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BONES FRACTURE

Lec . 2

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What is a fracture?

A bone fracture is a crack or break in a bone. Bone fractures usually result from a high force impact or stress. People with osteoporosis or bone cancer may experience a fracture with very little impact.

A fracture that results from a medical condition that weakens the bones is called a pathological fracture.

What is a bone fracture?

A bone fracture is a full or partial break in the continuity of bone tissue. Fractures can occur in any bone in the body.

There are several different ways in which a bone can fracture. For example, a closed fracture is a break to the bone that does not damage surrounding tissue or tear through the skin.

By contrast, a compound fracture is one that damages surrounding tissue and penetrates the skin. Compound fractures are generally more serious than simple fractures due to the risk of infection.

Types of fracture

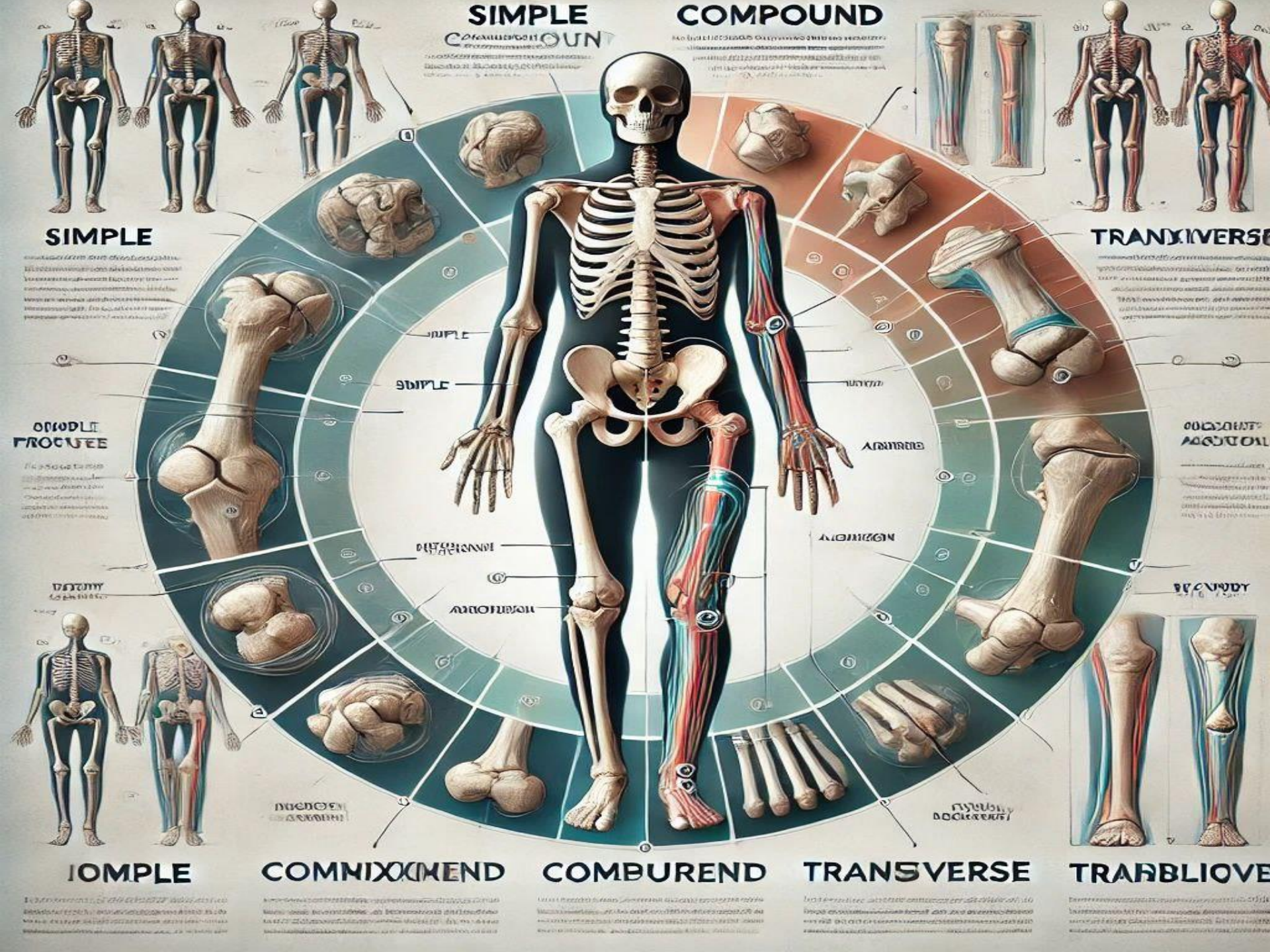
- **Avulsion fracture**: A muscle or ligament pulls on the bone, fracturing it.
- **Comminuted fracture**: An impact shatters the bone into many pieces.
- **Compression, or crush, fracture**: This generally occurs in the spongy bone in the spine. For example, the front portion of a vertebra in the spine may collapse due to osteoporosis.
- **Fracture dislocation**: This occurs when a joint dislocates, and one of the bones of the joint fractures.
- **Greenstick fracture**: The bone partly fractures on one side but does not break completely, because the rest of the bone can bend.

Types of fracture

- **Hairline fracture**: This is a thin, partial fracture of the bone.
- **Impacted fracture**: When a bone fractures, a piece of the bone may impact another bone.
- **Intra-articular fracture**: This occurs when a fracture extends into the surface of a joint.
- **Longitudinal fracture**: This is when the fracture extends along the length of the bone.
- **Oblique fracture**: An oblique fracture is one that occurs opposite to a bone's long axis.

Types of fracture

- **Pathological fracture**: This occurs when an underlying condition weakens the bone and causes a fracture.
- **Spiral fracture**: Here, at least one part of the bone twists during a break.
- **Stress fracture**: Repeated stress and strain can fracture a bone. This is commonTrusted Source among athletes.
- **Transverse fracture**: This is a straight break across the bone.


SIMPLE
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TRANSVERSE

MEDICAL STUDENTS

MEDICAL STUDENTS

SIMPLE

RACTURES

BOMBLE

FRACTURES

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Symptoms

Symptoms of a fracture vary depending on its location, a person's age and general health, and the severity of the injury.

people with a bone fracture will typically experience some of the following:

- pain
- swelling
- bruising
- discolored skin around the affected area
- protrusion of the affected area at an unusual angle
- inability to put weight on the injured area
- inability to move the affected area
- a grating sensation in the affected bone or joint
- bleeding if it is an open fracture

severe cases, a person may experience:

- Dizziness
- Faintness or lightheadedness
- Nausea

Bone Healing

Fracture healing is a complex interplay between biologic and mechanical mechanisms and occurs in four different tissue types: namely, cortical bone, intramedullary bone, periosteum, and surrounding soft tissues. Bone healing is thought to occur in three phases: inflammation, repair, and remodeling.

- Direct/ primary healing occurs when the bony fragments are fixed together with compression. There is no callus formation. The bony ends are joined and healed by osteoclast and osteoblast activity
- Indirect healing is more common than direct healing and involves both endochondral and intramembranous bone healing

Indirect healing usually occurs with:

- Non-operative fracture treatment
- Operative treatments where some motion occurs at the fracture site, such as:
  - Intramedullary nailing
  - External fixation
  - Internal fixation of comminuted fractures

Factors Affecting Bone Healing

1. Patient with nutritional deficits, smoking, and diabetic patient will experience delayed bone healing.
2. Parathyroid hormones have a vital role in bone healing by stimulating the differentiation and proliferation of osteoblasts and osteoclasts.
3. Aging process in which the patient will have:

- Chronic inflammation or the delay in resolving the inflammation to prepare for the anabolic process affect healing and cause a small callus formation, in addition to higher levels of circulating pro-inflammatory cytokines.
- Patient at this age will show a decrease in the quantity of the muscle stem cells and negatively affect affect the healing process.
- Decrease in the bone marrow blood vessels compared to young age and decrease in vascularization and angiogenesis.

