Knee Lesson Book
Knee Book Lesson Objectives

1. Describe non-surgical management of knee hypomobility disorders.
2. Describe the post-operative management of articular cartilage repairs and total knee arthroplasty.
3. Describe the management of patellar femoral dysfunction and compare and contrast conservative versus surgical approaches.
4. Describe management of knee ligament injuries and compare and contrast surgical versus conservative approaches.
5. Describe management of knee meniscal tears with comparison of surgical and conservative management techniques.
Reading assignment


Chapter 21– pages 687 to 751. Focus more on safety and treatment progression than on pathology. Be sure to note: Pg 706 box 21.4 and table 21.4, Pg 709 Box 21.5, Pg 723 Precautions, Pg 724 box 21.6, Pg 733-744 criteria for stage progression, Pg 740 box 21.15 and Pg 741 progression criteria for meniscus repair.
Knee injuries will be encountered across the lifespan from athletic adolescents, to active adults to inactive geriatric clients. Many of the knee injuries have surgical options that will only be employed with proof of failing the non-surgical conservative approach. The chapter appears very dense with an intensive amount of material. Remember however that you already understand arthritis, soft tissue healing and the goals of the various stages of the rehab cycle. Much of this information is not new to you, but specific examples of principles you already understand. Focus on treatment/exercise options and safety precautions.
Much the same as last week, think mostly of the function of the knee in the closed kinetic chain as well as the arthrokinematics in the closed kinetic chain.

Several anatomy points that bear review and highlighting:

Medial tibial condyle is longer than lateral tibial condyle = medial femoral condyle will be moving longer than lateral condyle and will slide further posterior. This is responsible for the screw home mechanism of the knee or functional locking of the knee. The femur rotates internally to lock into extension (closed kinetic chain). The function of the popliteus muscle is to unlock the knee when standing. Adding to this concept is the fact that hip extension pulls the iliofemoral ligament tight, which stabilized femur IR. A hip joint that is lacking extension will significantly impair knee extension/locking.

The medial meniscus is attached to both cruciate ligaments, the medial collateral ligament, and the semimembranosus tendon. Any injury to these structures often creates a meniscal injury as well.

Patello femoral dysfunction is most often attributed to faulty, excessive lateral tracking of the patella. This can be affected by Q-angle, tight IT bands/TFL, tight gluteus maximus, weak hip abductors and tight lateral retinaculum. Additionally, the patella is attached to the tibial tubercle by the ligamentum patella. A tight gastrocnemius will laterally rotate the tibial tubercle. Are there any foot positions that cause ER of the tibia?
I want to review some important muscle function points that might not jump out at you: Peak quadriceps function occurs at 70-50 degrees of flexion and is nearly exhausted at 15 degrees of flexion (hence extensor lags), the soleus assists with maintaining extension in standing, hamstring strength is greatest when it is stretched by hip flexion (common to 2 joint muscles) and poor hamstring function can cause genu recurvatum due to poor posterior instability, the gastrocnemius can assist in protecting against hyperextension in closed chain activities, finally the pes anserinus group help with medial knee stability.

In regard to the pes anserine, recall that one of the members is attached to medial collateral ligament and an injury to this ligament can cause some pain referrals and dysfunctions in all the muscles due to their common attachment. A helpful memory device about the order of attachment and palpation is Say Grace before Tea. This is important to remember because medial collateral ligaments are often managed conservatively, and due to the extensive attachments, it is difficult to treat all the possible sequelae.
Patellar and Functional ROM

The functional knee ROM of the knee is full extension for maximally efficient weight bearing, 60 degrees of flexion for swing phase of gait, 90 degrees or greater for getting into bath tubs, automobiles, and arising well from chairs.

In the closed kinetic chain patellar compression is maximum at 90 degrees of flexion, and rapidly rises at 30-60 degrees of flexion.

In the open kinetic chain patellar compression is maximum at 30 degrees of flexion.

How will this guide you in exercise selection for people with patellofemoral dysfunction?

A tight IT band is commonly understood to contribute to lateral knee pain due to its connection to the lateral retinaculum. A tight TFL obviously can contribute to this process. An often overlooked player is that a tight gluteus maximus will also contribute to tight IT band problems.
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- **Cruciate ligament repairs**
- **Essential information to note for ACLs:**
  - If patellar tendon or cadaver graft was used, always respect anterior knee pain and do not attempt to push or work through it. This is a warning sign to back off.
  - If a hamstring graft was performed always respect medial knee pain.
  - Approved ROM for exercise training are: closed chain 0-60, open chain 90-40.
  - Prohibited ROM training ranges are: closed chain 60-90 and open chain 0-40.

PCLs: Think slower. Immobilization will last for about 4 weeks. Weight bearing will be advanced slower and exercises will be advanced slower.

If the PCL tear was not addressed in a timely manner, the anterior subluxations of the femur in the medial compartment will likely give rise to medial compartment OA issues that may have to also be dealt with during the recovery period.

For both grafts and non-surgical management, the hamstrings are very important to be trained as dynamic stabilizers. Also remember that internal tibial rotation tightens/stresses both ligaments.
Meniscus

- Keep in mind that weight bearing must be pain free before advancing any significant stresses on the joint.
- Absolutely no undertaking of weight bearing combined with rotation on the involved leg until late in the recovery phase.
- When dealing with the medial meniscus, remember all of the multiple attachments. Strongly stressing any of these other structures will cause discomfort at an incompletely healed tear site.
• TKAs
  – There are many component options out there. Different surgeons favor different components. The choice of using cement or not is very similar to THA. Poor/reduced bone quality and older age of recipient or lower activity expectation will likely be cemented. Good bone health, younger age of recipient or higher level of activity will likely be uncemented.
  – The number one job during recovery is to attain full extension. This is vital for optimal performance in weight bearing. Patients are often very adverse to extension stretching in the beginning and you must watch very closely for any attempts to be resting the knee in the dreaded 25 degree flexion position. Why do they seek out this position? Gravity assisted stretching paired with quad setting is your greatest tool in achieving this objective. What does the quad setting bring to the table beyond the passive stretch?
  – Progressing flexion ROM is next on the list of goals to achieve. My greatest personal success with advancing flexion is AROM exercises over manual overpressure attempts at assisting stretching. The application of reciprocal inhibition of the quadriceps through active hamstring recruitment is very powerful.
  – Note Box 21.4 page 707 for specific exercise prohibitions