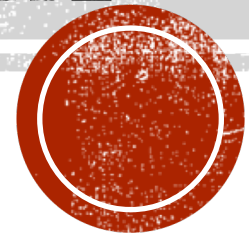
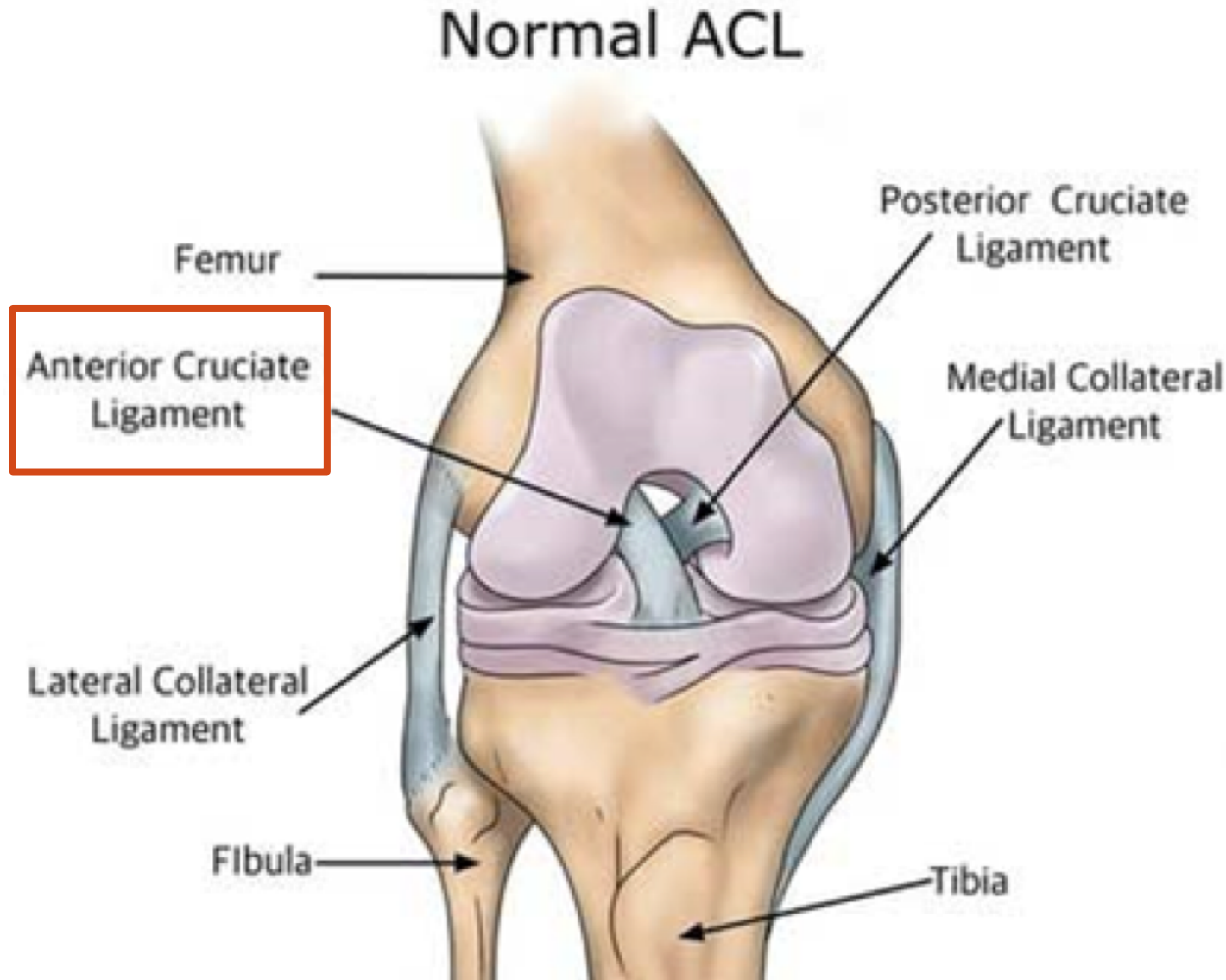


