* Pathology / sheet 1
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* Slides: 1+2
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**OSTEOARTHRITIS**

Slide 1

* There are two types of bone diseases: neoplastic (tumors) and non-neoplasic (inflammations and infections)

Slide 2

* Osteoarthritis is a degenerative disease that occurs in the chondrocytes and cartilaginous matrix
* Erosion of the cartilage in the joint due to the abnormal response of chondrocytes to biomechanical and biologic stresses that results in breakdown of the matrix.
* Changes in the matrix composition: water amount increases while proteoglycans decrease. These changes result in a total degeneration of the matrix and the chondrocytes.
* It is not an inflammatory disease; its name, Osteoarthritis, is a misnomer. The main aspect of the disease is degeneration due the abnormal response of the chondrocytes, but as the disease progresses inflammation might be seen.

Slide 3

* Primary: idiopathic disease (of unknown cause.)
* Secondary:

Obesity is one of the causes because the increased weight increases the stress on the joints.

Here, only the joint affected by the trauma is involved.

Slide 4

* Most obvious and first sign: pain.
* Morning stiffness: rigidity and difficulty in the movement of the affected joint.
* Limitation in the range of movement, such as inability to reflex the knee joint.
* Disability may result.
* The two joints that can’t be affected by osteoarthritis are the shoulder and elbow joints.
* Heberden nodes in WOMEN.
* Osteophytes: formation of abnormal new bone.

Slide 5

**Summary of Osteoarthritis-induced changes:**

* Degeneration in the cartilage. (articular cartilage between two articular surfaces)
* Fissuring due to the abnormal response of chondrocytes.
* The reduced amount of cartilage causes the two bones to get closer to each other resulting in friction.
* The synovial fluid gets inside the formed fissures and widens them which are called **(1) subchondral cyst.**
* **(2) Subchondral sclerosis**: reactive changes in the bone.
* **(3) Ostephytes formation.**

Slide 6

Picture A

The invaginations are called fissures that destroy the matrix

**OSTEOMYELITIS**

Slide 1

* All cases of osteomyelitis are infectious in origin.
* Pyogenic bacteria: ***Staphylococcus aureus****.*

Slide 2

* Hematogenous dissemination (most common in children)

Example: aggressive chewing of any material in the mouth causes erosion of the mucosa so the microorganism can spread from the blood to the bone and causes infection.

* Traumatic implantation after fractures or orthopedic procedures, especially in adults, here it is direct accumulation of the microorganism in the bone resulting in the infection.

Slide 3

* The pathogenicity factor of Staph. Aureus is the adhesion molecules.
* E.coli and group B strept: important causes of acute osteomyelitis in neonates through the genital route of the mother.
* Salmonella IS ALWAYS RELATED TO sickle cell anemia.
* People with sickle cell anemia are most likely to develop osteomyelitis due to what organism? Salmonella. HOW? In sickle cell anemia the vasculature of the capillaries is obstructed, when it occurs in the gut, it causes microinfarction, resulting in tissue necrosis in the bowel, this allows the microorganism of salmonella to be transferred through the blood to the bone. Also, keep in mind that the reticular endothelial system loses some of its function in those with sickle cell anemia as well as the spleen and liver function.
* In 50% of osteomyelitis cases, no organisms can be isolated, this means that in only 50% of the cases are culture positive, so we cannot totally rely on the cultures.
* Two types of cultures:

1. Blood culture: sometimes positive.
2. Bone culture: from the bone itself / 50% of the cases are positive.

* **The bacteria is ALWAYS present, but only in 50% of the cases it appears and we actually see it in the blood culture.**

Slide 4

* Morphology is important in the diagnostic surgical pathology as histopathologist.
* Mainly ACUTE inflammation:

1. Neutrophils
2. Degeneration of the bone = bone necrosis.

* GROSS MORPHOLLOGY:

1. **Sequestrum**: necrotic bone material causes a lesion inside the bone.
2. When the surrounding bone reacts to that it produces a shell called **involucrum.**

* On the outside of the cortex of the bone there is periosteum that is loosely attached to the bone, so when the infection spreads it may lead to subperiosteal abscess. (Occurs mostly in children where the periosteum is loosely attached.)
* If it spreads to the soft tissues to the adjacent joints is causes septic arthritis OR it opens to the skin as a sinus tract.

Slide 5

* Why chronic? The femur is totally removed.

Slide 6

* Septic arthritis = suppurative arthritis.
* WHY IN INFANTS? Due to the nature of blood supply that nourishes the epiphysis and metaphysis and the growth plate in between. (Remember that blood supply differs through the different age stages.)

Slide 7

* Imaging is one of the diagnostic methods = radiology = x-ray / seen as a lytic lesion surrounded by a reactive bone.
* Biopsy and bone cultures. MOST IMPORTANT ONES!

Slide 8

* Pathologic fracture: the disease in the bone causes the fracture not an outside agent or a mild trauma.
* It spreads in the blood so it may cause sepsis.

Slide 9

* Mycobacteria: TB and atypical.
* Bloodstream = Hematogenous.

Slide 10

* In the microscopic examination of bone biopsy in TB we see granuloma, **caseating granulomatous inflammation.**

Slide 11

* **Pott disease: TB osteomyelitis of the vertebra.**
* When TB occurs in the vertebra it is more likely to spread to the surrounding psoas muscles causing psoas abscess.