MEDICINE AND SURGERY

Course: Bone and Joint DiseasesYear: 4th

Period: 1st semesterCredits: 6

Objectives

Orthopaedics and trauma

- Describe general terminology, anatomy biomechanics and function of the body's major joints both in adults and in children.
- Describe the most common articular problems from patient complaints, clinical history and patient examination.
- Describe the most common traumatology problems and limb or life threatening injuries (trauma emergencies)
- Discuss the biomechanics of pathological joints and recognise them correctly with further investigations (XRAY; CT; MRI etc.)
- Be able to recognise the entity of the disease (classifications) and start a correct therapeutic approach accordingly.
- Identify the differences between a growing and mature skeleton at a basic level
- Recognise some of the most common congenital deformities
- Make a differential diagnosis and select the most appropriate initial investigations.

Rehabilitation Medicine

- Describe the most common diagnostic and therapeutic tools used in Rehabilitation
- Identify the normal gait pattern and the most frequent deviations observed in orthopaedic patients
- Identify the best treatment options for selected pathologies
- Understanding the rationale of the Individual Rehabilitation Plan

Imaging:

Imaging is an essential tool to analyse anatomy, to detect pathologies and to monitor disease healing and progression. Upon the completion of this module, the student will be required to:

- Describe the modalities and techniques used in the imaging of bone and joint diseases: plain radiographs, ultrasound, computed tomography, magnetic resonance imaging and nuclear medicine.
- Describe and recognize the normal appearance of bone and joints.
- Describe and recognize basic radiological signs of common bone and joint diseases.
- Describe common indications for the use of each imaging modality.

PATIENT ASSESSMENT SKILLS

Proposed outcomes:

- Perform an accurate and problem-focused musculoskeletal history.
- Perform a targeted musculoskeletal physical examination.
- Select the most appropriate initial investigations.
- Communicate findings efficiently.

Physical Examination

- Perform a screening examination e.g. GALS (Gait, Arms, Legs, Spine)
- Examine major joints and spine, including specific tests for pathology.
- Examine an acutely injured patient, including a focused neurological examination.
- Interpret found findings and relate them to the history.

Contents

MODULE: IMAGING

Anatomy and biomechanics

- Lower Limb (hip and pelvis, knee, foot and ankle) and Spine
- Upper Limb (shoulder, elbow, wrist and hand)

Learning goals:

- Describe the basic musculoskeletal anatomy and architecture of different bony districts
- Present the basis of Musculoskeletal biomechanics
- Describe the major mechanical and anatomical properties of bone, cartilage, tendons and ligaments,
- Describe how abnormal anatomy and biomechanics may play a major role in musculoskeletal disease

Introduction to bone and joint imaging

Learning goals:

- Discuss the imaging modalities used for the diagnosis of bone and joint diseases.
- Describe and recognize the normal appearance of bone and joints, with a particular focus on X-ray.
- Describe and recognize the basic X-ray signs of common bone and joint diseases.

Principles of physiopathology of bone and joint disease

Learning goals:

- Describe skeletal tissue (bone, cartilage, ligaments, tendons, muscle, etc.) structure and the cells involved in their development and remodelling
- Describe the mechanisms of bone loss leading to osteopenia and osteoporosis;
- Discuss the major imaging (X ray, DEXA) and laboratory (Ca, P, PTH, etc) findings that are helpful in the management of patients with bone loss;
- Describe the treatment options in terms of bisphosphonates, calcium and vitamin D supplementation, and other options, including potential side effects.
- Describe the basis of articular cartilage pathology, diagnosis and treatment
- Describe the basis of soft tissue (tendons, ligaments, muscles, etc) pathology, diagnosis and treatment
- Describe the principles of regenerative medicine

Osteoporosis and Osteopenia

Learning goals:

- Describe the mechanisms of bone loss leading to osteopenia and osteoporosis;
- Discuss the major imaging (X ray, DEXA) and laboratory (Ca, P, PTH, etc) findings that are helpful in the management of patients with bone loss;
- Describe the treatment options in terms of bisphosphonates, calcium and vitamin D supplementation, and other options, including the potential side effects

Birth and decay of human frame

Learning goals:

- Describe the most important steps involved in the foetal development of the musculoskeletal system
- Understand the different mechanisms of ossification and bone formation
- Understand the differences of the neonatal and adult bone configuration and how these arise.

- Understand bone structure and the cells responsible for bone remodelling
- Learn basic bone anatomy and architecture
- Describe the structure of the cell membrane and the transport mechanisms across the cell membrane.

Congenital malformations: common and unbelievable

Learning goals:

- Describe the deformities present in club foot and the principles of treatment
- Understand the articular malformation associated with DDH; early diagnosis and treatment
- Describe the normal and abnormal spine curvature, with special regard to scoliosis
- Understand the pathology associated to the most common forms of osteochondral dysplasia
- Understand the unknown

Traumatology: general part

Learning goals:

- Discuss the etiopathogenesis of fractures, and the biology of fracture healing and remodelling
- Describe the principles of fracture classification
- Describe early and delayed fracture complications (local and systemic)
- Describe general principles of fracture treatment
- Describe traditional and innovative imaging techniques used to determine fracture types and healing
- Discuss traumatological emergencies
- Describe the imaging modalities used for the diagnosis of fractures.
- Describe the main radiological findings of bone fractures.

