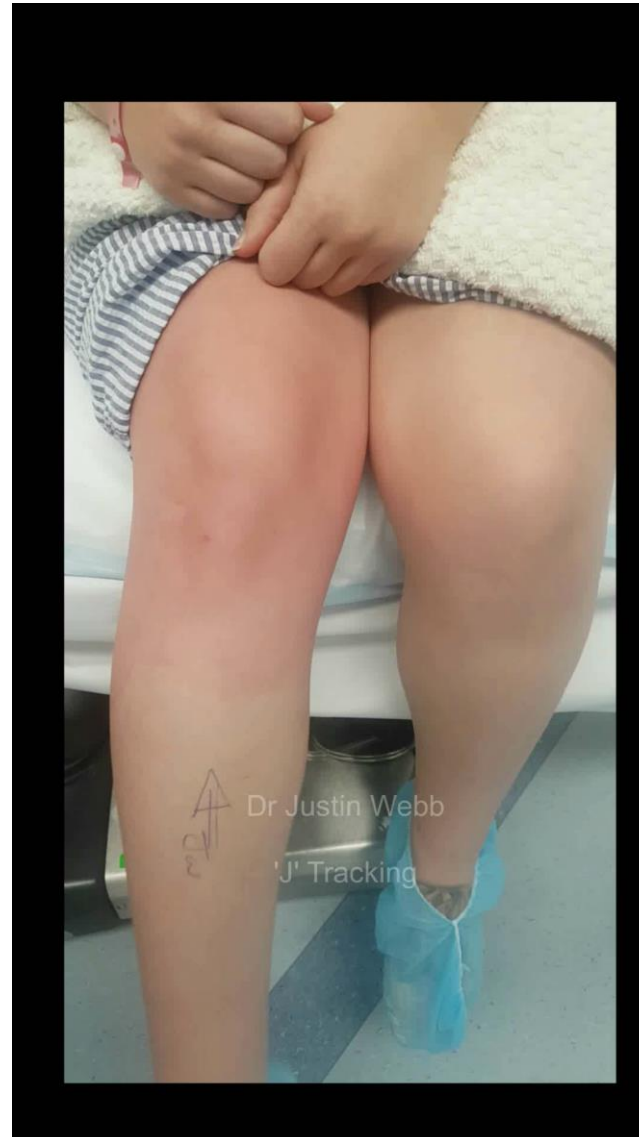


Normal

Flattened
femoral
groove and
patellar
dislocation



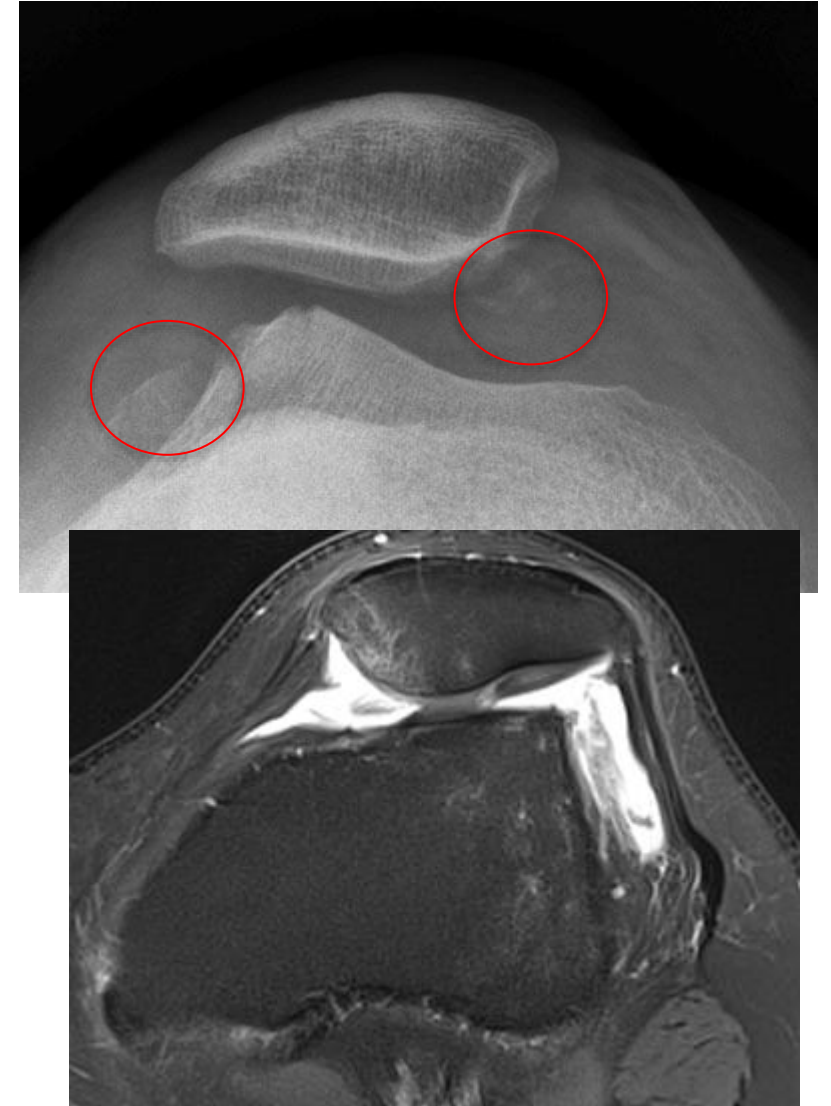
Patellofemoral instability



Patellofemoral instability

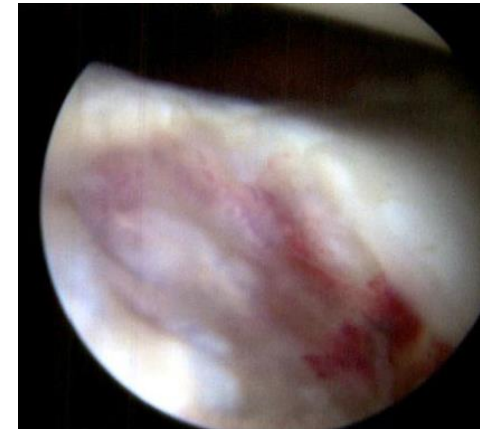
Initial Management

- Pain Relief
- Avoid brace if possible – Crutches to walk
- Restore ROM
- Physiotherapy
- Return to sport usually 6-12 weeks



Patellofemoral instability

