JOINTS NOTES AND CLINICAL DEFORMITIES IN DETAIL + MUSCLES

Joints (articulations) are connections between bones that allow movement and provide stability. They are classified based on structure and function.

Classification of Joints –

Category	Type	Examples	Key Features
Fibrous Joints (Synarthrosis)	Sutures	Skull bones	Immovable
	Syndesmosis	Inferior tibiofibular joint	Slight movement
	Gomphosis	Tooth in socket	Peg-and-socket joint
Cartilaginous Joints (Amphiarthrosis)	Primary (Synchondrosis)	Epiphyseal plate	Temporary, hyaline cartilage
	Secondary (Symphysis)	Pubic symphysis, IV discs	Fibrocartilage, slight movement
Synovial Joints (Diarthrosis)	Plane	Intercarpal joints	Gliding movements
	Hinge	Elbow, knee	Uniaxial (flexion-extension)
	Pivot	Atlantoaxial joint	Rotation around one axis
	Condyloid	Wrist joint	Biaxial (flexion-extension, abduction-adduction)
	Saddle	1st carpometacarpal joint	Biaxial (greater range of motion)
	Ball and Socket	Shoulder, hip	Multiaxial (all movements)

Detailed Anatomy of Important Joints

1. Shoulder Joint (Glenohumeral Joint)

- Type: Synovial, Ball and Socket
- Bones: Humerus (head) + Scapula (glenoid cavity)
- Movements: Flexion, extension, abduction, adduction, internal and external rotation, circumduction
- Ligaments:
  - Glenohumeral ligaments (superior, middle, inferior)
  - Coracohumeral ligament
  - Transverse humeral ligament
- Clinical Significance: Dislocations (anterior most common), Rotator cuff injuries

2. Elbow Joint

- Type: Synovial, Hinge
- Bones: Humerus + Ulna + Radius
- Movements: Flexion and extension
- Ligaments:
  - Ulnar collateral ligament (medial)
  - Radial collateral ligament (lateral)
  - Annular ligament (around radial head)
- Clinical Significance: Tennis elbow (lateral epicondylitis), Golfer's elbow (medial epicondylitis)

3. Wrist Joint (Radiocarpal Joint)

- Type: Synovial, Condyloid
- Bones: Radius + Scaphoid + Lunate + Triquetrum
- Movements: Flexion, extension, radial/ulnar deviation
- Clinical Significance: Colles fracture (distal radius), Carpal tunnel syndrome

4. Hip Joint

- Type: Synovial, Ball and Socket
- Bones: Femur (head) + Acetabulum
- Movements: Flexion, extension, abduction, adduction, medial/lateral rotation
- Ligaments:
  - Iliofemoral (strongest, prevents hyperextension)
  - Pubofemoral
  - Ischiofemoral
  - Ligament of the head of the femur
- Clinical Significance: Hip dislocation (posterior common), Osteoarthritis

5. Knee Joint

- Type: Synovial, Hinge
- Bones: Femur + Tibia + Patella
- Movements: Flexion, extension, slight rotation
- Ligaments:
  - Anterior cruciate ligament (ACL) – prevents anterior displacement
  - Posterior cruciate ligament (PCL) – prevents posterior displacement
  - Medial collateral ligament (MCL)
  - Lateral collateral ligament (LCL)
- Clinical Significance: ACL injuries, Meniscus tears

6. Ankle Joint

- Type: Synovial, Hinge
- Bones: Tibia + Fibula + Talus
- Movements: Dorsiflexion, plantarflexion
- Clinical Significance: Sprains (most common – lateral ligament injury)

Clinical Conditions Related to Joints

Condition	Joints Affected	Cause	Symptoms
Osteoarthritis	Weight-bearing joints (knee, hip)	Cartilage degeneration	Pain, stiffness, crepitus
Rheumatoid Arthritis	Small joints (hands, feet)	Autoimmune disorder	Morning stiffness, joint deformity
Gout	First metatarsophalangeal joint	Uric acid crystals	Sudden pain, swelling, redness
Dislocation	Shoulder, hip	Trauma	Loss of function, pain, deformity
Ligament Injuries	Knee (ACL, MCL), Ankle	Sports injuries	Instability, swelling

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Clinical Deformities of Joints in General Surgery -

Joint	Deformity	Cause	Clinical Features
Shoulder	Dislocation (anterior/posterior)	Trauma, Seizures	Pain, loss of contour, arm held in abnormal position
	Frozen Shoulder (Adhesive Capsulitis)	Diabetes, Immobilization	Painful restriction of movement, especially external rotation
	Winged Scapula	Long thoracic nerve injury	Medial border of scapula protrudes, difficulty in arm abduction
Elbow	Cubitus Varus ("Gunstock Deformity")	Malunion of supracondylar fracture	Medial angulation of forearm
	Cubitus Valgus	Non-union of lateral condyle fracture	Lateral angulation of forearm
	Tennis Elbow (Lateral Epicondylitis)	Overuse (repetitive strain)	Pain over lateral epicondyle, worsens with wrist extension
	Golfer's Elbow (Medial Epicondylitis)	Overuse	Pain over medial epicondyle, worsens with wrist flexion
Wrist & Hand	Colles' Fracture Deformity ("Dinner Fork Deformity")	Fall on outstretched hand	Dorsal angulation of distal radius
	Smith's Fracture Deformity ("Garden Spade Deformity")	Fall on flexed wrist	Volar angulation of distal radius
	Claw Hand	Ulnar nerve injury	Hyperextension of MCP, flexion of PIP & DIP
	Ape Hand	Median nerve injury	Thenar atrophy, inability to oppose thumb

