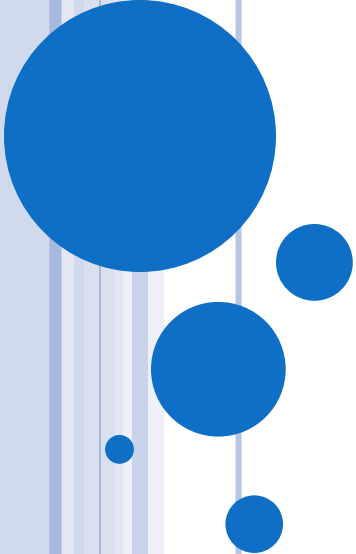




THE KNEE ASSESSMENT

ARTHOKINEMATICS REVIEW

TIBIOFEMORAL JOINT

- Resting Position- 25° flexion
- Close Packed Position- full extension, lateral Rot of Tib
- Capsular Pattern- flexion>extension (When inflammation of a joint occurs limited range of motion occurs of the involved joint is often found in a specific joint, each joint has a different capsular pattern)
- 2° of freedom (motions available)
 - Flexion/extension
 - IR/ER
- Joint surfaces
 - Femoral condyles- convex
 - Menisci/tibial plateaus- concave

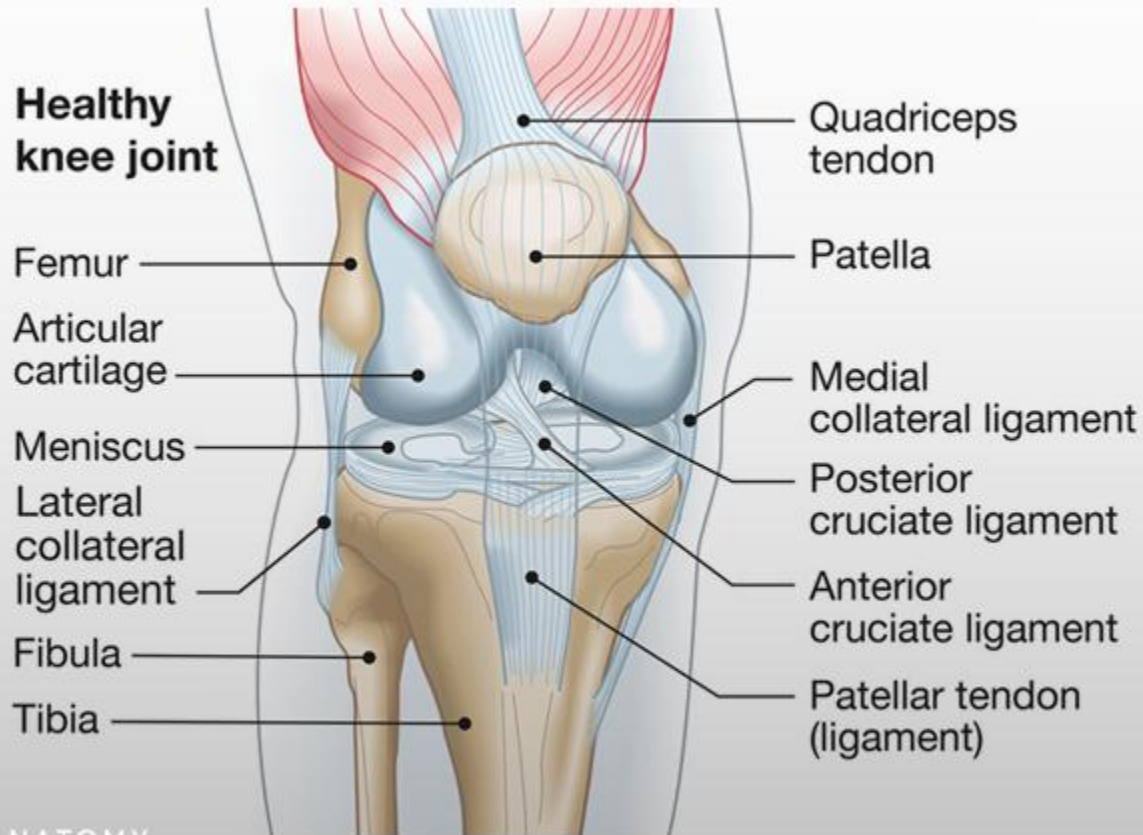


END FEELS

- Flexion- tissue approximation
- Extension- tissue stretch
- Medial rotation of tibia- tissue stretch
- Lateral rotation- tissue stretch
- Patellar movement- tissue stretch all directions



ANATOMY REVIEW



KNEE ANATOMY

MUSCLE REVIEW

Action	Muscle Acting
Flexion of knee	Biceps femoris, semitendinosus, semimembranosus, gracilis, sartorius, popliteus, gastrocnemius, TFL, plantaris
Extension of knee	Rectus femoris, vastus medialis, vastus intermedius, vastus lateralis, TFL
Medial rotation of tibia	Popliteus, semimembranosus, semitendinosus, sartorius, gracilis
Lateral rotation of tibia	Biceps femoris

FUNCTION OF THE MENISCUS

- Improve congruency between tibia and femur
- Joint lubrication
- Shock absorber
- Distributes stress
- Decreases friction
- Prevents joint hyperextension
- Allows rotation of femoral condyles for the locking mechanism



MEDIAL MENISCUS

- Attaches anteriorly to intercondyle space of tibia in front of ACL
- Attaches posteriorly to posterior intercondyle space between lateral meniscus and PCL
- Attached to posterior fibers of MCL



LATERAL MENISCUS

- Attaches anteriorly to intercondyle space by tibia behind/lateral to ACL
- Attaches posteriorly behind intercondylar space by tibia to the posterior medial meniscus



MEDIAL COLLATERAL LIGAMENT

- Broad, flat
- Approx. 3 finger widths back from medial patella
- Attaches proximally to medial condyle of the femur and distally to medial epicondyle of tibia ~6cm below joint line
- Blends with capsule and medial meniscus



LATERAL COLLATERAL LIGAMENT

- Thinner, cord-like
- Attaches proximally to lateral femur condyle and distally to fibula head



ANTERIOR CRUCIATE LIGAMENT

- Medially to anterior intercondyle space of tibia and medial surface of lateral femoral condyle
- Courses upward, backwards and laterally
- Turns on itself to insert over a broad flattened area



POSTERIOR CRUCIATE LIGAMENT

- Attaches to posterior intercondyler space of tibia and posteriorly to lateral meniscus
- Inserts on lateral surface of medial femur condyle
- Courses up, forward and medially