Factors Affecting Bone Healing

4. Factors related to the fracture site:

- Infection of the fracture site at healing process.
- Insufficient formation of cartilage within fracture gap and marrow space.
- Open, comminuted fracture, and the extent of soft tissue injury also show delayed union healing

Thank you

Hip Replacement

Lec.8

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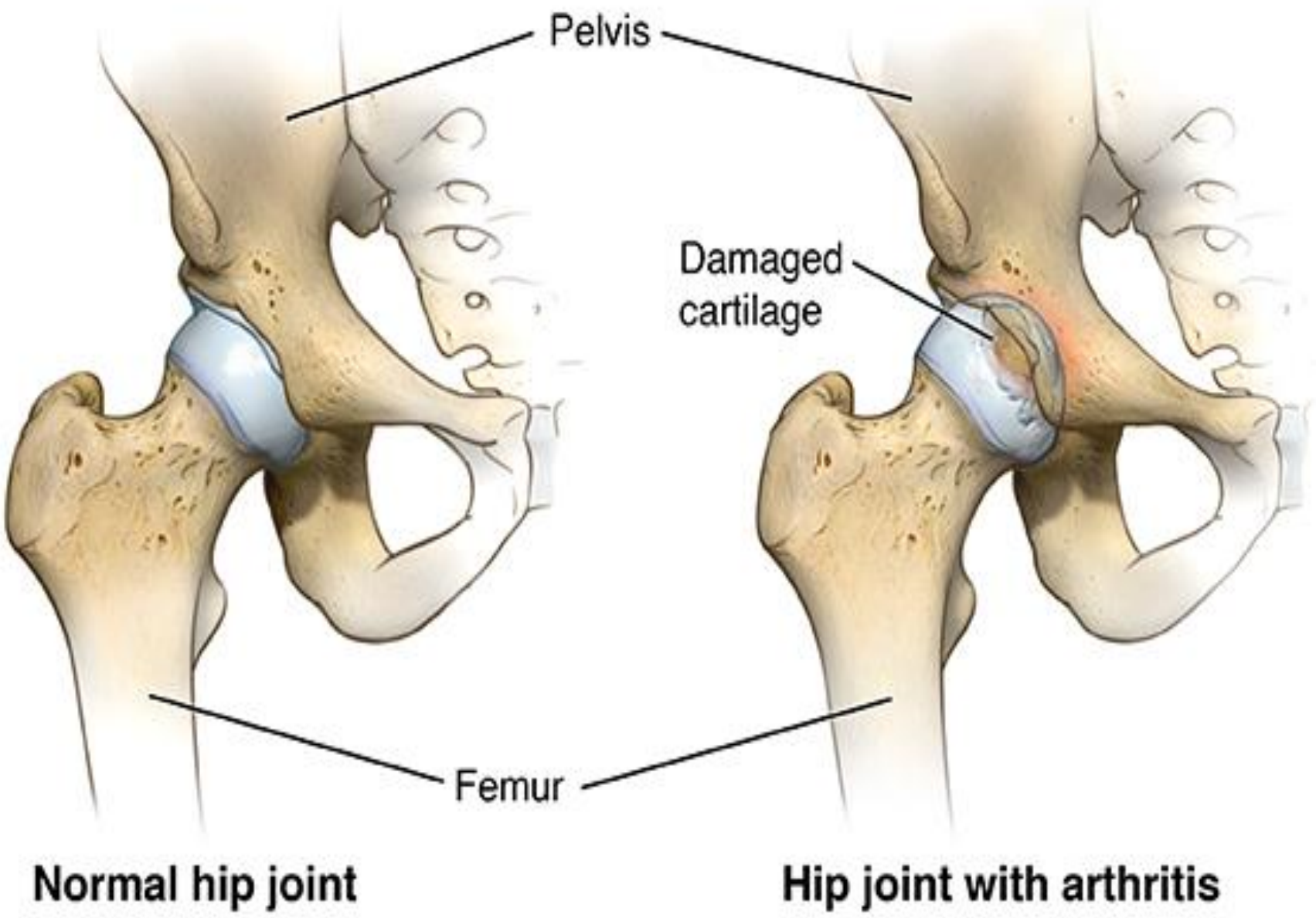
What is a hip replacement?

Hip replacement, also called hip arthroplasty, is a surgical procedure to address hip pain. The surgery replaces parts of the hip joint with artificial implants. The hip joint consists of a ball (at the top of the femur, also known as the thigh bone) and a socket (in the pelvis, also known as the hip bone). Hip replacement surgery includes replacement of one or both parts. The goal of the procedure is to allow you to resume daily activities and exercise with less pain

Who can benefit from a hip replacement?

- Osteoarthritis (most common)
- Rheumatoid arthritis
- Osteonecrosis (avascular necrosis)
- Injury such as hip fracture
- Tumor in the hip joint


Pelvis
Damaged cartilage
Femur
Normal hip joint
Hip joint with arthritis

Traditional and Minimally Invasive Hip Replacement

Advantages of minimally Invasive Hip Replacement

- Lower risk of muscle damage
- Less pain
- Quicker and easier recovery
- Less limping
- Shorter hospital stay
- Lower chance of hip dislocation