Joint	Deformity	Cause	Clinical Features
	Dupuytren's Contracture	Fibrosis of palmar fascia	Flexion deformity of fingers (4th & 5th)
	Mallet Finger	Extensor tendon injury	Flexion deformity of DIP joint
Hip	Hip Dislocation (Posterior/Anterior)	Trauma	Shortened, internally/externally rotated leg
	Coxa Vara	Congenital, Rickets	Decreased femoral neck angle (<120°)
	Coxa Valga	Cerebral palsy, Neuromuscular disorders	Increased femoral neck angle (>140°)
	Trendelenburg Gait	Weak gluteus medius (hip abductor)	Pelvic drop on opposite side while walking
Knee	Genu Varum ("Bow Legs")	Rickets, Blount's disease	Outward bowing of knees
	Genu Valgum ("Knock Knees")	Rickets, Obesity	Knees touch while standing
	Patella Baja	Post-surgery, fibrosis	Low-positioned patella
	Patella Alta	Ligament laxity, congenital	High-riding patella

Joint	Deformity	Cause	Clinical Features
Foot & Ankle	Pes Planus (Flat Foot)	Congenital, Tibialis posterior dysfunction	Loss of medial arch
	Pes Cavus (High Arch Foot)	Charcot-Marie-Tooth, Neuromuscular diseases	High medial arch
	Hallux Valgus (Bunion)	Ill-fitting shoes, Genetics	Lateral deviation of great toe
	Clubfoot (Talipes Equinovarus)	Congenital	Inverted, plantarflexed foot
Spine	Scoliosis	Idiopathic, Neuromuscular disorders	Lateral curvature of spine
	Kyphosis ("Hunchback")	Osteoporosis, Scheuermann's disease	Exaggerated thoracic curvature
	Lordosis	Obesity, Pregnancy	Exaggerated lumbar curvature
	Pott's Disease (Spinal TB)	Tuberculosis	Gibbus deformity, vertebral collapse

Muscles in Clinical Anatomy of Joints –

Joint	Muscle Group	Muscles	Function	Clinical Significance
Shoulder	Rotator Cuff	Supraspinatus	Initiates abduction	Rotator cuff tear (common)
		Infraspinatus	External rotation	Shoulder instability
		Teres Minor	External rotation	Weakness in external rotation
		Subscapularis	Internal rotation	Weakness in internal rotation
	Other Muscles	Deltoid	Main abductor	Axillary nerve injury → Weak abduction
		Trapezius	Elevates & retracts scapula	Spinal accessory nerve injury → Shoulder droop
		Serratus Anterior	Protracts scapula	Long thoracic nerve injury → Winged scapula
Elbow	Flexors	Biceps Brachii	Flexion & supination	Rupture → "Popeye sign"
		Brachialis	Main elbow flexor	Rarely injured
	Extensors	Triceps Brachii	Extension	Radial nerve injury → Weak extension

Joint	Muscle Group	Muscles	Function	Clinical Significance
	Pronators	Pronator Teres & Quadratus	Pronation	Median nerve compression → Pronator syndrome
	Supinators	Supinator	Supination	Radial nerve palsy → Weak supination
Wrist & Hand	Flexors	Flexor Carpi Radialis (FCR)	Wrist flexion	Median nerve compression → Carpal tunnel syndrome
		Flexor Carpi Ulnaris (FCU)	Wrist flexion	Ulnar nerve compression
	Extensors	Extensor Carpi Radialis & Ulnaris	Wrist extension	Radial nerve palsy → Wrist drop
	Intrinsic Muscles	Thenar Muscles	Thumb movement	Ape hand deformity (Median nerve injury)
		Hypothenar Muscles	Little finger movement	Claw hand (Ulnar nerve injury)
Hip	Flexors	Iliopsoas	Hip flexion	Weakness → Difficulty climbing stairs
	Extensors	Gluteus Maximus	Hip extension	Weakness → Difficulty standing from sitting

Joint	Muscle Group	Muscles	Function	Clinical Significance
	Abductors	Gluteus Medius & Minimus	Abduction	Trendelenburg gait (Superior gluteal nerve injury)
	Adductors	Adductor Longus, Brevis, Magnus	Adduction	Groin pain (Common in athletes)
Knee	Extensors	Quadriceps (Rectus Femoris, Vastus Lateralis, Medialis, Intermedius)	Knee extension	Patellar tendon rupture → Inability to extend knee
	Flexors	Hamstrings (Biceps Femoris, Semitendinosus, Semimembranosus)	Knee flexion	Hamstring strain → Common sports injury
Ankle & Foot	Dorsiflexors	Tibialis Anterior	Dorsiflexion	Foot drop (Common in

Joint	Muscle Group	Muscles	Function	Clinical Significance
				peroneal nerve injury)
	Plantarflexors	Gastrocnemius, Soleus	Plantarflexion	Achilles tendon rupture → Loss of push-off
	Invertors	Tibialis Posterior	Inversion	Dysfunction → Flat foot
	Evertors	Peroneus Longus & Brevis	Eversion	Peroneal nerve injury → Weak eversion
Spine	Extensors	Erector Spinae	Spine extension	Weakness → Poor posture, back pain
	Flexors	Rectus Abdominis	Trunk flexion	Weakness → Core instability

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