LIGAMENT FUNCTIONS

□ ACL

- Major knee stabilizer (rotary stability)
- Prevents anterior excursion of tibia on femur
- Limits IR of tibia
- Minor role in resisting valgus/varus stress and limiting hyperextension

□ PCL

- Prevents subluxation of femur on tibia
- Helps ACL with rotary stability

□ LCL

- Resists varus stress
- Increased tension with tibial ER

□ MCL

- Resists valgus stress and tibial ER



PATELLOFEMORAL JOINT

- Joint between patella and femur
- Patella has 5 facets, each articulate differently with the femur during movement
- Functions of the Patella include
 - Guide for quad tendon
 - Decreases friction
 - Controls capsular tension of the knee
 - Protects femur condyles



PATELLAR LOADING ACTIVITIES

- Walking
 - 0.3x the body weight
- Climbing stairs
 - 2.5x the body weight
- Descending stairs
 - 3.5x the body weight
- Squatting
 - 7x the body weight

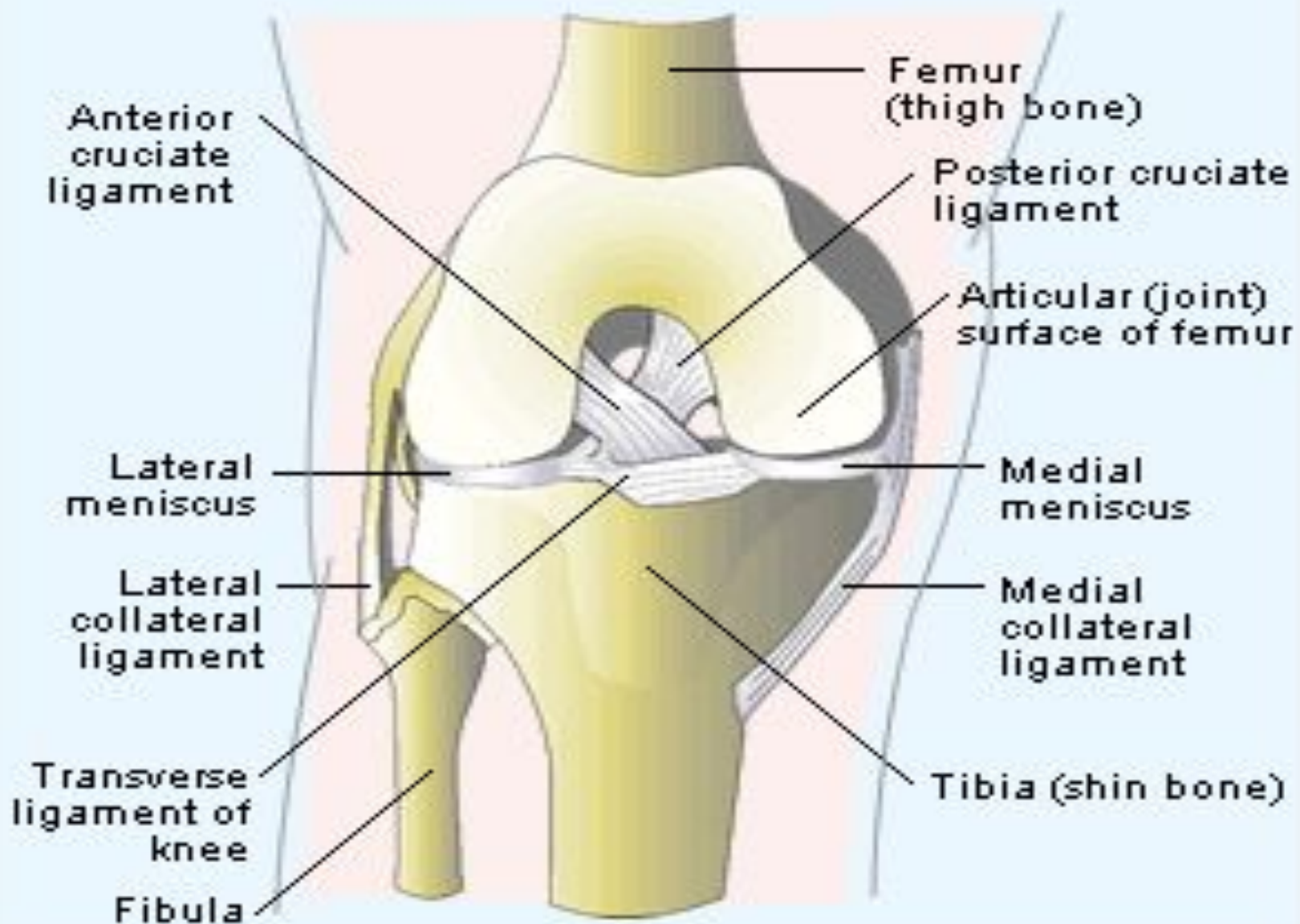


BAUER'S CLINICAL PREDICTION RULE FOR ACUTE KNEE FRACTURE

- Severe joint line tenderness
 - Severe localized swelling with effusion and ecchymosis
 - Flexion less than 90°
 - Inability to weight bear
-
- If there is a presence of these symptoms then a X-ray is required



KNEE JOINT LIGAMENTS: RIGHT KNEE FLEXED AND VIEWED FROM THE FRONT



SUPERIOR TIBIOFIBULAR JOINT

- Movement occurs at this joint via the ankle
- Supported by anterior and posterior capsular ligaments
- Articulating joints vary in size/shape



SUPERIOR TIBIOFIBULAR JOINT



GENERAL ASSESSMENT



Normal

ნორმალური



Bowleggedness (Vargus)

ბოვლეგედნესი (ვარგუსი)



Knock Knees (Valgus)

კნოკ კნეზი (ვალგუსი)



Q ANGLE

- Q angle is the angle between the quadriceps muscles and the patellar tendon
- The angle is obtained by first ensuring that the lower limbs are at right angles to the line joining the 2 ASIS
- A line is then drawn from the ASIS to the midline of the patella on the same side
- Another line is drawn from the Tibial tubercle to the midpoint of the patella
- The angle is formed by the crossing of these 2 lines
- Normal Q angle is 13 for males and 18 for females
- Any angle less than 13 is associated with chondromalacia patella, subluxed patella, genu valgum, increased lateral tibia torsion



OTHER OBSERVATION

- Antalgic Gait – or other Gait anomalies
- Foot positioning
- Foot arches
- What Else?
- Read Patient History and observation in your text starting on 872



AROM

- Performed First, Painful motions last
- Degrees of motions
 - Flexion- 0-135°
 - Extension- 0-15 °
 - IR of tibia on femur - 20-30 °
 - ER of tibia on femur- 30-40 °