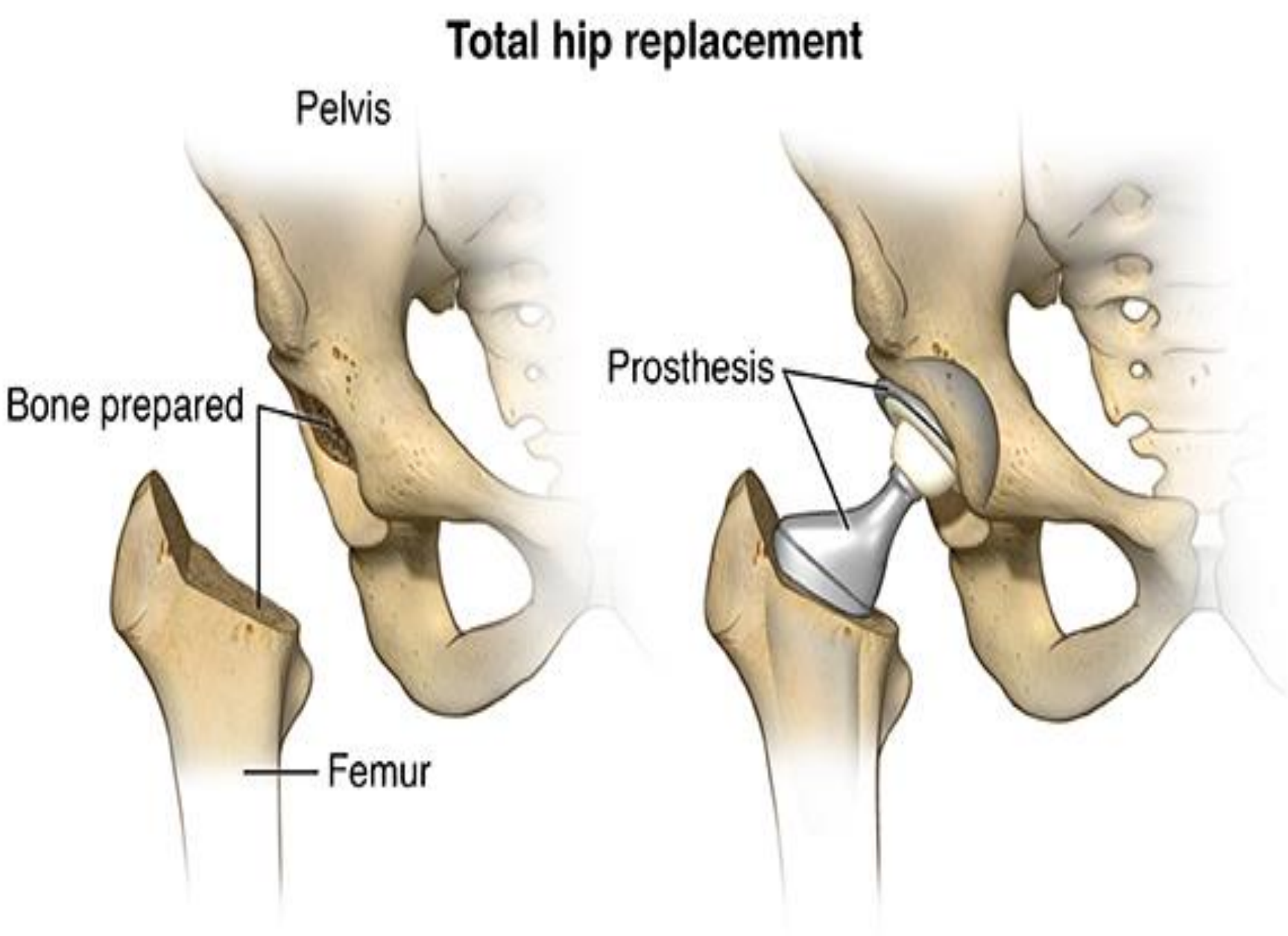
Traditional Hip Replacement

A traditional hip replacement includes a single, large incision that helps the surgeon gain access to the hip, usually through the side (lateral approach) or from the back (posterior approach).

Recovery from a traditional hip replacement can take time, because the surgeon needs to cut through or detach some muscles and tendons to get to the joint. (The muscles and tendons are repaired when the hip implants are in place).

Parts of a Hip Replacement Implant (Hip Prosthesis)

- The hip replacement implant, also called hip prosthesis, has two parts:
- A **ceramic ball** attached to a metal stem, which is inserted into the thigh bone (femur) for stability
- A **metal cup** (typically made of titanium) with an inner plastic layer, which is attached to the socket part of the hip joint (acetabulum) to allow the prosthetic joint to rotate smoothly
- In the past, the ball was made of metal as well, but the current standard is ceramic.


Total hip replacement
Pelvis
Bone prepared
Femur
Prosthesis

Types of Socket Implant Attachment

- **Uncemented prosthesis** attaches with a porous surface, which allows bone to grow over time and hold it in place.
- **Cemented prosthesis** attaches with bone cement.

Both uncemented and cemented approaches can work well to secure the implant. As hip replacement techniques have evolved over the years, the cement used has improved, as have methods to encourage natural bone re-growth.

What are the risks of hip replacement surgery?

there are some risks during and after a hip replacement:

- Bleeding
- Infection
- Blood clots in the legs or lungs
- Leg length discrepancy
- Injury to nearby nerves
- Fracture
- Continued pain or stiffness
- Dislocation
- Loosening or wearing out of the prosthesis
- Unrelieved joint pain (this may be temporary)

What are the risks of hip replacement surgery?

In very, very rare cases of bone surgery, particularly procedures using cement, an embolism (blockage) can occur if fat from the bone marrow enters the bloodstream. A fat embolism can raise the risk of a heart attack or stroke.

1. After the surgery, notify your doctor if you notice any of the following:
2. Fever
3. Redness, swelling, or bleeding or other drainage from the incision site that doesn't stop after a few days
4. Increased pain around the incision site
5. Pain in the lower leg that is unrelated to the incision
6. New or increased swelling of the lower leg
7. Chest pain
8. Shortness of breath

other Risks

1. Infection
2. dislocation
3. limb length inequality
4. loosening
5. impingement
6. osteolysis
7. metal sensitivity
8. nerve palsy
9. chronic pain and
10. death

THANK YOU

BONE HEALING OUTLINE

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Outlines of treatment and Prognosis

How are bone fractures treated?

How your fracture is treated depends on which type it is, what caused it and how damaged your bones are.

Immobilization

If your fracture is mild and your bones did not move far out of place (if it's non-displaced), you might only need a splint or cast. Splinting usually lasts for three to five weeks. If you need a cast, it will likely be for longer, typically six to eight weeks. In both cases you'll likely need follow up X-rays to make sure your bones are healing correctly.

Closed reduction

More severe breaks require a closed reduction to set (realign) your bones. During this non-surgical procedure, your provider will physically push and pull your body on the outside to line up your broken bones inside you. To prevent you from feeling pain during the procedure you'll receive one of the following:

- Local anesthetic to numb the area around your fracture.
- Sedatives to relax your whole body.
- General anesthesia to make you sleep through the procedure.

After the closed reduction, your provider will put you in a splint or cast.

Bone fracture surgery

Some bone fractures require surgery. Depending on which type of fracture you have — and how badly your bones are damaged — there are few techniques your surgeon might use.

Internal fixation

Your surgeon will realign (set) your bones to their correct position and then secure them in place so they can heal and grow back together. They usually perform what's called an internal fixation, which means your surgeon inserts pieces of metal into your bone to hold it in place while it heals. You'll need to limit how much you use that part of your body to make sure your bone can fully heal.

Internal fixation techniques include:

- **Rods:** A rod inserted through the center of your bone that runs from top-to-bottom.
- **Plates and screws**: Metal plates screwed into your bone to hold the pieces together in place.
- **Pins and wires**: Pins and wires hold pieces of bone in place that are too small for other fasteners. They're typically used at the same time as either rods or plates.

Some people live with these pieces inserted in them forever. You might need follow-up surgeries to remove them.

External fixation

You might need an external fixation. Your surgeon will put screws in your bone on either side of the fracture inside your body then connect them to a brace or bracket around the bone outside your body. This is usually a temporary way to stabilize your fracture and give it time to begin healing before you have an internal fixation.

Arthroplasty

If you fracture a joint (like your shoulder, elbow or knee) you might need an arthroplasty (joint replacement). Your surgeon will remove the damaged joint and replace it with an artificial joint. The artificial joint (prosthesis) can be metal, ceramic or heavy-duty plastic. The new joint will look like your natural joint and move in a similar way.

Bone grafting

You might need bone grafting if your fracture is severely displaced or if your bone isn't healing back together as well as it should. Your surgeon will insert additional bone tissue to rejoin your fractured bone. After that, they'll usually perform an internal fixation to hold the pieces together while your bone regrows. Bone grafts can come from a few sources:

Internally from somewhere else in your body — usually the top of your hip bone.

An external donor.

An artificial replacement piece.

After your surgery, your bone will be immobilized. You'll need some combination of a splint, cast, brace or sling before you can start using it like you did before your fracture.

Complications of bone fracture treatment

Fracture surgery complications include:

- **Acute compartment syndrome (ACS**): A build-up of pressure in your muscles may stop blood from getting to tissue, which can cause permanent muscle and nerve damage.
- **Malunion**: This happens when your broken bones don't line up correctly while they heal.
- **Nonunion**: Your bones may not grow back together fully or at all.
- **Bone infection (osteomyelitis**): If you have an open fracture (the bone breaks through your skin) you have an increased risk of bacterial infection.
- **Other internal damage**: Fractures can damage the area around the injury including your muscles, nerves, blood vessels, tendons and ligaments.

What medications are used to treat bone fractures?

Over-the-counter NSAIDs like aspirin or ibuprofen can lead to bleeding and other complications after a surgery. Your surgeon will talk to you about the medications you can take to reduce pain after your surgery

NSAID side effects

Side effects of NSAIDs include:

- **Bleeding.**
- **Ulcers.**
- **Stomach pain.**
- **Bowel complications.**

Outlook / Prognosis

What can I expect if I have a bone fracture?

Most people who break a bone make a full recovery and can resume their typical routine after their bone heals. Some fractures can have a long-term impact on your life, especially if you experienced other injuries. Talk to your surgeon or provider before resuming any physical activities or playing sports while you're recovering.

When should I go to the emergency room?

Go to the emergency room right away if you've experienced a trauma.

If you think you have a bone fracture, you need to see a healthcare provider as soon as possible. Go to the emergency room if you experience any of the following:

- Intense pain.
- You can't move a part of your body like you usually can.
- A part of your body is noticeably different looking or out of its usual place.
- You can see your bone through your skin.
- Swelling.
- New bruising that appears at the same time as any of these other symptoms.