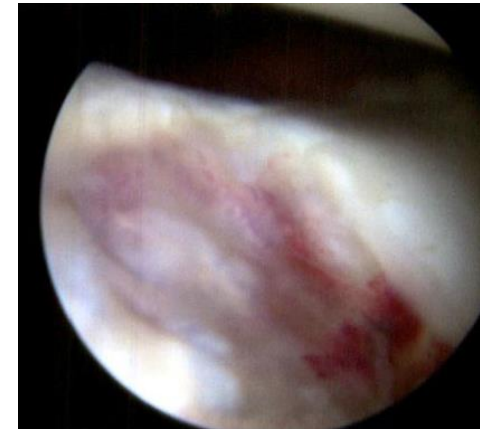
- 1st time dislocation
 - 30% recurrence
- 2nd time dislocation
 - 60% recurrence
 - Consider stabilisation
- 3rd time dislocation
 - Stabilisation



Patellofemoral instability

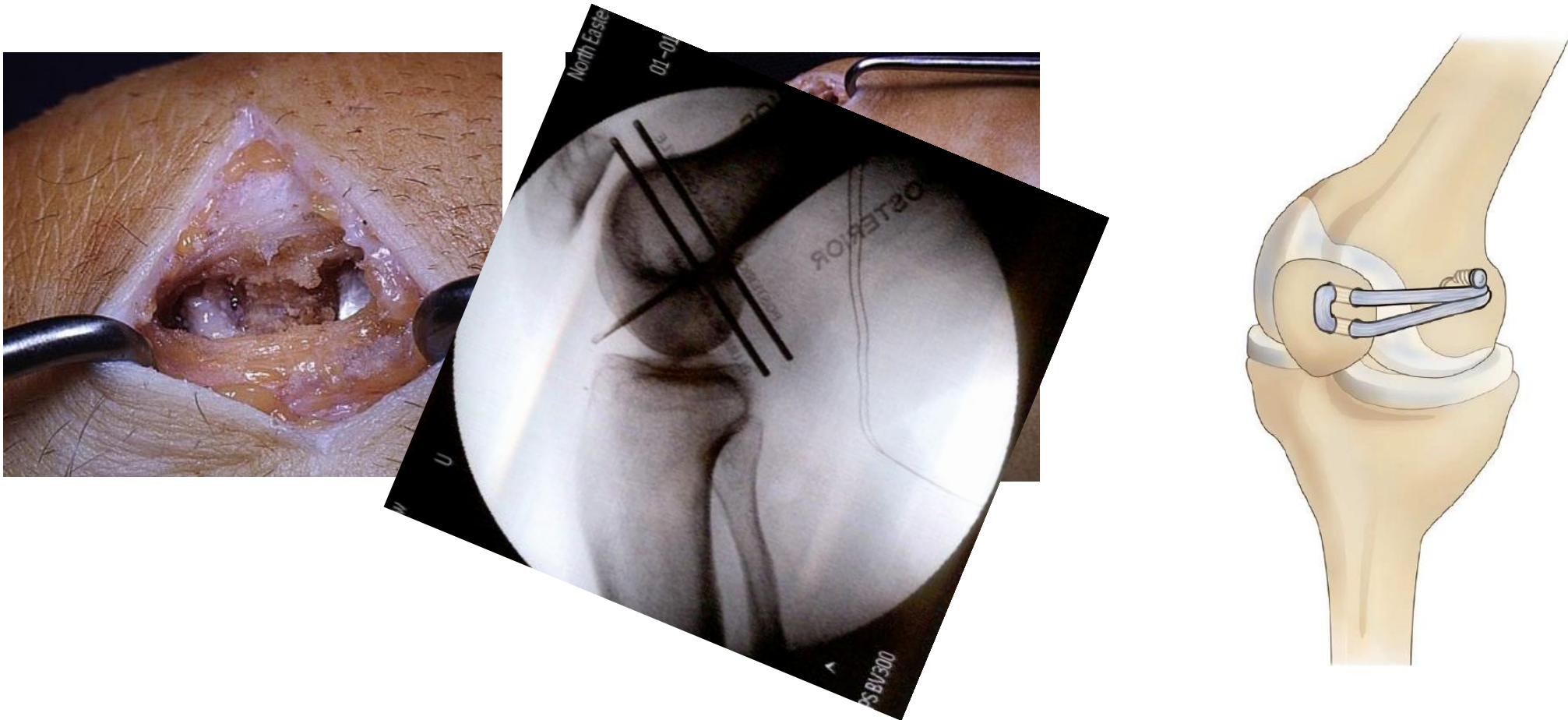
- 1st time dislocation
 - 30% recurrence
- 2nd time dislocation
 - 60% recurrence
 - Consider stabilisation
- 3rd time dislocation
 - Stabilisation