****Combined movements: flexion+IR and extension+ER**



PROM - ENDFEELS

- Flexion- tissue approximation
- Extension- tissue stretch
- Medial rotation of tibia- tissue stretch
- Lateral rotation- tissue stretch
- Patellar movement- tissue stretch all directions



RIM

- Flexion of the knee
- Extension of the knee
- Ankle plantarflexion
- Ankle dorsiflexion

- In alignment cases
 - Hip abductors
 - Hip lateral rotators



PALPATION

- Medial and lateral joint lines- place thumbs on either side of patellar tendon, joint space exist in the depression
- Medial and lateral tibial epicondyles
- Tibial plateaus
- Adductor tubercle
- Pes Anserinus tendon
- Gerdy's Turbercle
- Medial and lateral femoral condyles
- Fibular head
- Tibial tuberosity
- MCL- 3 finger widths medial to medial patella border
- LCL- cross leg, allow hip ABD/ER, palpate cord from head of fibula upward to femur lateral condyle

<https://www.youtube.com/watch?v=Jey2R9urbOM>



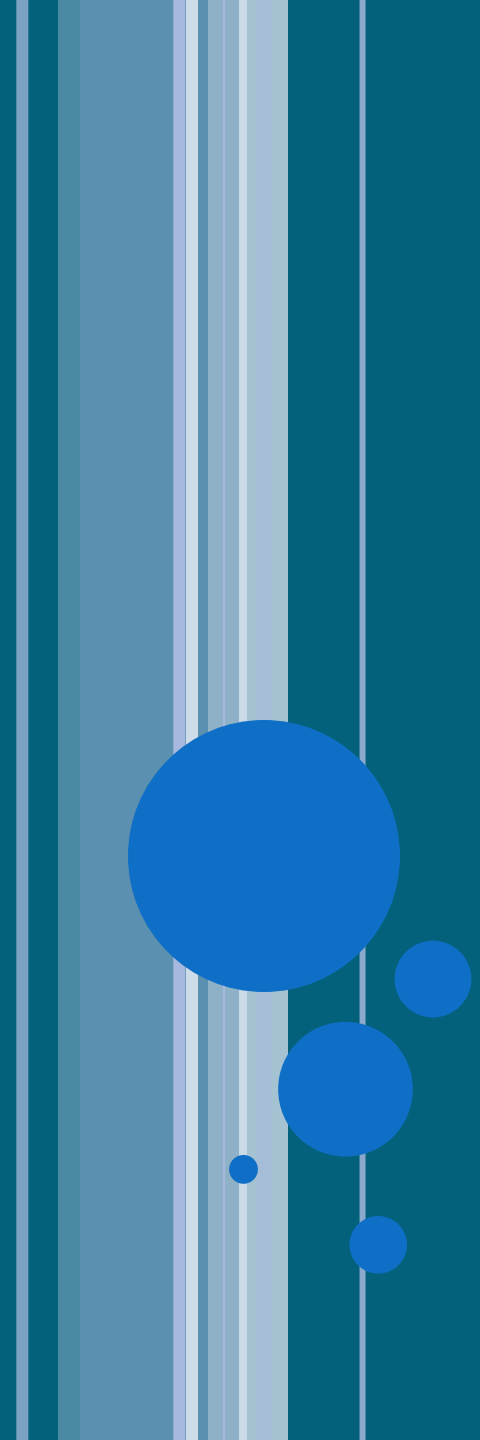
FUNCTIONAL TESTS FOR THE KNEE

- Walking
- Ascending and descending stairs
- Squatting (both knees should move symetrically)
- Squatting and then bouncing at end of squat
- Running straight ahead
- Running straight ahead and then stopping on command
- Vertical jump
- Running and twisting
- Jumping and going into full squat
- Hard cuts, pivots and twists



KNEE CONDITIONS



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LIGAMENT TEST FOR THE KNEE

ACL SPRAIN/STRAIN

- What is it?
 - Partial or complete tearing of the ACL of the knee
- How it Happens?
 - May happen over repetitive microtrauma or a single traumatic happen
 - Occur when athlete rapidly decelerates followed by a sharp or sudden change in direction (cutting or twisting)
 - When the knee is in full extension the ACL is tight, therefore heavy or stiff legged landing with knee in valgus position can also lead to ACL injury



RISK FACTORS

- Female
 - Peak rupture during ovulation
 - Anatomically smaller ACL
- Contact sports
 - Soccer
 - Basketball
 - Gymnastics
 - Hockey
 - Skiing
- Associated knee instability
- Weak hamstrings
- Poor Conditioning
- Cleated footwear



HEALTH HISTORY

- Deep knee pain after trauma
- Popping sound at time of injury
- Any of the described mechanism of injury as noted in slides above
- Swelling within the first two hours
- Prior History of knee injuries
- Can often associate with MCL and medial meniscus tear



OBSERVATION, PALPATION & MOVEMENT

- Observation
 - Joint effusion
 - Bony abnormality
 - Antalgic gait
- Palpation
 - Examine Joint lines
 - Check Collateral ligament tenderness
- AROM AND PROM will be limited due to pain
- RIM may be weak due to pain



SPECIAL TEST

ANTERIOR DRAWER TEST

□ How its done?

- Patient is supine knees flexed to 90, feet flat on the table
- Therapist places their weight on the clients feet to stabilize them
- Next grasp the clients Tibia and draw the clients Tibia towards you

□ Results?

- Positive sign – Excessive motion more than 6mm indicates injury to ACL (However chances are strong that if this is positive injury may also have occurred to the following other structures as well
 - Posterolateral capsule, posteromedial capsule, MCL, ITB, Posterior Oblique ligament and Anterior popliteus Complex
- A Torn PCL will give a false positive so only positive is posterior sag sign is negative

<https://youtu.be/IdnBKv38EEQ>



LACHMAN'S TEST

- Best indicator or ACL ligament tear
- How its done?
 - Client Supine with affected leg beside the examiner
 - Therapist holds the patients knee between full extension and 30° of flexion (this position is close to the functional position of the knee, ACL plays a major role) Patients femur is stabilized with the therapist outside hand (downward force) while the proximal tibia is moved forward (upward force)
 - For best results the Tibia should be slightly rotated laterally and the translation force should be anteromedial pressure. The hand on the Tibia should apply the force
- Positive sign – mushy or soft end feel or excessive anterior translation. Indicates injury to ACL, posterior oblique ligament or Arcuate-popliteus complex