Can bone fractures cause fevers?

Bone fractures themselves don’t cause fevers. However, if you have a fever, or the area around your broken bone feels warm or hot go to the emergency room. This can be a sign of a serious infection that needs to be examined by a provider right away.

POST-OPERATIVE TOTAL KNEE REPLACEMENT

Lec.7

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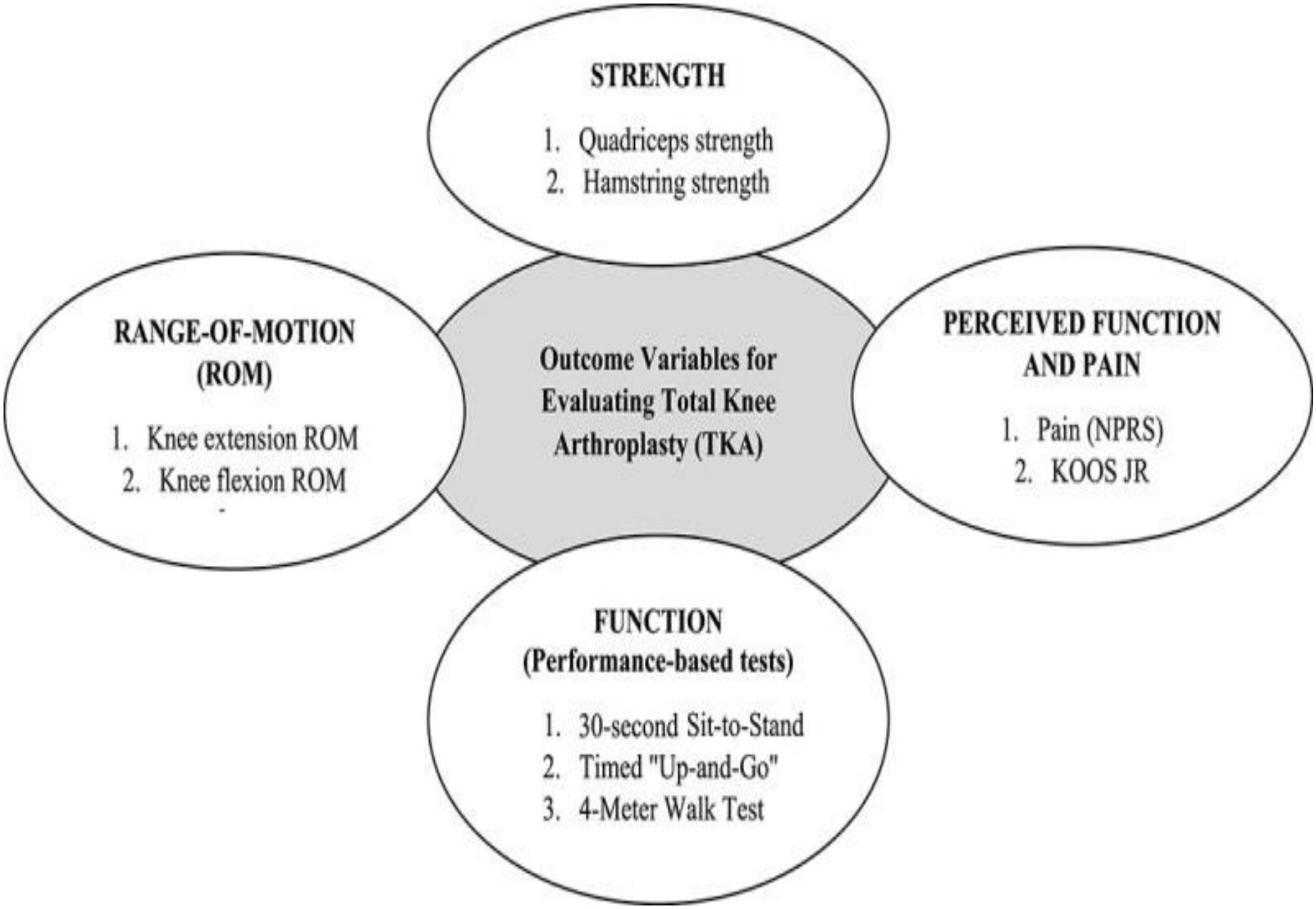
INTERVEOW

It is important for you to take an active role in your recovery process after surgery. Your physiotherapist will teach you exercises to help return strength, movement and function to your new knee. You can help your recovery by:

1. Managing the pain and swelling
2. Doing your exercises regularly
3. Moving around and gradually going back to your daily activities

Objectively assessing outcomes after TKA is critical to determine prognosis and to evaluate the efficacy and effectiveness of treatments including rehabilitation.

Outcome measures include range of motion (ROM), pain, patient-reported outcomes (PROs), strength, and performance-based functional tests.


STRENGTH
1. Quadriceps strength
2. Hamstring strength
RANGE-OF-MOTION (ROM)
1. Knee extension ROM
2. Knee flexion ROM
Outcome Variables for Evaluating Total Knee Arthroplasty (TKA)
PERCEIVED FUNCTION AND PAIN
1. Pain (NPRS)
2. KOOS JR
FUNCTION (Performance-based tests)
1. 30-second Sit-to-Stand
2. Timed "Up-and-Go"
3. 4-Meter Walk Test

The early postoperative period following TKA often includes

- period of substantially reduced activity.
- Some postoperative protocols promote significant rest and carry strong warnings against too much activity during the first 2 weeks following TKA.

Category	Intervention Examples	Notes
Pain and swelling management	• Modalities (eg, ice, heat, electrical stimulation) • Pain medications • Elevation • Ankle pumps, ankle circles, and other light motions • Relative rest	Pain and swelling management are typically the focus of early postoperative rehabilitation. Clinicians should monitor pain and swelling over time, particularly as patients progress in therapy or increase outside activities (eg, wean off an assistive device, resume work, or resume an exercise program).

ROM and flexibility exercises	• Knee extension and flexion stretching including low-load, long duration • Joint mobilizations (patellofemoral, tibiofemoral) • Flexibility exercises • Functional activities that use full available ROM	Rehabilitation should include ROM exercises frequently throughout the day during the early postoperative period, then taper frequency of ROM exercises while monitoring ROM to ensure criteria are met. Joint mobilizations, flexibility exercises, and functional activities that use the patient's full available ROM (eg, stationary cycling, walking with full knee extension during initial contact) may aid recovery and maintenance of ROM.

Targeted and progressive strengthening	• Open- (eg, knee extension) and close-chain (eg, squats) quadriceps strengthening • Strengthening exercises targeting hamstrings, ankle plantar flexors/dorsiflexors, hip/gluteal musculature, low back, and core • NMES	Targeted and appropriately dosed strengthening is the hallmark of a progressive rehabilitation program. Exercises should be performed unilaterally and bilaterally and must be at sufficient intensity to develop muscular strength, power, and/or hypertrophy. Perform exercises to an 8-repetition maximum to induce muscle strength gains.

Functional activities and cardiovascular exercise	• Use of an assistive device • Training on transfers • Gait retraining • Stair negotiation • Cardiovascular exercise (eg, walking, elliptical, cycling, aerobics, cross-country skiing)	Basic self-care and activities of daily living should be the focus during early postoperative rehabilitation. As patients progress, rehabilitation should prepare patients to gradually resume their preferred higher-level recreational activities such as hiking, cycling, skiing, or yoga. Later stages of rehabilitation and especially home exercise programs should incorporate cardiovascular exercises, progressing from basic (eg, walking, stationary cycling) to higher level activities (eg, hiking, cycling).

Balance and neuromuscular control exercises	• Static and dynamic balance activities • Neuromuscular control/movement retraining exercises	Balance and neuromuscular control/movement retraining exercises should address compensatory movement strategies and restore symmetrical movement patterns.
Patient education	• Educating individuals on signs and symptoms of infection, prognosis, exercise progression, expectations, self-management, etc	Clinicians should educate patients throughout the plan-of-care, initially focusing on postoperative expectations and recognizing early signs of potential complications, then progressing to self-management of their condition.