ADVANCEMENTS IN ARTHROSCOPIC ACL RECONSTRUCTION SURGERY

By: Lauren Klepper



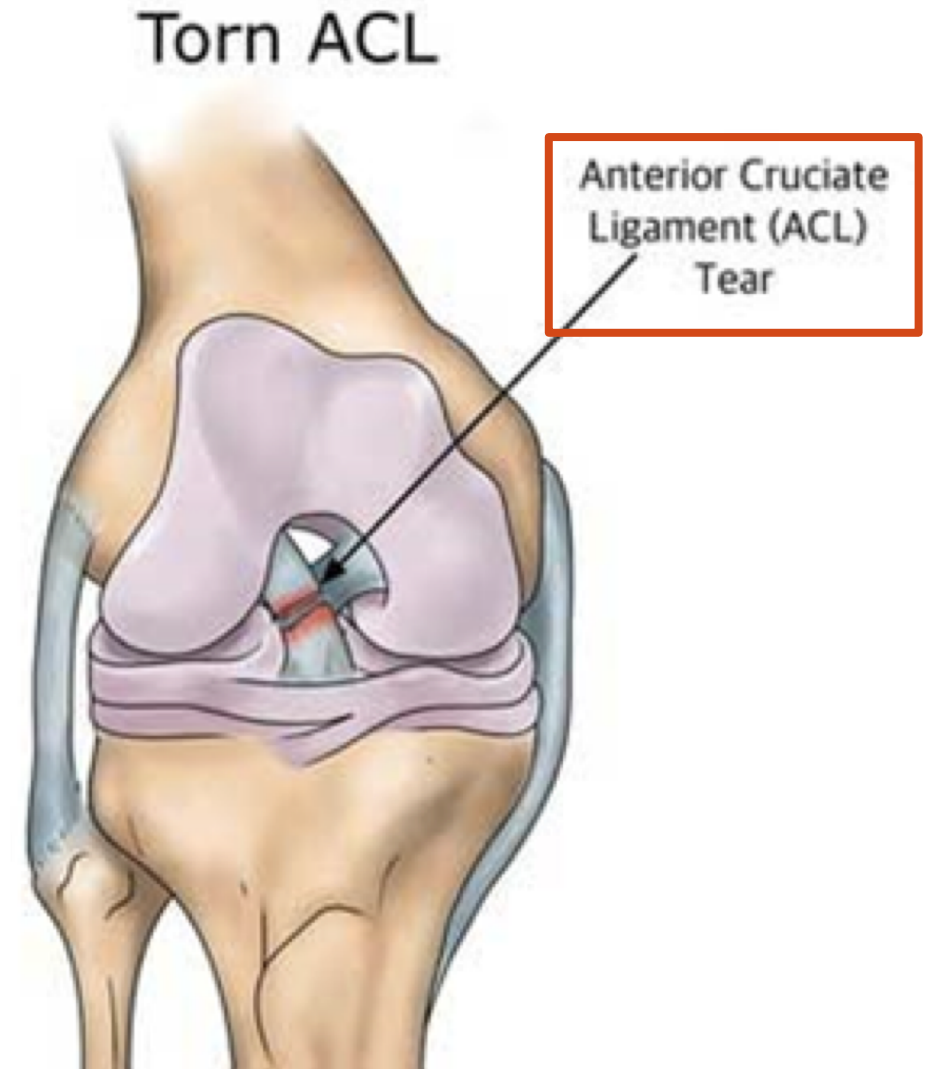
WHAT IS THE ACL?



- Anterior Cruciate Ligament
- Helps stabilize knee joint
- Connects femur to tibia and prevents anterior movement
- Prevents hyperextension of the knee

ACL INJURY

- Approximately 150,000 ACL injuries each year in the United States
- Account for more than \$500 million in U.S. health-care costs each year
- Most common severe sports related injury
- Athletes make up the majority of ACL injuries
 - soccer, football, basketball, track
- What causes athletic ACL injuries?