<https://youtu.be/JFkbKNNa7xQ>



PCL SPRAIN/TEAR

- What is it?
 - Partial or complete tearing of the Posterior Cruciate Ligament
- How does it happen?
 - Usually occurs when force is applied to the Anterior proximal Tibia with a flexed knee
 - Hyperextension & rotational or valgus/varus stress mechanisms can also cause PCL tears



RISK FACTORS

- More often Male
- Usually sport related – Contact sport as listed for ACL
- Single leg impacts
 - Falling on shin
 - Car accident where tibia hits dash
- Forced Hyperflexion or extension of the knee
- Cleated footwear
- Only 5% isolated PCL injuries generally associated with ACL and MCL injury



HEALTH HISTORY

- Deep knee pain (mild injury more painful)
- Swelling – depends on grade
- History of any of the mechanisms of injury as slide above
- Patient may hear a pop at time of injury
- Feeling of knee instability



OBSERVATION, PALPATION & MOVEMENT

□ Observation

- Look for sign of injury to anterior proximal tibia (scrapes, bruises)
- Mild antalgic gait
- Posterior sag sign – Tibia drops posterior when supine with knees bent

□ Palpation

- Palpate all other knee structures to feel for injury to other structures
- Tenderness over sight of injury
- Tight quadriceps

□ Range of Motion

- AROM/PROM mildly limited at end of range
- RROM normal



SPECIAL TESTS

POSTERIOR SAG SIGN

□ How is it done?

- Client is supine with the knee flexed to 90° and hip flexed to 45°. Therapist stand at the side of the table and looks at the orientation of the tibia to the femur

□ Positive Sign

- If the tibia drops back or “sags” the test is positive for a torn posterior cruciate ligament

<https://youtu.be/7vgTMnfP4fs>



Posterior sag sign results



POSTERIOR DRAWER TEST

□ How its done?

- Patient is supine knees flexed to 90, feet flat on the table
- Therapist places their weight on the clients feet to stabilize them
- Next grasp the clients Tibia and draw the clients Tibia away from you

□ Results?

- Positive sign – Excessive motion, posterior sag visible indicates PCL injury. One of the most effective means determining PCL injury and posterolateral corner injuries

<https://youtu.be/wDIG1l5wzZs>



LCL SPRAIN

- What is it?
 - Partial or complete tear of the Lateral Collateral Ligament
- How it happens?
 - Usually a varus (medial to lateral) force across the knee causing stretching or tearing



RISK FACTORS

- Contact sports or high velocity sports
- Prior knee injury
- Muscle strength or proprioception imbalances
- Poor conditioning
- Often in association with other knee injury



OBSERVATION, PALPATION & MOVEMENT

□ Observation

- Possible altered gait, mild or no swelling (more swelling indicates other injury)

□ Palpation

- Tenderness over LCL (palpate in figure 4 position)

□ Motion

- AROM & PROM may have lateral knee pain with full extension
- RROM usually normal, limitation due to pain



SPECIAL TEST

*VARUS STRESS TEST OF THE KNEE

□ How its done?

- Client is supine with legs extended. Therapist places one hand on the lateral side of the ankle. The other hand is stabilizing the medial side of the femur just proximal to knee. Apply an Adduction force
- Perform in full extension and 30 degrees knee flexion

□ • A positive sign

- pain local to the lateral knee indicating a injury to the lateral collateral ligament or increased movement indicating LCL laxity

<https://youtu.be/sg1gk6QKARw>



MCL SPRAIN

- What is it?
 - Partial or complete tearing to medial collateral Ligament of the knee
- How does it happen?
 - Valgus force (Lateral to Medial) force across the knee. Due to the attachment on the medial meniscus are often injured together



RISK FACTORS

- Contact or High Velocity activities
- Prior knee injury
- Muscle or proprioceptive imbalances
- Over use injury in swimmers (whip kick)



HEALTH HISTORY

- Acute medial knee pain usually following valgus strain
- May hear a pop during injury
- History of knee pain



OBSERVATION, PALPATION & MOVEMENT

□ Observation

- Possible limp dependant on severity
- Possible swelling or bruising

□ Palpation

- Point tenderness over MCL
- Palpate medial joint line (medial mensicus)

□ Movement

- AROM & PROM may be limited due to pain
- RROM should be WNL



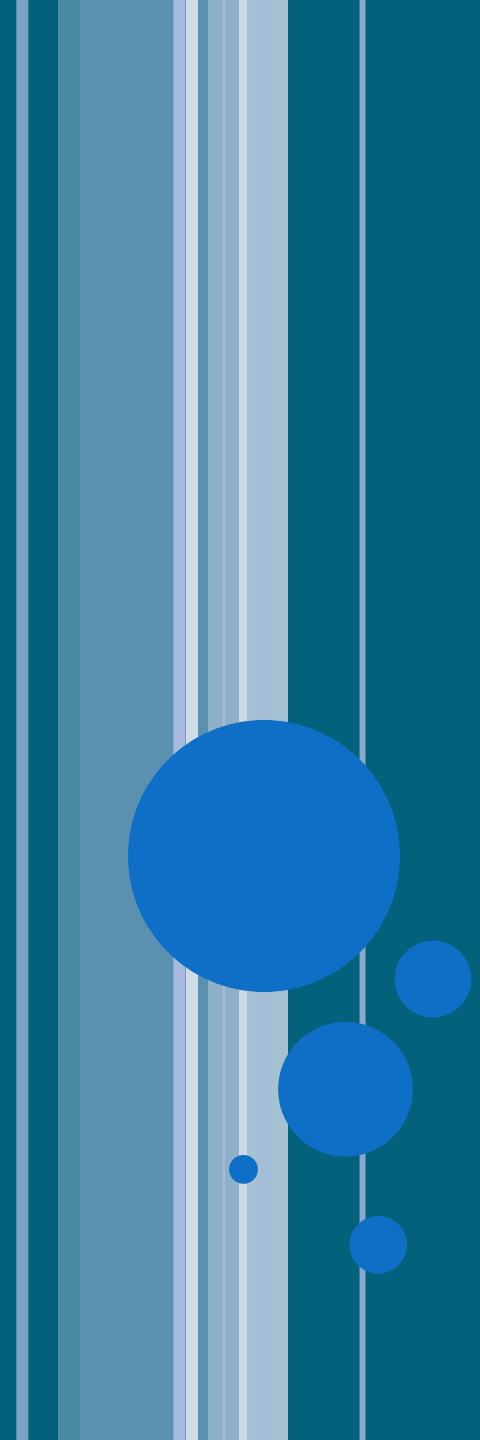
SPECIAL TEST

*VALGUS STRESS TEST OF THE KNEE

- How its done?
- Client is supine with legs extended
 - Therapist places one hand on the lateral side of the femur proximal to the knee, and the other on the medial side of the ankle. Apply an abduction force to the knee
 - Perform in full extension and 30 degrees knee flexion
- Positive sign
 - pain local to the medial knee indicating a injury to the medial collateral ligament or increased movement indicating MCL laxity