- Refer



Patellofemoral instability

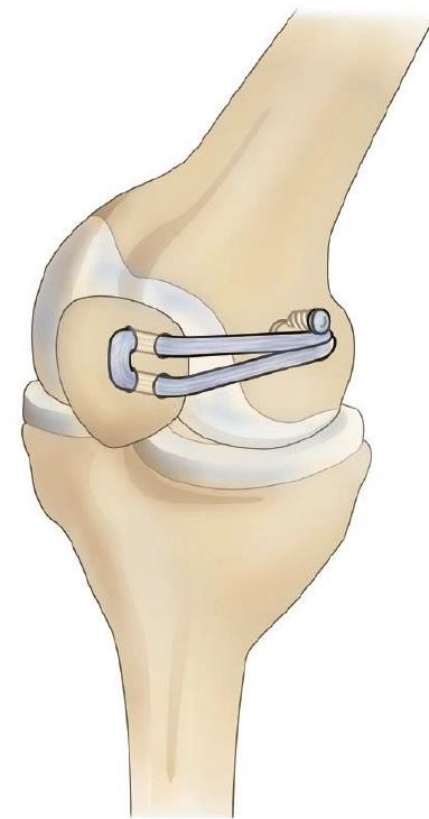
Medial patellofemoral ligament reconstruction



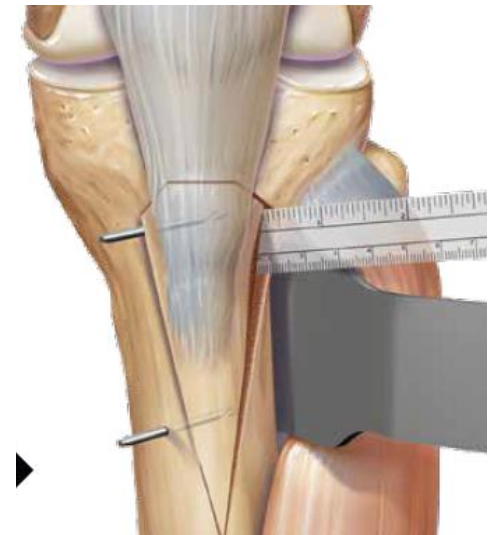
Patellofemoral instability

Medial patellofemoral ligament reconstruction

- No Brace
- Crutches until good gait
- Avoid deep flexion 6 weeks
- RTP 6-9 months



Patellofemoral instability



Patellofemoral instability

Tibial Tubercle Osteotomy

- Medialise +/- distalise
- Brace
- Crutch weight bearing
- Much Slower



Patellofemoral instability

- Xray+/- MRI for loose body
- Avoid immobilisation
- Referral if recurrent



Patellofemoral instability

Questions?

Thankyou

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