<https://aquaphysicaltherapy.com/news/returning-from-an-acl-injury-amanda-doran-dpt>

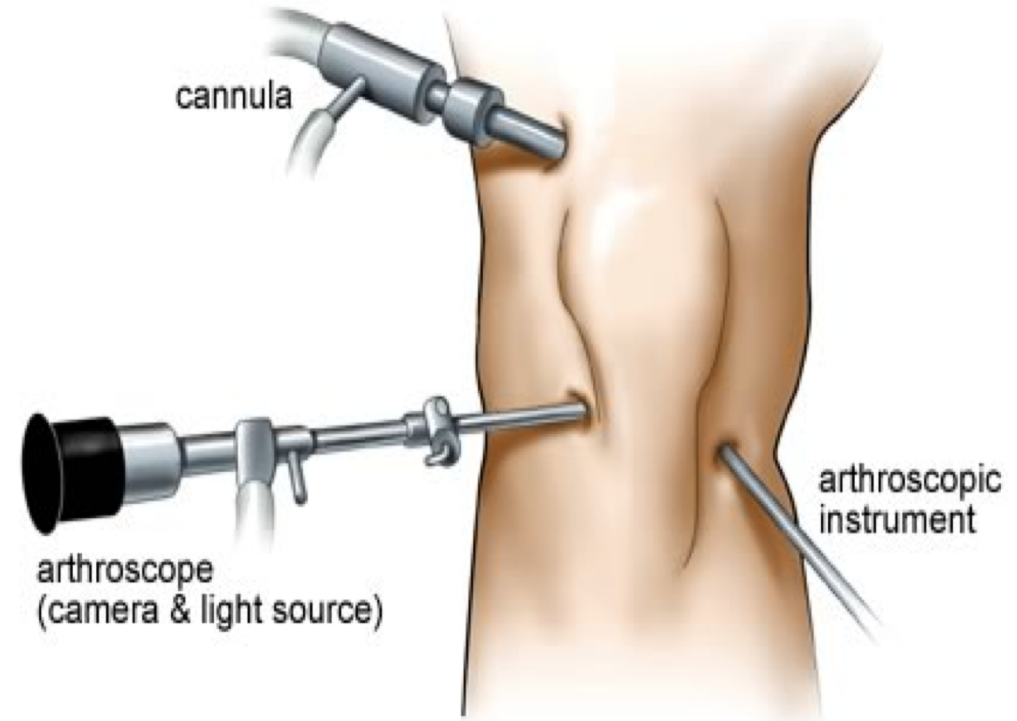
(Gans, et al., 2018)

TRADITIONAL ACL SURGERY

- Open knee surgery
- Invasive surgery due to full view of joint
- Large incisions and scars with higher chance for infection
- Performed in hospital
- More risks involved

ARTHROSCOPIC ACL SURGERY

- Minimally invasive “key hole” surgery
- Can access joint and repair injury without opening the joint
- Outpatient surgery
- 85-95% of patients will have clinically stable knees



https://www.aclsolutions.com/surgery_5.php

ADVANTAGES & DISADVANTAGES OF ARTHROSCOPIC ACL SURGERY

Advantages	Disadvantages
Smaller/less scarring	Limited joint visibility
Less blood loss during surgery	Skin and soft tissue can be stretched and torn
Less chance for infection	Typically more expensive
Less post-operative pain and swelling	Higher complication rate for certain people
Less damage to surrounding ligaments/tendons	More complex (learning curve)
Go home after 1-2 hrs	