<https://youtu.be/GSFbhttpxCuQ>



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MENISCUS LESION OR TEAR

MENISCUS TEAR

- What is it?
 - A tear of the meniscus between tibial and femoral joint
- How does it happen?
 - Usually results from repetitive use
 - Normally twisting injury in younger clients and complication of osteoarthritis in elderly clients
 - 75% are medial meniscus



RISK FACTORS

- Obesity
- Higher risks in individuals who are athletes or active lifestyles



HEALTH HISTORY

- Joint line pain
 - With a cycle of pain – worse, better then worse
- Possible clicking, locking, catching, crepitis or instablility
- Swelling usually a delayed symptom
- Repetive twisting or squatting
- Single traumatic event



OBSERVATION & PALPATION

□ Observation

- Antalgic gait
- Local swelling or redness in less than 50%

□ Palpation

- Joint line Tenderness
- Firm lump felt over joint line may indicate meniscal cyst



MOVEMENTS

□ AROM or PROM

- Pain at end range
- Block to motion or locking can occur with displaced tears
- Pain or swelling limits RIM

□ RIM

- Weak due to pain at joint
- Muscle wasting may occur due to disuse



SPECIAL TESTS – APLEY'S TEST (DISTRACTION & COMPRESSION)

□ How it's done?

- Client is prone with affected knee flexed to 90°, Therapist stabilizes the clients thigh on the table with their knee. Therapist then applies medial and lateral rotation to the tibia combined with distraction. Therapist should note any restrictions, excessive movement or discomfort of the client. The process is then repeated with compression instead of distraction

□ Positive signs

- If rotation with distraction is more painful the problem is probably ligamentous
- If rotation with compression is more painful the problem is probably meniscal

https://youtu.be/6Z_9lfX_Pc8



McMURRAY TEST

- The “grandfather” of meniscus test of the Knee
- How its done?
 - Client is supine with knee completely flexed. Therapist then medially rotates the tibia and extends the knee. Therapist repeats this motion altering the amount of flexion and extension to address different portion of the lateral meniscus
 - To test the medial meniscus the therapist then laterally rotates the tibia and extends the knee at varying degrees to assess the entire meniscus
- Positive sign
 - If there is a clicking or snapping sound with pain in the first position this indicates a loose fragment of the lateral meniscus
 - pain and clicking or snapping sounds in the joint space are all positive signs



THESSALY TEST

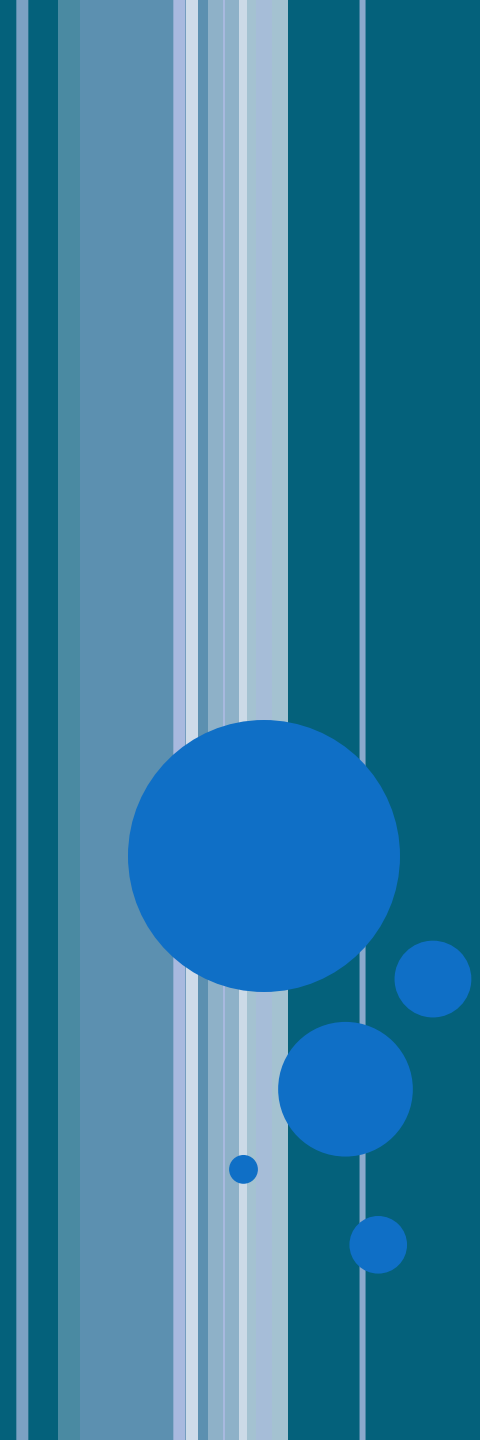
- Patient stands flat footed on one leg while the examiner offers a hand for balance
- Patient flexes knee to 20 ° and then rotates femur on knee medially and laterally 3 times
- Unaffected leg done first
- Positive sign
 - Medial or lateral joint line pain
 - Patient have sense of locking or catching the knee
 - <https://youtu.be/ebraZ4jM36A>



BOUNCE HOME TEST

- Patient supine on the table
- Examiner grasps patients heel, their leg in knee flexion
- Passively move the leg into extension quickly, should be able to achieve full leg extension
- Positive sign – extension not complete or rubbery bounce back end feel; pain radiate up or down medial or lateral joint line



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PATELLA PATHOLOGIES

CHONDROMALACIA PATELLA

□ What is it?