Home exercise program	• Comprehensive, progressive home exercises that complement the plan-of-care	A home exercise program should complement the plan-of-care, be manageable, and progress over time.

Fracture Complications

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Introduction

Most bone injuries heal normally. But some patients do experience complications during the healing process.

Complications of fractures fall into two categories: early and delayed.

- Early complications include wound healing problems, **shock**, **fat embolism**, **compartment syndrome**, **deep vein thrombosis**, **thromboembolism (pulmonary embolism**), disseminated intravascular coagulopathy, and infection.
- Delayed complications include delayed union and nonunion, avascular necrosis of bone, reaction to internal fixation devices, complex regional pain syndrome, and heterotrophic ossification.

Early Complications

Intervention	Description	Signs and Symptoms	Action to Take
Shock	Hypovolemic or traumatic shock resulting from hemorrhage and from loss of extracellular fluid into damaged tissues may occur in fractures of the extremities, thorax, pelvis, or spine. Because the bone is very vascular, large quantities of blood may be lost as a result of trauma, especially in fractures of the femur and pelvis.	•Anxiety or Agitation. •Cool, Clammy Skin or Sweating, Moist Skin •Confusion •Decreased or No Urine Output •Generalised Weakness •Pale Skin Color (Pallor) •Rapid Breathing	•Urgent Medical Team Review •Management includes restoration of blood volume and circulation, relieving the patient's pain, providing adequate splinting, and protecting the patient from further injury and other complications.

Compartment Syndrome	•Risk Factors:Tibial or Forearm Fractures •High-energy Wrist Fractures •Crush Injuries Timeframe: •Usually occurs in the very acute phase, post-injury	•Pain out of proportion to the associated injury •Pain on passive movement of the muscles of the involved compartments •Severe Swelling •Neurovascular Changes - 5P's	•MEDICAL EMERGENCY •Inform the surgeon immediately. Requires immediate action. •Remove any cast, splint of circumferential dressing and elevate limb to heart level. •May require emergency fasciotomy

Pulmonary Embolism	•Risk FactorsSerious Limb Injury Surgery •Prolonged Bed Rest •Static Lower Limb Posture for more than 6 hours •Trauma and Spinal Cord Injury •Smoking •Oral Contraceptives •Hormone Replacement Therapy •Cancer •Chemotherapy •Pregnancy and Post-Partum Period •Advanced Age (>40 years old) •Immobilizer or Cast •Central Venous Catheterization Timeframe: •Patient is most at risk in the acute phase and first three months post-injury	•Pyrexia •Dyspnea and/or Tachypnea •Crackles •Second Heart Sound •Pleuritic Chest Pain •Profuse Sweating •Haemoptysis •Tachycardia •Hypotension •Lightheaded / Dizzy •Syncope •Cyanosis	•Urgent Medical Team Review. Requires immediate action. •Check Observations •Administer oxygen if required and if this is within your scope of practice

Deep Vein Thrombosis	Usually in the calf but can also occur in upper limbs. This can progress to a Pulmonary Embolism, which may cause death several days to weeks after injury. (see above)Risk Factors Reduced Skeletal Muscle • Contractions Bed Rest.• Lower Limb Fractures• Pelvic Fractures• Timeframe: Patient is most at risk in • the acute phase and first three months post-injury	Swollen, Hard, • Painful Limb Tender to Touch• Heat• Discolouration • (usually red but can be blueish-grey)	Inform Medical • Team Check whether • the team is happy for the patient to mobilise

Infection	•Risk FactorsOpen Fractures •Internal Fixation •Surgical Wound •Pin Sites	•New or Increasing Pain •Heat •Redness •Swelling •Green or Cloudy Oozing/Discharge •Tenderness	•Inform the Medical Team Infections must be treated promptly. •Antibiotic therapy must be appropriate and adequate for prevention and treatment of infection[2].

Signs and Symptoms

It’s important to know the warning signs of a bone healing complication. Receiving prompt care is critical to treating complications. S &S include:

- Chronic pain
- Drainage from a Wound
- Fever
- Swelling
- Limping

Patient-Related Risk Factors

Certain patient-related characteristics influence the development of fracture-healing complications in general, even though specific healing complications may differ by their mechanism.

- Diabetes, NSAID use, and a recent motor vehicle accident are most consistently associated with an increased risk of a fracture-healing complication, regardless of fracture site or specific fracture-healing complication. [4]
- In delayed union and non-union identified risk factors include: age; lower limb > upper limb; open fractures; infection; diabetes; smoking; poor blood supply[5].
- Fractures in obese children have a higher rate of complications independently from conservative or surgical treatment. Surgical indications are more common than in normal weighted children and are generally more invasive.

The Role of Physical Therapy in Fracture Rehabilitation: A Deep Dive

Fractures, though common, can significantly impact one's quality of life, disrupting daily activities and causing immense discomfort. The journey from fracture to recovery is often challenging, requiring a multidisciplinary approach where physical therapy plays a pivotal role. In this deep dive, we'll explore the comprehensive role of physical therapy in fracture rehabilitation, shedding light on its importance, techniques, and benefits.

Understanding Fractures

Before rooting into the role of physical therapy, it’s crucial to grasp the nature of fractures. Fractures occur when there is a break or crack in the continuity of bone tissue. They can result from various factors, including trauma, falls, sports injuries, or underlying medical conditions like osteoporosis. Fractures range from simple cracks to complex breaks, each demanding tailored fracture care treatment approaches.

Importance of Physical Therapy

Physical therapy is indispensable in fracture rehabilitation for several reasons:

1. **Restoring Mobility and Functionality:** Fractures often lead to immobility, muscle atrophy, and joint stiffness. Physical therapists devise personalized exercise regimens to restore range of motion, strengthen muscles, and improve flexibility, enabling patients to regain functional independence.
2. **Pain Management**: Fractures typically accompany intense pain and discomfort. Physical therapy incorporates modalities such as manual therapy, electrical stimulation, and therapeutic ultrasound to alleviate pain, facilitating a smoother recovery process.
3. **Preventing Complications**: Prolonged immobilization can predispose individuals to complications like deep vein thrombosis, pressure ulcers, and joint contractures. Physical therapists employ techniques to mitigate these risks, ensuring optimal recovery and minimizing setbacks.
4. **Enhancing Healing**: Active movement and controlled stress on fractured bones stimulate osteoblast activity, accelerating the bone healing process. Physical therapy interventions like weight-bearing exercises and progressive resistance training promote bone remodeling, fostering faster and stronger recovery.

The Rehabilitation Process

Fracture rehabilitation through physical therapy typically follows a phased approach:

1. **Acute Phase**: In the initial stages post-fracture, the focus is on pain management, swelling reduction, and preserving joint mobility. Physical therapists utilize modalities like ice therapy, gentle mobilization exercises, and elevation to alleviate symptoms and prepare the affected area for further interventions.
2. **Subacute Phase:** As healing progresses, therapy intensifies to improve muscle strength, proprioception, and balance. Weight-bearing exercises, resistance training, and proprioceptive activities help rebuild muscle mass, enhance stability, and prevent deconditioning.
3. **Chronic Phase:** In the final phase, therapy transitions towards functional training and return to pre-injury activities. Patients engage in sport-specific drills, agility exercises, and task-oriented activities to refine movement patterns, regain confidence, and reintegrate into daily life or sports activities.

The Role of the Physical Therapist

Physical therapists, equipped with specialized training and expertise, play a crucial role in fracture rehabilitation. They conduct comprehensive assessments to determine the extent of injury and design personalized treatment plans tailored to individual needs. With a focus on patient education and empowerment, physical therapists guide individuals through each phase of their recovery journey, fostering optimal outcomes.