Traumatology: regional

Spine traumatology: Spinal fracture / spinal trauma, Spinal post-traumatic deformities

- Describe principal fractures of the spine
- Describe region-specific fracture complications
- Describe region-specific principles of fracture treatment
- Describe the most common devices used in fracture fixation

Wrist and hand traumatology: wrist fractures, hand fractures, scaphoid fracture, Metacarpal / phalangeal fractures

- Describe principal fractures of the wrist and hand
- Describe region-specific fracture complications
- Describe region-specific principles of fracture treatment
- Describe the most common devices used in fracture fixation

Shoulder and elbow traumatology: Shoulder dislocation, AC joint separation, Clavicle fracture, Biceps tendon and rotator cuff ruptures, humerus fractures, Olecranon fracture, Radial head fracture

- Describe principal fractures of Shoulder and elbow
- Describe region-specific fracture complications
- Describe region-specific principles of fracture treatment
- Describe the most common devices used in fracture fixation

Hip and pelvis traumatology: Femoral neck fracture, Pubic ramus fracture, femoral diaphysis fractures

- Describe principal fractures of hip and pelvis
- Describe region-specific fracture complications
- Describe region-specific principles of fracture treatment
- Describe the most common devices used in fracture fixation

Knee region fractures: Patella fracture, tibial plateau and diaphysis fractures, distal femur fractures

- Describe principal fractures around the knee
- Describe region-specific fracture complications
- Describe region-specific principles of fracture treatment
- Describe the most common devices of fracture fixation

Foot and Ankle traumatology: Ankle fractures-dislocation, ankle sprain, Foot fractures, Metatarsal stress fracture, Achilles tendon rupture

- Describe principal fractures of foot and ankle
- Describe region-specific fracture complications
- Describe region-specific principles of fracture treatment

- Describe the most common devices used in fracture fixation

Regional pathology: hip

Learning goals:

Describe etiopathogenesis, diagnostic approach, clinical and anatomo-pathologic features and main therapeutic strategies of the following pathologies, with the aim of enabling students to perform a differential diagnosis between common causes of hip dysfunction.

- Hip Osteoarthritis
- Groin pain
- CAM and Pincher lesion
- Sacroiliac (SI) joint dysfunction
- Greater trochanteric bursitis
- Describe common indications for the use of different imaging modalities in common diseases of the upper and lower limbs.
- Describe common indications for the use of different imaging modalities in common diseases of the pelvis and the hip

Regional pathology: knee

Learning goals:

Describe etiopathogenesis, diagnostic approach, clinical and anatomo-pathologic features and main therapeutic strategies of the following pathologies, with the aim of enabling students to perform a differential diagnosis between common causes of knee dysfunction.

- Degenerative joint disease/osteoarthritis (unicompartmental or pancompartmental)
- Meniscus tears and inherent treatment options
- Anterior cruciate ligament (ACL) tear and inherent treatment
- Medial collateral ligament (MCL) sprain
- Osgood-Schlatter's disease
- Iliotibial band syndrome (ITBS)

- Patellofemoral pain syndrome

- Describe common indications for the use of different imaging modalities in common diseases of the Knee

Regional pathology: foot and ankle

Learning goals:

Describe etiopathogenesis, diagnostic approach, clinical and anatomo-pathologic features and main therapeutic strategies of the following pathologies, with the aim of enabling students to perform a differential diagnosis between common causes of foot and ankle dysfunction

- Ankle sprains
- Hallux valgus and finger deformities
- Pes planus and pes cavus
- Plantar fasciitis
- Achilles tendinosis and Hagelund disease
- Morton's neuroma
- Describe common indications for the use of different imaging modalities in common diseases of Foot and Ankle

Regional pathology: shoulder and elbow

Learning goals:

Describe etiopathogenesis, diagnostic approach, clinical and anatomo-pathologic features and main therapeutic strategies of the following pathologies, with the aim of enabling students to perform a differential diagnosis between common causes of shoulder dysfunction.

- Rotator cuff pathology (tear/strain/tendinopathy)
- Describe signs and symptoms of Impingement syndrome/sub acromial bursitis
- Describe signs and symptoms of Adhesive capsulitis
- Describe signs and symptoms of Degenerative joint disease/osteoarthritis
- Describe signs and symptoms of AC Joint degenerative joint disease /osteoarthritis
- Describe signs and symptoms of Biceps tendinopathy

Describe etiopathogenesis, diagnostic approach, clinical and anatomo-pathologic features and main therapeutic strategies of the following pathologies, with the aim of enabling students to perform a differential diagnosis

between common causes of elbow dysfunction.