- Abnormal softening & degeneration of cartilage on the posterior side of the patella which results from poor patellar alignment as it slides over the distal end of the femur with knee flexion
- One of the most common sources of knee pain
- Other names may include runners knee, patellofemoral syndrome, anterior knee pain syndrome, retropatellar chondropathy



PRIMARY CAUSES

- Direct blow or Dislocation
- Repetitive stress of high impact activities, jumping activities
- Larger Q angle
- Anatomical variation
- Knee osteoarthritis
- Aging



RISK FACTORS

- ❑ Foot over pronation
- ❑ Vastus medialis weakness
- ❑ Tight quadriceps, hamstrings, IT band, Gastrocnemius, Soleus
- ❑ Patella Alta or Patella Baja Positioning
- ❑ Ligament Laxity or muscle imbalance
- ❑ Leg length discrepancy or pelvic subluxation
- ❑ Poor footwear or orthotics
- ❑ Femoral Anteversion
- ❑ Tibial Torsion



HEALTH HISTORY

- Pain usually behind the patella, dull achy, knee pain
- Can sometimes be sharp pain
- Crepitis or grinding motion
- Related to overuse or changes in level of activity
- May have history of direct knee trauma
- May have family history



OBSERVATION AND PALPATION

□ Observation

- Possible atrophy of Vastus Medialis
- Over pronation during gait
- Usually no swelling
- Observe patella height and Q angle

□ Palpation

- Tenderness of the patella
- Patella too high or too low



MOVEMENT

- AROM - May show J sign or lateral tracking during the last portion of knee extension
- PROM – Normal
- RIM – Pain may increase with patellar load
 - Also Assess Hamstrings, and quadriceps



PLICA “STUTTER” TEST

- Patient seated on edge of table with both knees flex to 90° over the table
- Examiner place a finger over patellar and applies pressure as client slowly extends knee
- Positive sign = patella stutters or jumps between 60° and 45° of flexion during otherwise smooth movement.
 - Test is only effective if there is no swelling



CLARKES SIGN (PATELLAR GRIND)

- This test assesses the presence of a problem with articulation between patella and the femoral condyles. Not specific to 1 pathology.
- Patient lies supine, knees extended
- Examiner presses down above the base of the patella with web of hand (some recommend directly over the patella)
- Patient is then asked to contract the quadriceps
- If patient can complete and maintain contraction without pain it is negative
- Positive sign is pain behind the patella or inability to complete the contraction
- Monitor applied pressure carefully as this can be positive on anyone if too much pressure is applied

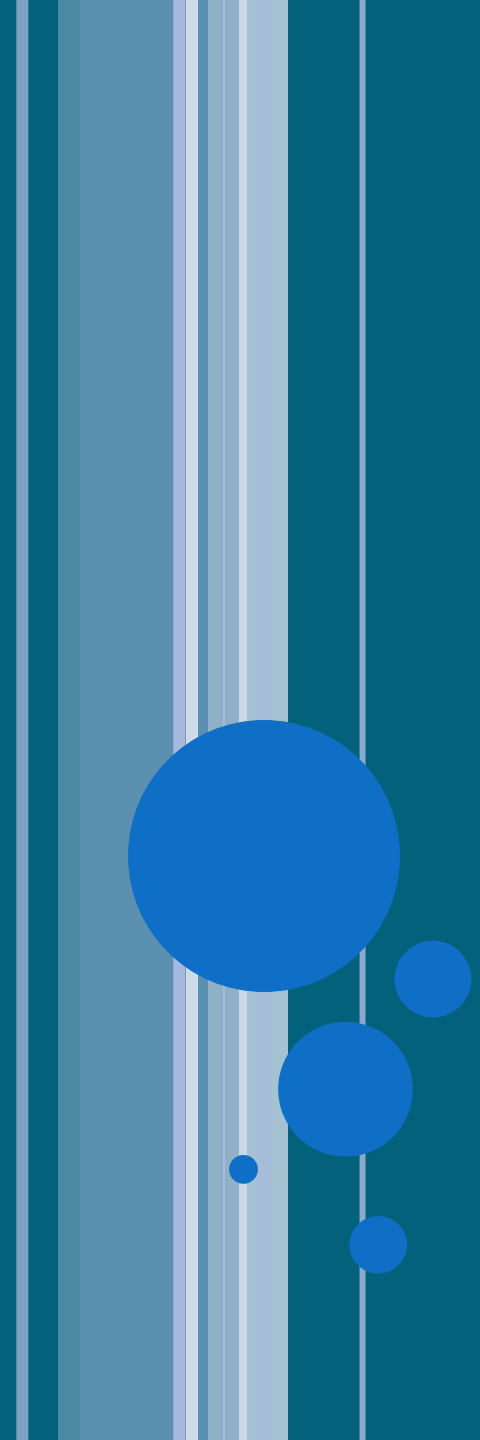


ACTIVE PATELLAR GRIND TEST

- Patient seated on edge of table with both knees flex to 90° over the table
- Examiner place hand over patellar and applies pressure as client slowly extends knee, feel for crepitis
- Positive= pain occurs within ROM
 - Where in the ROM indicates what part of the patella is demonstrating the pathology

Pg 843



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KNEE PATHOLOGIES

GENU VALGUM/GENU VARUM/GENU RECURVATUM

- Genu Valgum (knocked Knees)
 - Angulation of knee in which lower leg deviates outward in relation to the Upper leg. The result is separated feet when the knees touch
- Genu Varum (bow legged)
 - Angulation of knee in which lower leg deviates inward in relation to upper leg (results in separated knees when the feet touch)
- Genu Recurvatum (back Knee)
 - Hyperextension of the knees greater than 5 degrees



RISK FACTORS

- Rheumatologic diseases
- Haemophilia
- Rickets/Osteomalacia
- Ehlers-Danlos Syndrome
- Poor Alignment of prior fractures or trauma
- Ligament laxity
- Prior knee sprains



HEALTH HISTORY

- Common in children, concerned parent will likely bring in child
- Knee or other joint pain
- Sitting in the W position
- More serious conditions, congenital anomalies, or injury



OBSERVATION AND PALPATION

□ Observation

- Alter gait, circumductive gait
- Leg length inequality
- Knock knees or bowleggedness
- Abnormal Q angles

□ Palpation

- Hypertonic hip, knee or leg muscles
- Retro or Anteversion of Tibia or Femur



MOTION

- PROM may be softer or larger than expected



SPECIAL TESTS – VALGUS/VARUS STRESS TEST

- Previously discussed



JUMPER'S KNEE

- AKA – Patellar Tendinopathy, patellar Tendinosis or Tendinitis,
- What is it?
 - Tendinopathy of the quadriceps tendon or attachments of the infrapatellar tendon



RISK FACTORS

- ❑ Over training
- ❑ Poor jumping or landing technique
- ❑ Jumping Sports
- ❑ Inflexibility of hamstrings
- ❑ Weakness of Hamstrings or quadriceps
- ❑ Rapid increase in activity or intensity
- ❑ Court surface hardness or slope
- ❑ Increase in body weight or height
- ❑ Over pronation or worn out footwear



HEALTH HISTORY

- Anterior knee pain (achy, itchy) below the patella
 - Pain worse with excessive activity
 - Increased pain with prolonged sitting that is relieved by straightening leg
- History of positive risk factors