Techniques Used in Physical Therapy

Physical therapists employ a diverse range of techniques tailored to individual needs and fracture types:

1. **Manual Therapy:** Hands-on techniques like joint mobilization, soft tissue massage, and my ofascial release aid in restoring joint mobility, reducing pain, and releasing muscular tension
2. **Therapeutic Exercise**: Customized exercise programs encompassing stretching, strengthening, and proprioceptive activities enhance muscle function, joint stability, and overall physical conditioning.
3. **Modalities:** Modalities such as ultrasound, electrical stimulation, and heat therapy complement exercise interventions, promoting tissue healing, reducing inflammation, and alleviating pain.
4. **Functional Training:** Functional tasks mimicking real-life movements facilitate the transfer of rehabilitation gains to functional activities, fostering independence and confidence in daily tasks.
5. **Education and Home Exercise Program**: Patient education plays a vital role in fracture rehabilitation, empowering individuals with knowledge on injury management, activity modification, and home exercise strategies to sustain progress outside therapy sessions.

Benefits of Physical Therapy

The incorporation of physical therapy into fracture rehabilitation yields numerous benefits:

1. **Optimized Recovery**: Physical therapy expedites the healing process, enabling individuals to regain function and mobility sooner than with passive approaches alone.
2. **Reduced Complications**: Active rehabilitation minimizes the risk of complications associated with prolonged immobilization, enhancing overall outcomes and patient safety.
3. **Improved Functional Outcomes**: By targeting specific impairments and functional deficits, physical therapy enhances functional independence, enabling individuals to resume their pre-injury activities with confidence.
4. **Prevention of Recurrence**: Through education and targeted interventions, physical therapy addresses underlying risk factors and movement dysfunctions, reducing the likelihood of future injuries or fractures.

Specific fractures and dislocations

Lec 5

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What is a dislocation?

Dislocation is the medical term for bones in one of your joints being knocked or pushed out of their usual place.

A joint is any place in your body where two bones meet. They're part of your skeletal system. You have hundreds of joints throughout your body. They support your body from head to toe.

-Any joint in your body can be dislocated. Dislocations can be painful and make it hard (or impossible) to use your affected joint. Dislocations can also strain or tear the tissues around your joints, including your:

- Muscles.
- Nerves.
- Tendons.
- Blood vessels.

Types of dislocations

- **Complete dislocations (luxation):** A complete dislocation happens when the bones in your joint are totally separated and pushed out of place.
- **Subluxation:** Subluxation is the medical term for a partial dislocation. You have a subluxation if something pulls your joint apart and the bones still touch, just not as completely as usual.

Dislocations are very common. The most commonly dislocated joints include:

- Fingers.
- Shoulders.
- Knees.
- Elbows.
- Hips.
- Jaws.

What are the symptoms of a dislocation?

- Pain.
- Swelling.
- Bruising.
- The joint looking noticeably different or out of place.
- Being unable to move or use your joint.
- A feeling of instability or like the joint is weaker than usual.

What causes dislocations?

- Car accidents.
- Sports injuries.
- Falls.

Dislocation risk factors

- Play contact sports.
- Are older than 65.
- Have Ehlers-Danlos syndrome or another health condition that weakens connective tissues (including ligaments, tendons or muscles) around joints.

What are common complications of a dislocation?

- Muscle strains.
- Ligament and tendon sprains.
- Nerve damage.
- Damaged blood vessels.
- Bone fractures (broken bones).

What tests are done to diagnose dislocations?

- X-rays.
- Magnetic resonance imaging (MRI).
- A computed tomography (CT) scan.
- Ultrasound.

Management and Treatment

relocation, manipulation or a closed reduction.

carefully push and pull on the dislocated joint to move it back into alignment.

you might need other treatment, including:

- **Immobilization**: Wearing a splint, sling or brace will hold your joint in place while it heals.
- **Medication**: Your provider will tell you which medication you can take to reduce pain and inflammation. Don't take over-the-counter (OTC) pain relievers for more than 10 days in a row without talking to your provider.
- **Rest**: You'll need to avoid any physical activity that uses or puts stress on your affected joint.

Dislocation surgery : If the injury that dislocated your joint caused other damage inside your body, you might need surgery to repair it. Some people with severe dislocations need surgery to reset their joint if a closed reduction doesn't work.

What is the recovery time after a dislocation?

dislocated finger may feel back to normal in three weeks. A bigger joint like your shoulder could take several months or longer to heal.

Prevention of dislocation

You can’t always prevent a dislocation. They usually happen because of accidents and traumas you can’t plan for.

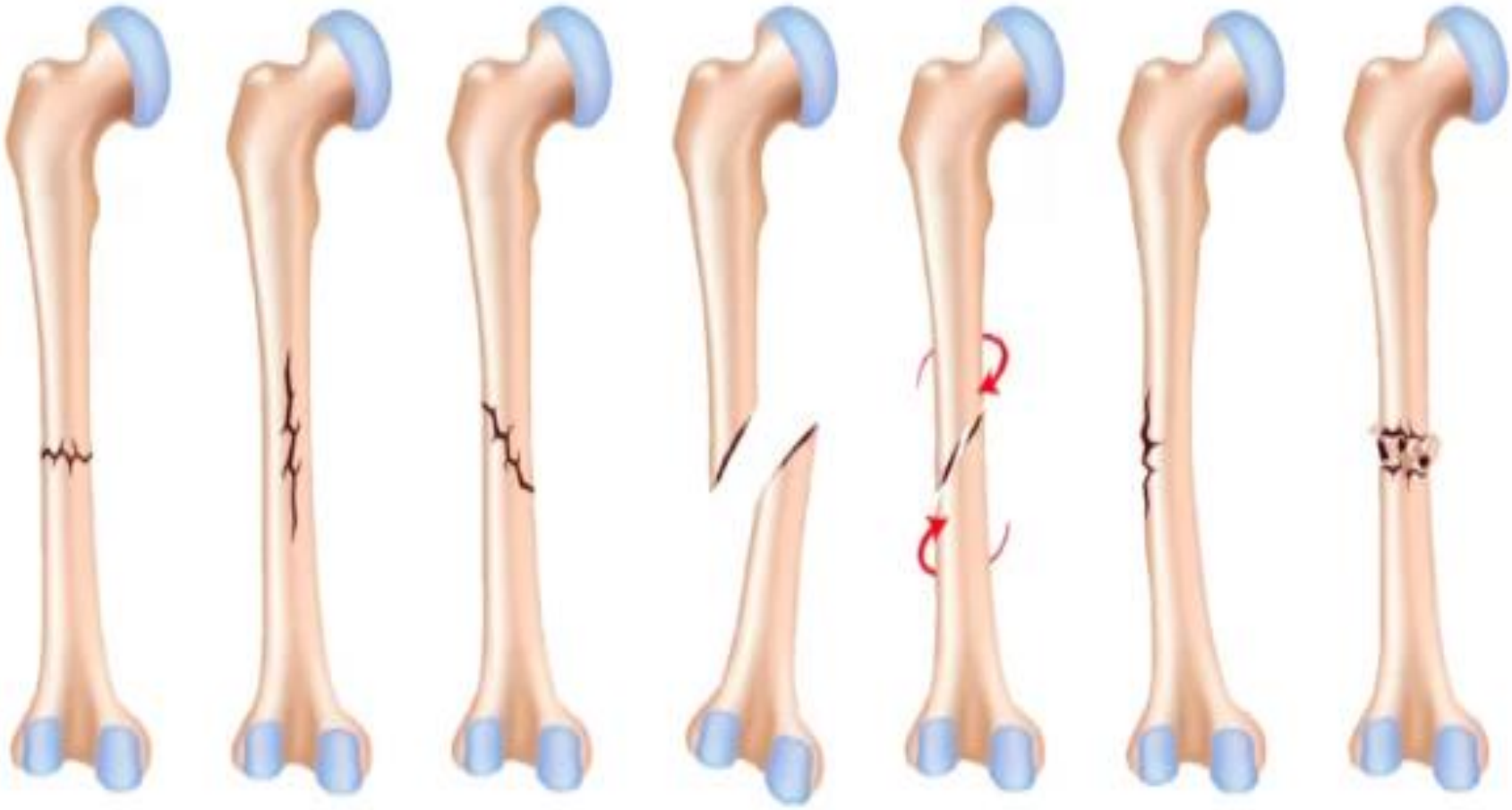
During sports or other physical activities:

- Wear the right protective equipment.
- Don’t “play through the pain” if one of your joints hurts during or after physical activity.
- Give your body time to rest and recover after intense activity.
- Stretch and warm up before playing sports or working out.
- Cool down and stretch after physical activity.

general safety tips to reduce your risk of an injury:

- Make sure your home and workspace are free from clutter that could trip you or others.
- Always use the proper tools or equipment at home to reach things. Never stand on chairs, tables or countertops.
- Use a cane or walker if you have difficulty walking or have an increased risk for falls

Types of Bone Fractures



Transverse

Linear

Oblique, nondisplaced

Oblique, displaced

Spiral

Greenstick

Comminuted

Total knee replacement

Lec 6

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Anatomy

The knee is the largest joint in the body and having healthy knees is required to perform most everyday activities.