- Lateral epicondylosis
- Medial epicondylosis

- Olecranon bursitis
- Ulnar nerve entrapment (cubital tunnel syndrome)
- Elbow osteoarthritis
- Describe common indications for the use of different imaging modalities in common diseases of the Shoulder and Elbow

Regional pathology: wrist and hand

Learning goals:

Describe etiopathogenesis, diagnostic approach, clinical and anatomo-pathologic features and main therapeutic strategies of the following pathologies, with the aim of enabling students to perform a differential diagnosis between common causes of elbow dysfunction.

- Carpal tunnel syndrome
- Wrist ganglions
- DeQuervain's tenosynovitis
- Dupuytrens contracture
- Carpometacarpal arthritis
- Trigger finger
- Describe common indications for the use of different imaging modalities in common diseases of Wrist and hand

Regional pathology: spine

Learning goals:

Describe etiopathogenesis, diagnostic approach, clinical and anatomo-pathologic features and main therapeutic strategies of the following pathologies, with the aim of enabling students to perform a differential diagnosis between common causes of spine dysfunction

- Degenerative disc disease
- Spondylolysis/listhesis
- Scoliosis/kyphosis and complex deformities of the spine

- Nerve root entrapment /low back pain/ sciatica/cruralgia/cervicalgia

- Describe common indications for the use of different imaging modalities in common diseases of the Spine

Imaging of the spine with special focus on *low back pain*

- Describe common indications for the use of different imaging technologies in common diseases of the spine.
- Describe the main causes of low back pain.
- Discuss the diagnostic pathway of a patient with low back pain.

Musculoskeletal benign and malignant tumours

Learning goals:

Musculoskeletal tumours are extremely rare pathologies, which are managed by dedicated orthopaedic surgeons. Student should be able to describe the classification of musculoskeletal tumours and the main clinical features and diagnostic paths of the most common malign and benign tumours, in order to understand when to suspect the presence of these challenging pathologies.

- Classification of benign and malignant tumours
- Most common benign bone tumours: anatomo-pathological features, signs, symptoms, diagnostic algorithm and principles of multidisciplinary treatment modalities
- Most common bone malignant tumours: anatomo-pathological features, signs, symptoms, diagnostic algorithm and principles of multidisciplinary treatment modalities
- Soft tissue tumours: anatomo-pathological features, signs, symptoms, diagnostic algorithm and principles of multidisciplinary treatment modalities
- Describe the main radiological signs of benign and malignant tumours.
- Discuss the diagnostic pathway of a patient with bone tumours.
- Describe the main interventional radiology procedures applied to bone and joint diseases.
- Describe the main indications of interventional radiology for bone and joint diseases.

MODULE: REHABILITATION MEDICINE

Introduction to physical and rehabilitation medicine

HUMANITAS UNIVERSITY

Learning goals:

- Rehabilitation in the future: Rehabilitation 2030
- Epidemiology
- The role of the Physical and Rehabilitation Medicine Physician
- Individual Rehabilitation Plan
- Diagnostic, therapeutic and assessment tools in Rehabilitation

Strength and movement assessment in rehabilitation

Learning goals:

- Strength assessment and improvement
- Gait cycle and terminology
- Physics and instrumental GA
- Gait phases and observational gait analysis
- GA Reporting and common orthopaedic gait pattern

Therapeutic approaches in rehabilitation

Learning goals:

- Evidence-based physical therapies
- Interventional therapies

Clinical rehabilitation – focus on.

Learning goals:

- Joints diseases rehabilitation: Spine, Knee

Teaching Methods

The module of Orthopaedics includes direct lectures to the students, clinical practice on patient evaluation and interpretations of specific investigations i.e. X ray, CT scans, MRI, for a variety of different pathologies. It also includes a

practical part in the OR where the student will be exposed to the most frequent surgical procedures performed in orthopaedics.

Lectures, given by the most experienced specialists in the field Orthopaedics will introduce the students to state of the art theory on the most common orthopaedic problems. Lectures will be followed by comprehensive one on one demonstrations on the most detailed semeiotic manoeuvres as well as tests for all joint diseases, thus demonstrating how to approach articular malfunction from a clinical aspect.

The Rehabilitation Medicine module includes lectures with a focus on clinical implications and new diagnostic and therapeutic approaches in Rehabilitation.

Verification of learning

The final test will consist of 34 multiple-choice questions (Orthopaedics and Traumatology, Imaging, Rehabilitation,) with only one correct answer (unless stated otherwise). The final mark will be proportional to the number of correct answers.

Texts

- McRae's Orthopaedic Trauma and Emergency Fracture Management, 3e (Churchill Pocketbooks)
- Henry Willmott Trauma and Orthopaedics at a Glance
- Squire's fundamentals of radiology - Robert Novelline - Harvard shorter books (Radiology)
- Essentials Radiology - Gunderman – Thieme
- Manuale di ortopedia e traumatologia (Federico A. Grassi, Ugo E. Pazzaglia)
- www.orthobullets.com