OBSERVATION, PALPATION

□ Observation

- Rarely any swelling
- Affected tendon may look thick

□ Palpation

- Localized point tenderness over tendon
- Pain with compression of Patellofemoral joint
- Hamstring or quadriceps testing
- Possibly compensatory joint dysfunction (foot, ankle, hip, pelvis, low back)



MOVEMENT

- AROM – Weakness with squat, crepitis possible
- PROM – Pain at end range when patellar ligament stretches the most
- RIM – Possible quad weakness
- Should be no ligament laxity



SPECIAL TESTS

- Chondromalacia Tests (clarke's sign, active patellar grind test) should come up negative
- Palpable point tenderness is the most accurate way to determine this condition
- Functional Test
 - One hop test. On the good leg the client takes one long jump hop landing on the same foot, the repeats on the effected side. Compare length of jump. Any asymmetry over 85 percent is considered positive



ILLIOTIBIAL BAND TENDINOPATHY

- ITB Contracture - Contracture or thickening of ITB
- ITB Friction Syndrome – inflammation and pain where ITB crosses the lateral femoral condyle



CAUSES OF ITB CONTRACTURE

- ❑ Activities which place Hip and Knee Flexion (causes TFL and ITB to shorten for example cycling, horseback riding)
- ❑ Postural Imbalances – anterior pelvic tilt or hyperlordosis (both shorten TFL). Can be caused weak gluteus (causes TFL to tighten and pull pelvis anterior), tight Rectus femoris (pulls pelvis anterior)
- ❑ Habitual weight bearing on one leg, causes short TFL on the other side
- ❑ Prolonged wheel chair use or bedrest – can lead to slow progression of a contracture



CAUSES OF ITB FRICTION

- Prolonged, repetitive motions with knee and hip flexed
 - Contributing factors are poor TFL stretching procedures
 - Anterior pelvic tilt



HEALTH HISTORY

- Pain gradual at onset, worse with activity
- Pain is felt along the lateral thigh and into lateral aspect of knee
- Secondary trochanteric bursitis may be secondary condition

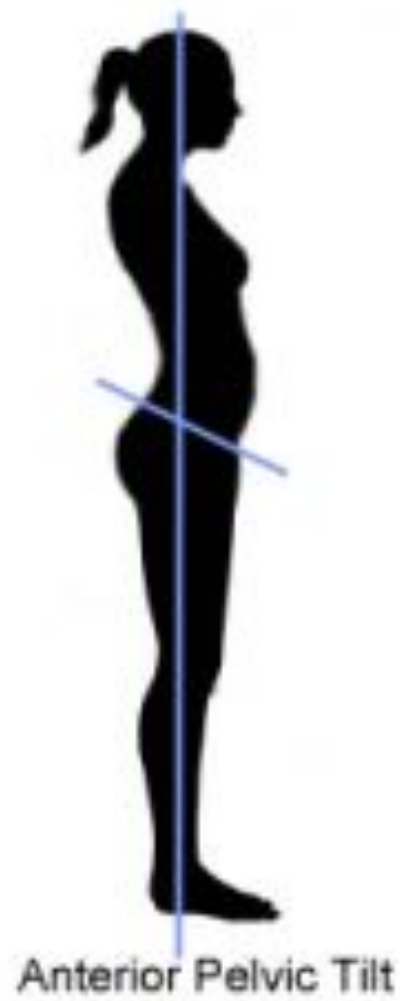
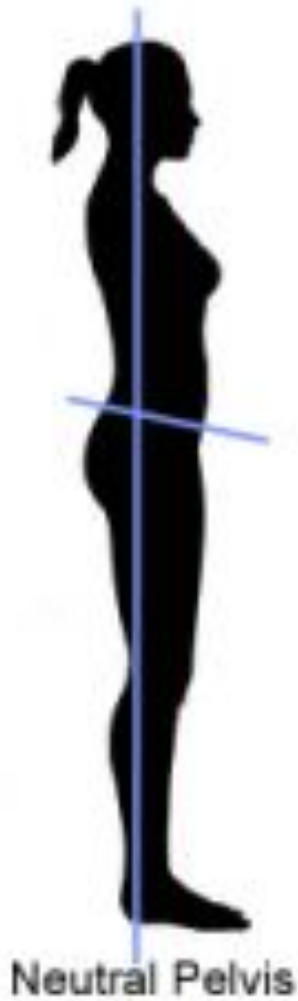


OBSERVATIONS

- A well defined ITB band may create in the lateral aspect of affected thigh
- With unilateral Contracture, from anterior view, lateral pelvic tilt (low) on the affected side
- The knee on affected side may have Lateral positioning
- Pes Planus on affected side
- Anterior pelvic tilt will be visible upon bilateral ITB Contracture, as well as possibility of bilateral lateral position of knee, bilateral pes planus
- ITB Friction Syndrome – Redness and local Edema may be observed on affected lateral femoral condyle



ANTERIOR PELVIC TILT



PALPATION

- Tenderness upon the ITB, Especially distal third section and at the Greater Trochanter
- Affected ITB thickened and reinforced, Adhesions present
- Unilateral
 - Increased tone and trigger points possible in TFL and Glute max
 - In non contractured side increased tone in iliopsoas, adductors, QL
 - In Bilateral all of the above muscles
- With ITB Friction Syndrome – inflammation with heat, swelling and point tenderness is present local to the affected lateral femoral condyle



MOVEMENT

□ AROM

- Reduced extension and adduction of hip
- Painful knee extension may occur with contracture, always occurs with ITB friction syndrom
- Can be bilateral or unilateral depending on presentation

□ PROM

- Pain full extension at lateral aspect of knee

□ RIM

- Strength tests may show stronger TFL, hip flexors, and Glute max, with weaker Glute med



SPECIAL TESTS – THOMAS TEST

- Patient lies supine on the table
- Examiner slides hand under patients back to check for excessive lordosis (usually present with tight hip flexors), the examiner then flexes the clients knee to their chest which should flatten out the the lower back and stabalize the pelvis
- Have the patient then hold their knee to their chest
- The Leg on the table is the one being tested
- Positive Sign – If the extended leg rises off the table hip flexion contracture is present, if you push the extended leg back onto the table this should increase the lordosis (confirmation of a positive sign)
 - Alternately if the leg does not lift off the table but abducts (J signs) as the leg is brought to the chest INDICATES a tight ITB on the extended leg side

<https://youtu.be/NMDd-4NspHs>



ELY'S TEST

- Tests for tightness of Rectus Femoris
- Patient prone
- Examiner passively flexes knee
- Positive= test hip lifts off the table as examiner flexes knee