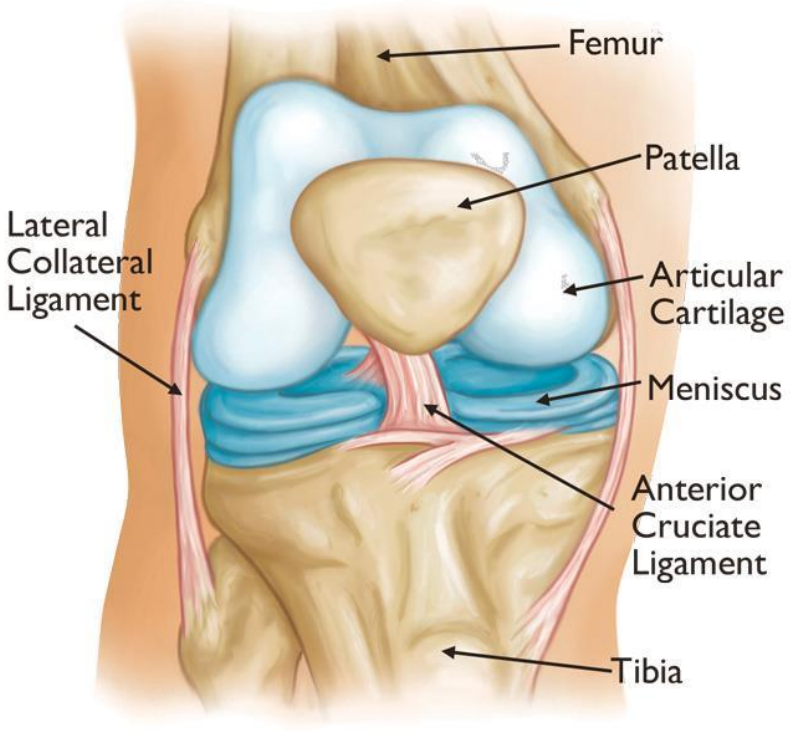
The knee is made up of:

- The lower end of the femur (thighbone)
- The upper end of the tibia (shinbone)
- The patella (kneecap)

The ends of these three bones are covered with articular cartilage, a smooth substance that protects the bones and enables them to move easily within the joint.

The menisci are located between the femur and tibia. These C-shaped wedges act as shock absorbers that cushion the joint.

Large ligaments hold the femur and tibia together and provide stability. The long thigh muscles give the knee strength.



Normal knee anatomy. In a healthy knee, these structures work together to ensure smooth, natural function and movement.

All remaining surfaces of the knee are covered by a thin lining called the synovial membrane. This membrane releases a fluid that lubricates the cartilage, reducing friction to nearly zero in a healthy knee.

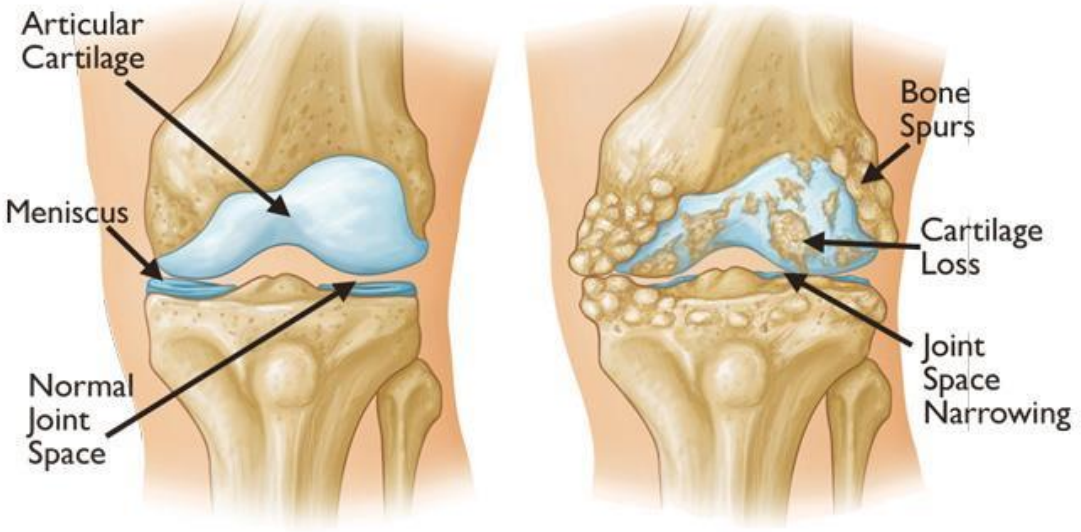
Normally, all of these components work in harmony. But disease or injury can disrupt this harmony, resulting in pain, muscle weakness, and reduced function.

Cause of chronic knee pain

The most common cause of chronic knee pain and disability is arthritis. Although there are many types of arthritis, most knee pain is caused by just three types: osteoarthritis, rheumatoid arthritis, and posttraumatic arthritis.

- **Osteoarthritis**. This is an age-related wear-and-tear type of arthritis. It usually occurs in people 50 years of age and older, but may occur in younger people, too. The cartilage that cushions the bones of the knee softens and wears away. The bones then rub against one another, causing knee pain and stiffness.

Osteoarthritis often results in bone rubbing on bone. Bone spurs are a common feature of this form of arthritis.



Cause of chronic knee pain

- **Rheumatoid arthritis.** This is a disease in which the synovial membrane that surrounds the joint becomes inflamed and thickened. This chronic inflammation can damage the cartilage and eventually cause cartilage loss, pain, and stiffness. Rheumatoid arthritis is the most common form of a group of disorders termed "inflammatory arthritis."
- **Posttraumatic arthritis**. This can follow a serious knee injury. Fractures of the bones surrounding the knee or tears of the knee ligaments may damage the articular cartilage over time, causing knee pain and limiting knee function.

Knee replacement surgery

Knee replacement surgery replaces parts of injured or worn-out knee joints. This also is known as knee arthroplasty. During the surgery, damaged bone and cartilage are replaced with parts made of metal and plastic.

Knee replacement surgery can help ease pain and make the knee work better. To decide whether a knee replacement is right for you, a surgeon checks your knee's range of motion, stability and strength. X-rays help show the extent of damage.