WHAT TO EXPECT DURING ACL ARTHROSCOPIC RECONSTRUCTION

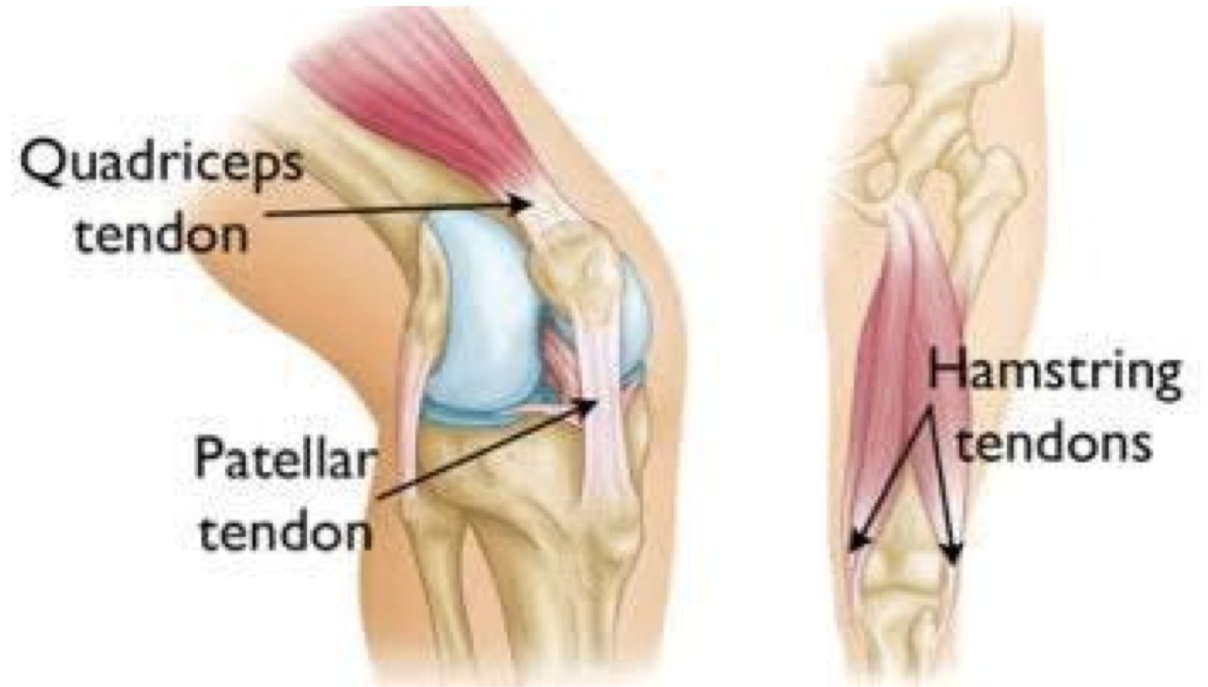
- Tendon used for ACL graft is harvested and prepared
- Torn ACL is removed
- Femoral and tibial tunnels are drilled for ACL graft fixation
- Graft is passed through the tunnel
- Screw tibial and femoral sides of graft