<https://youtu.be/0FgacndWb4Q>



OBER'S TEST

- Method: client side lying, stabilize hips while bringing top leg into hip extension with the knee bent, passively lower leg
- Positive: leg remains abducted, does not go lower than the table. ITB Contracture, If any signs of neurological conditions occur – consider pathology of femoral nerve, Tenderness over the Greater Trochanter should indicate Trochanteric Bursitis

<https://youtu.be/Amjv6FzDeLE>



NOBLES TEST

- Patient supine
- Examiner Flexes knee to 90° with hip flexion
- Pressure applied by the therapist on lateral femoral condyle or 1-2cm above it with thumb
- While pressure is maintained, passively extend the knee
- Positive Sign
 - At aprox 30° of flexion (0° being straight leg) The patient experiences severe pain over lateral condyle of the femur
 - Recreation of patients pain that occurs with activity is a positive sign ITB Friction Syndrome

<https://youtu.be/4KFYKaqUD4Q>



BURSITIS OF THE KNEE

- Bursitis – Inflammation of Bursa
- Common locations of Bursitis in the knee
 - Iliotibial Bursitis
 - Pes Anserine Bursitis
 - Gastrocnemius Bursitis (Baker's Cyst)
 - Prepatellar Bursitis (“housemaid’s Knee”)
 - Infrapatellar Bursitis
- Causes of bursitis
 - overuse of the structures surrounding the bursa, leading to excessive friction and inflammation of bursa walls
- Contributing factors
 - Muscle imbalances, poor biomechanics, postural dysfunctions, lack of flexibility



LOCATIONS OF COMMON KNEE BURSITIS'S

- Pes Anserine Bursa – lies between the Tendons of the Semitendinosus, Gracilis, and Sartorius
- Infrapatellar Bursa – Between Patellar Ligament and Tibia
- Iliotibial Band Bursa – Between IT band and overlying tendons
- Prepatellar Bursitis – between the lower half of the patella, the patellar ligament and the skin



GASTROCNEMIUS BURSITIS (BAKER'S CYST)

- A baker cyst is a synovial cyst that appears at the lateral side of the popliteal space
- Thought to be an enlargement of the extracapsular bursa between the gastrocnemius and semimembranosus muscles or a herniation of the synovium through the posterior joint capsule wall



OBSERVATIONS AND PALPATIONS

□ Acute

- Swelling and redness over the bursa that are more superficial
- Antalgic gait or posture
- Heat palpated locally
- Painful when compressed

□ Chronic

- Adhesions can be palpated
- Bogginess may be noted
- Hypertonicities and TP may be noted



MOTION

- AROM – In acute motion is reduced in all directions, In chronic usually only in the motion that puts the most compression on the bursa
- PROM – Reduced Range of motion due to pain, possibly empty end feel
- RIM – Painful when bursa is compressed



SPECIAL TESTS

- Any test that will compress the Bursa including
 - Valgus/Varus test
 - Ober's
- ***Patellar Ballotement**
 - Patient supine with leg straight
 - Examiner applies anterior to posterior pressure over the patella
 - Examiner gently oscillates the patella, palpating for motion
- Positive Sign
 - **Increased motion or spongy joint feel:** Intra-articular knee swelling
- **Clinical notes:**
- Normally the patella should move approximately 1 mm, in the presence of joint swelling the anterior to posterior motion will be increased as local edema raises the patella further off the femur. Trauma is the most common cause of joint effusion at the knee (Bursitis, internal derangement, ligament sprain or rupture, vascular damage, fracture).



ADDITIONAL KNEE SPECIAL TESTS

Tests for Patellar Dislocation

□ Fairbank's Apprehension Test

- Client supine knee flexed to 30 degrees
- Examiner moves the patella laterally and slightly distally
- If the patient feels the patella is going to dislocate they are to contract the quadriceps muscle

□ Positive Sign

- Patient Contracting the quadriceps muscle
- Apprehensive look on clients face



OSGOOD SCHLATTERS DISEASE

- Avulsion of patellar tendon from tibial tuberosity
- Affects boys ages 13-14 and girls ages 11-12 on average who participate in sports involving running, jumping, pivoting, direction changes
- Tibial tuberosity is not fully developed in children, susceptible to break down with excessive force of quads pulling at attachment
- **Needs rest from activity!
- When resolved tibial tuberosity will be more prominent d/t excess calcium





Osgood-Schlatters

OSTEOARTHRITIS

- ❑ Wearing of cartilage, common d/t amount of load exerted on knee joint
- ❑ Bone on bone, osteophytes/bone spurs
- ❑ Joint inflammation/swelling
- ❑ Difficulty bearing weight
- ❑ Protective muscle spasm
- ❑ Alleviating factors:
 - ❑ Anti-inflammatories (prescription/ice)
 - ❑ RMT, PT
 - ❑ Biking, swimming



PERIPHERAL NERVE INJURIES

□ Common Peroneal Nerve (L4-S2)

- Injured at fibular head
- Stretched during inversion ankle sprain
- Inability to dorsiflex foot
- Sensory loss in dorsum of foot and lateral leg

□ Saphenous Nerve (L2-4)

- Injured during surgery/trauma/entrapped between vastus **medialis** and adductor magnus
- Medial knee pain aggravated by walking, standing, quads exercises

□ Treatment:

- Correct L/E mechanics
- Anti-inflammatory modalities
- Nerve sliders

https://youtu.be/Fv_EJV8q2E0



KNEE JOINT MOBILIZATIONS



KNEE COMPLEX JOINT PLAY

- Backward glide of the tibia
- Forward glide of the tibia
- Medial translation of tibia on femur
- Lateral translation of tibia on femur
- Medial displacement of patella
- Lateral displacement of patella
- Depression of the patella
- Anteroposterior movement of the fibula on tibia

Pg 952 (photos)

Pg 949-953



REFERRED PAIN

- TFL - lateral aspect of the thigh
- Sartorius - over course of muscle (anterior thigh)
- Quadriceps - Anterior thigh, patella, lateral thigh and knee (vastus lateralis)
- Adductor brevis and longus - superior anteriolateral thigh, proximal to patella and sometimes down anteromedial leg
- Adductor magnus- medial thigh from groin to adductor tubercle
- Gracilis- medial thigh (primarily the midportion)
- Semimebranosus and semitendinosus- ischial tuberosity, posterior thigh, and posteromedial calf
- Biceps femoris- posterior knee up posterior thigh
- Popliteus- posterior knee
- Gastroc- posterior knee, posterolateral calf, and posteromedial calf to foot instep
- Plantaris- posterior knee and calf