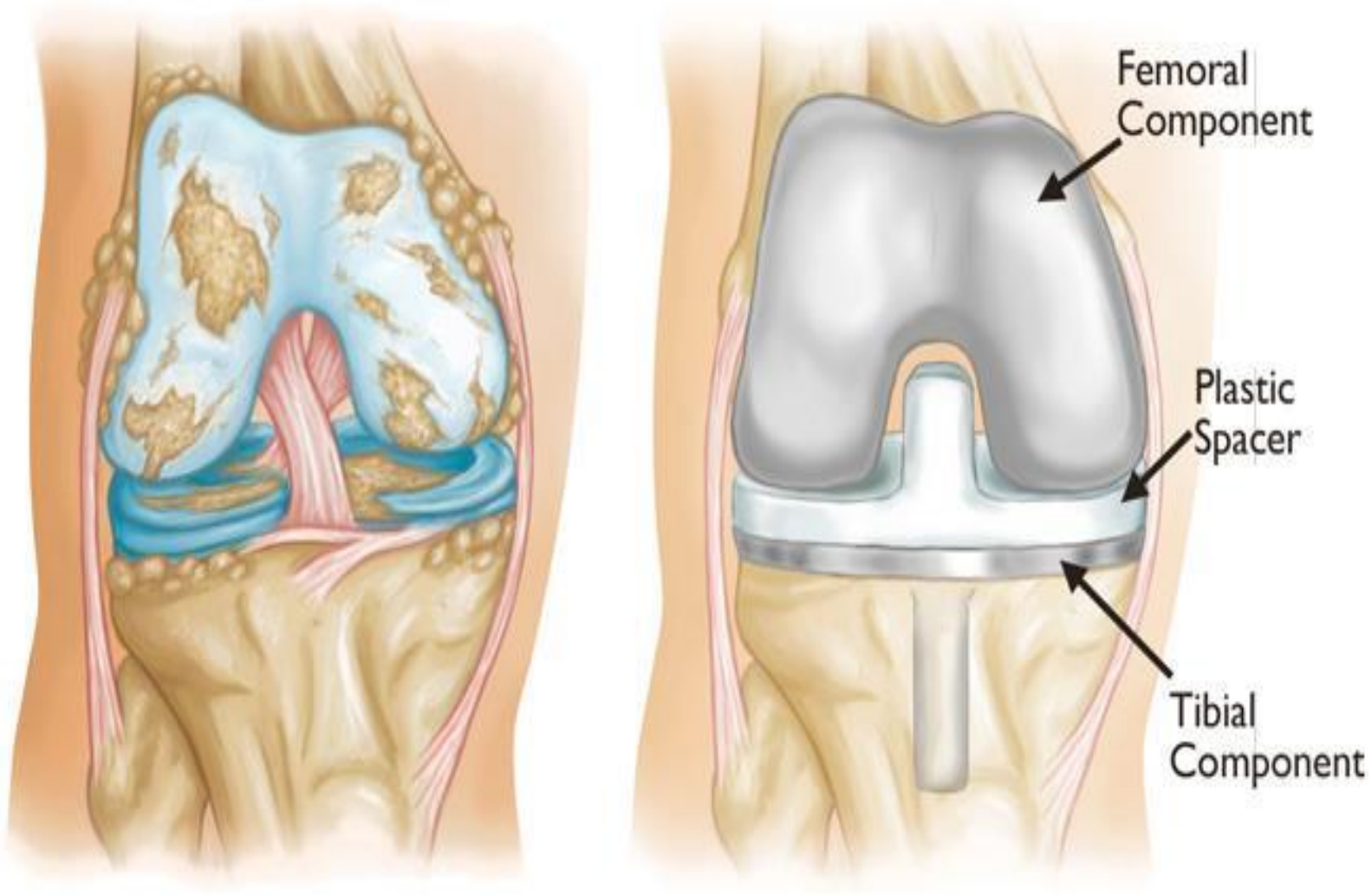
The right artificial joints and surgical techniques needed depend on many factors including age, weight, activity level, knee size and shape, and overall health.

Description

A total knee replacement (also called total knee **arthroplasty**) might be more accurately termed a knee "resurfacing" because only the surfaces of the bones are replaced.

There are four basic steps to a knee replacement procedure:

- **Prepare the bone**: The surgeon removes the damaged cartilage surfaces at the ends of the femur and tibia, along with a small amount of underlying bone.
- **Position the metal implants**: The surgeon replaces the removed cartilage and bone with metal components that re-create the surface of the joint. These metal parts may be cemented or "press-fit" into the bone.
- **Resurface the patella**: The surgeon cuts the undersurface of the patella (kneecap) and resurfaces it with a plastic button. Some surgeons do not resurface the patella, depending upon the case.
- **Insert a spacer:** The surgeon inserts a medical-grade plastic spacer between the metal components to create a smooth gliding surface.



(**Left**) Severe osteoarthritis. (**Right**) The arthritic cartilage and underlying bone has been removed and resurfaced with metal implants on the femur and tibia. A plastic spacer has been placed in between the implants. The patellar component is not shown for clarity.

Risks

Knee replacement surgery, like any surgery, carries risks. They include:

Blood clots. Surgeons often recommend blood-thinning medicines to prevent this risk. The most common location for blood clots is in the leg. But they can travel to the lungs and become deadly.

Nerve damage. Nerves in the area where the implant is placed can be injured. Nerve damage can cause numbness, weakness and pain.

Infection. Infection can occur at the incision site or in the deeper tissue. Surgery is sometimes needed to treat an infection.

The implants used for knee replacements are durable, but they may loosen or become worn over time. If this happens, another surgery may be needed to replace the loose or worn parts.

THANK YOU

Orthopedics

Lec.1

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Anatomy of bone:

upper limb : The upper extremity or arm is a functional unit of the upper body. It consists of three sections: the

- upper arm,
- Forearm(ulna & radius)
- hand.

It extends from the shoulder joint to the fingers and contains 30 bones. It also consists of many nerves, blood vessels (arteries and veins), and muscles.

The upper limb is characterized by a great deal of mobility, although perhaps the ball and socket joint formed between the humerus and the scapula is not the most stable of joints in the body

Upper Limb

The primate upper limb, or forelimb, is divided into four regions, most of which contain several bones. The most proximal part, nearest the trunk, is the shoulder girdle, which is composed of two bones: the clavicle anteriorly and the scapula posteriorly

Upper arm

The humerus, the only bone in the upper arm, is a typical long bone consisting of a relatively long shaft between two fairly bulbous ends

The lower arm consists of two long bones, the radius and the ulna

Upper Limb

Wrist and hand

The wrist consists of eight small irregular bones called carpals that articulate with each other to form the carpus

The carpals are arranged in a proximal and distal row. The proximal row articulates with the distal ends of the radius and ulna to form the wrist joint. The series of joints between the proximal and distal rows is called the midcarpal joint.

The hand consists of 5 metacarpals and 14 phalanges (or digits)

upper limb consists of 32 bones: shoulder (scapula and clavicle), upper arm (humerus), lower arm (radius and ulna), wrist (8 carpals) and hand (5 metacarpals and 14 phalanges)

Lower limb

The lower extremity can be divided into several parts or regions, as follows:

- Hip
- Thigh
- Knee
- Leg
- Ankle
- Foot

Lower limb

Hip and pelvis

The structural framework of the hip region is provided by the pelvis, a structure composed of the pelvic girdle and the coccyx. In turn, the pelvic girdle consists of two hip bones and the sacrum, interconnected at the pubic symphysis and sacroiliac joints

hip bone has three parts (ilium, ischium, pubis) and accepts the head of the femur to form the hip joint. This ball-and-socket joint is responsible for providing the lower extremity with an extensive degree of movement.

Thigh anatomy

he thigh is located between the hip and the knee. It is the strongest and most prominent part of the lower extremity, thus a personal favourite for fitness enthusiasts to showcase. The scaffold of the thigh is provided by the femur, the only bone of this region and the longest bone in the body. It has an upper extremity, a shaft, and a lower extremity, all of which are full of various structural landmarks.

The knee joint is formed by the close interaction of three bones: femur, tibia , and patella (kneecap).

leg anatomy

The two main bones of the leg are the tibia (‘shin bone’) located medially and the fibula, which is located more laterally. The tibia is the largest of the two, hence it is responsible for weight bearing. Two joints hold the tibia and fibula together (the superior and inferior tibiofibular joints), as well as an anatomical structure called the interosseous membrane.

foot bones : include the 7 tarsals; calcaneus, talus, navicular, cuboid, and cuneiform (three in total) bones, as well as the metatarsals, and phalanges. They are held together by several ligaments, the most well known being the collateral and long plantar ligaments of the foot.