<https://www.knee-pain-explained.com/arthroscopic-ACL-surgery.html>

DIFFERENT TENDONS & GRAFTS USED FOR ACL RECONSTRUCTION

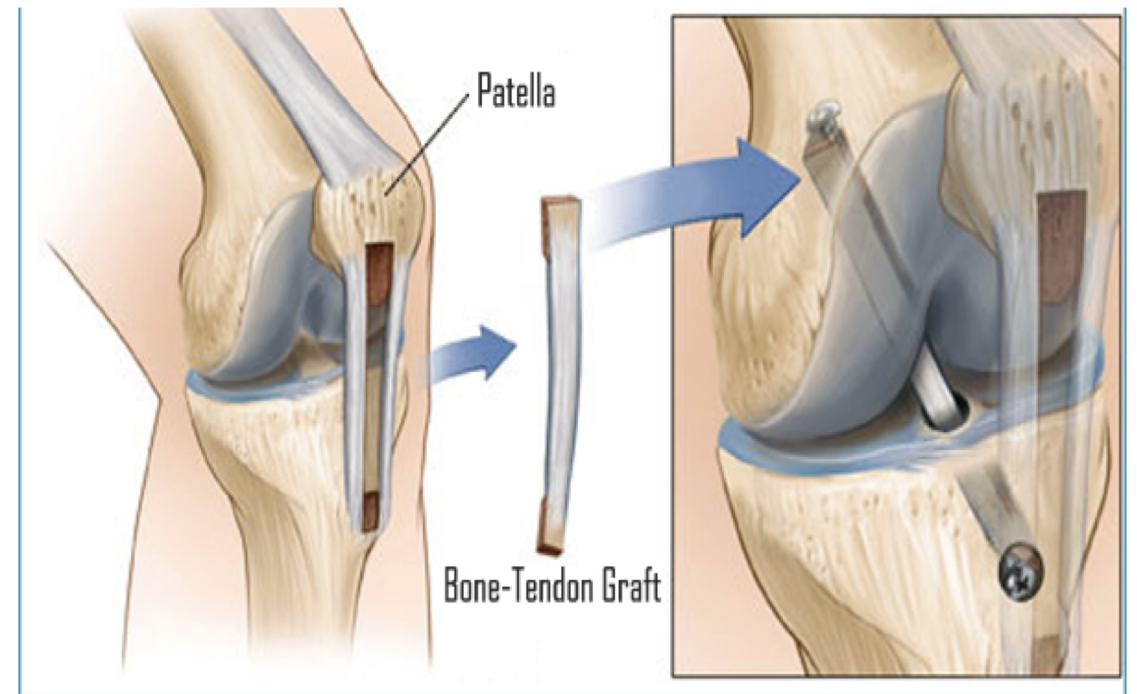
- Repair → reconstruction
- Synthetic grafts
- Quadriceps tendon
- **Patellar tendon**
- **Hamstring tendons**



<https://thenakedphysio.com/2014/09/22/the-challenge-of-knee-pain/>

PATELLAR TENDON GRAFT

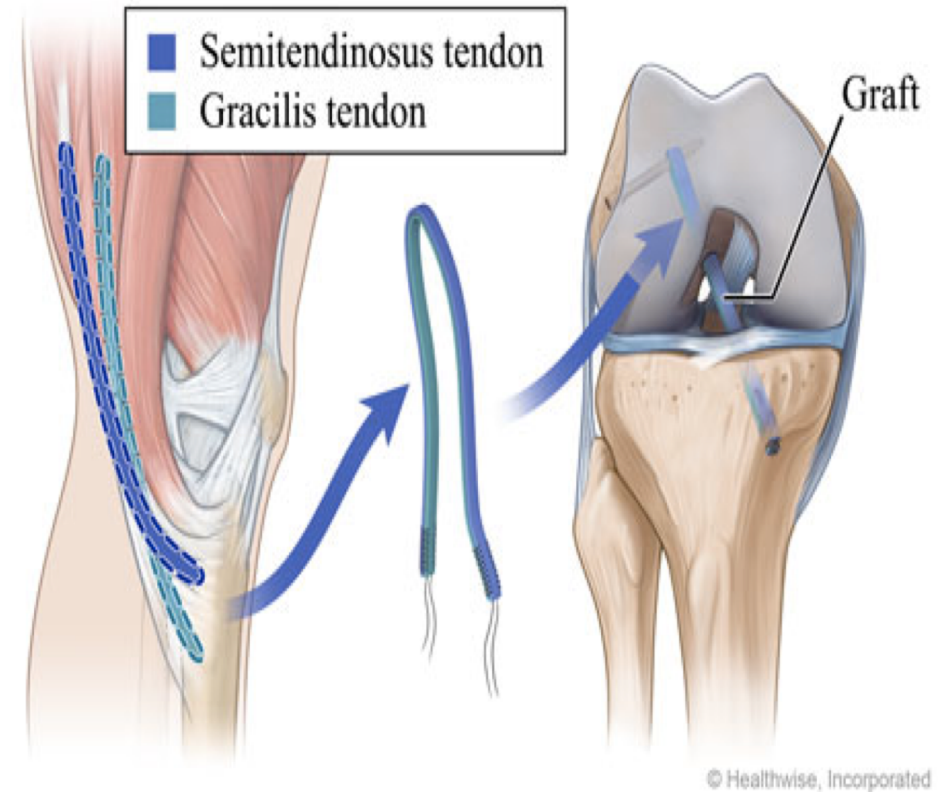
- Close resemblance to ACL
 - Length and strength
- 1/3 of the tendon is removed
- Segment of bone removed
- Bone-to-bone healing
- Risks involved



<https://www.healthclues.net/blog/en/how-does-a-tendon-graft-grow-into-an-acl/>

HAMSTRING TENDONS GRAFT

- Less pain & smaller incision than patellar tendon
- Tendon-to-bone
 - Longer graft healing time
- Regeneration
 - 79% rate of regeneration for semitendinosus
 - 72% rate of regeneration for gracilis
- Strength of graft essentially equal to patellar tendon



<https://myhealth.alberta.ca/Health/Pages/conditions.aspx?hwid=abr6842>

(Samuelsen, et al., 2017)

SCREWS USED FOR TENDON GRAFT FIXATION

- **Metal screws**
 - Used in the early ACL surgeries and currently used today
- **Synthetic/plastic screws**
 - Used in the early 1990's
- **Bioabsorbable screws**
 - Relatively recent



<https://www.pagepress.org/journals/index.php/or/article/view/6445/6065>

METAL SCREW

- Graft failure rate of 6%
- First screw to be used, and still commonly used today
- Can be hard to remove for future or further surgeries
- Can cause interference with MRI
- Shouldn't set off metal detector due to size

BIOABSORBABLE SCREW

- Graft failure rate of 23%
- Made from poly L-lactic acid (PLLA) or calcium-based substance
- Absorbs into the bone
- More flexible & easier to manipulate
- Takes a long time to absorb which can result in higher risk for tibial cysts

(Chevallier, et al., 2018)

(Laupattarakasem & Laupattarakasem, 2018)

RECOVERY/REHAB WITH TRADITIONAL SURGERY (30 YEARS AGO)

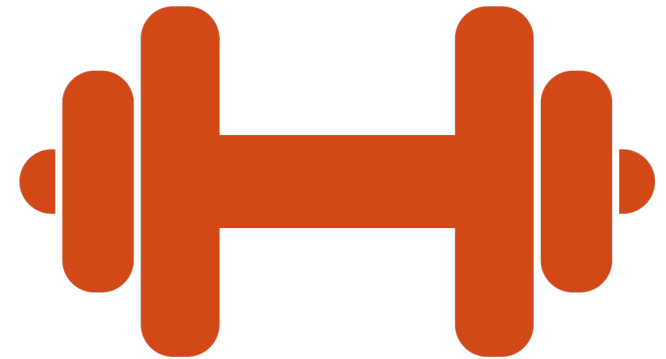
- Full leg cast for 6 weeks
- Crutches for 8 weeks
- PT started after cast was removed
- Stiffness, loose ligament, no knee stability
- High risk of arthritis



<https://study.com/academy/lesson/long-leg-short-leg-casts.html>

RECOVERY/REHAB WITH ARTHROSCOPIC SURGERY

- Crutches for 4-8 weeks post ACL surgery & brace
- Rehab/PT begins 2 days post surgery
- Weight bearing and mobility
- 8 months until strong enough to return to sports
- 18 months until full recovery



(Shelbourne & Klotz, 2006)

(Heckmann, et al., 2012)

CONCLUSIONS

- The patellar tendon and hamstring tendon can be effective and beneficial
- Hamstring tendon is more commonly used due to less long-term pain
- Both screw options are effective
- There is a clear advantage to recovery following the arthroscopic surgery due to faster recovery time, more mobility, and less stiffness.

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