M.S.S. Pathology Lab.#1 Notes

In this lab we will discuss some of the Musculoskeletal system disorders.

This Sheet only contain EXTRA NOTES + ANSWERS FOR THE SLIDES' QUESTIONS.

Slide #2

Osteomyelitis.

Osteomyeltis is an inflammation of bone and bone marrow; it is virtually synonymous with infection. We can usually see an inflammation process surrounding the bone trabeculae.

As we can see, the upper slide is a low power, and the lower one is a high power. Also we can see that there are some processes of repairing.

Q1) Describe the microscopic findings in this picture

We have the following:

1) **neutrophiles** (They are acute inflammatory cells , they are multi-nucleated)

2)lymphocytes (Which are chronic inflammatory cells)

3)**plasma cells**

4)Bone Perforated by inflammatory cells, and bone trabeculae infiltrated with inflammatory cells .

5) Also we can see that there are some processes of repairing and healing, and sometimes fibrous tissue and vascular spaces.

Q2) What is the most common offending microorganisim ?

It is Staphylococcus Aureus.

Q3) **What does the black arrow represent?**

Bone trabiculae, which are abnormal and Acellular and there is no Osteocytes. They are not viable "Dead" necrotic bone.

Note : Osteocytes can be seen in the upper slide.

Q4) **Name 3 complications of chronic osteomyelitis**

chronic osteomyelitis can be complicated by:

-pathologic fracture

-secondary amyloidosis

-Endocarditis

-Sepsis

-development of squamous cell carcinoma if the infection creates a sinus tract

-rarely osteosarcoma

Slide #3

Osteochondroma

Remember: it develops only in bones of **endochondral** origin.

Q1) 1-**Describe the histologic components of this lesion.**

-Periosteum(fibrous tissue)
- Bone & bone marrow (Bony component),
- cartilage(Which is the main component), which surrounds the bony component. (it can be called **:Cartilaginous cap** because it is cap-shaped)
-We have disorganized Ossification of cartilage → Chondrocytes undergoing endocondral ossification.
- continuous stalks and stalk-like leisions.

2- Which One is Truly neoplastic ?

The Cartilage (cartilaginous cap)→ Cartilagenous tumor.

Q2)Is it a malignant tumor?
No, it is a benign tumor, which is composed of chondrocytes .

Q3) Name a genetic abnormality associated with this lesion?

Inactivation of both copies of **EXT1** or **EXT2** genes in chondrocytes of the growth plate (tumor suppressor genes encode proteins essential for polymerization of heparan sulfate).
Note : it can be sporadic or inherited genetic defect.
Heredity Exostosis Syndrome in **EXT1** or **EXT2** genes can result in this cancer. It is characterized by multiple Osteochondroma.

Slide #4

Giant cell tumor

*Giant-cell tumor is so named because it contains a mixture of mononuclear cells and a profusion of multinucleated osteoclast-type giant cells, giving rise to the synonym *osteoclastoma*.

*It is a common benign but locally aggressive bone tumor, belongs to the "Miscellaneous Bone Tumors "

* Its tissue of origin is **NOT** known yet (**NOT** from the bone, **NOR** from the cartilage).

*It arises in the epiphysis and involve the metaphysis of long bones around the knee (distal femur & proximal tibia)

((Extra note : Giant-cell tumors in adults involve both the epiphyses and the metaphysis, but in adolescents
they are confined proximally by the growth plate and are limited to the metaphysis.))

*It usually arises in individuals in their 20s to 40s.

*Prominent <u>non-neoplastic</u> multinucleate osteoclast-type giant cells.

It's Components :
1)the **giant cells** (Multinucleated cells – Up to 100 Nuclei) they are sililar to osteoclast cells.
2) the **mononucleated cells**.(they are the neoplastic component)
Giant cells result from mononuclear cells.

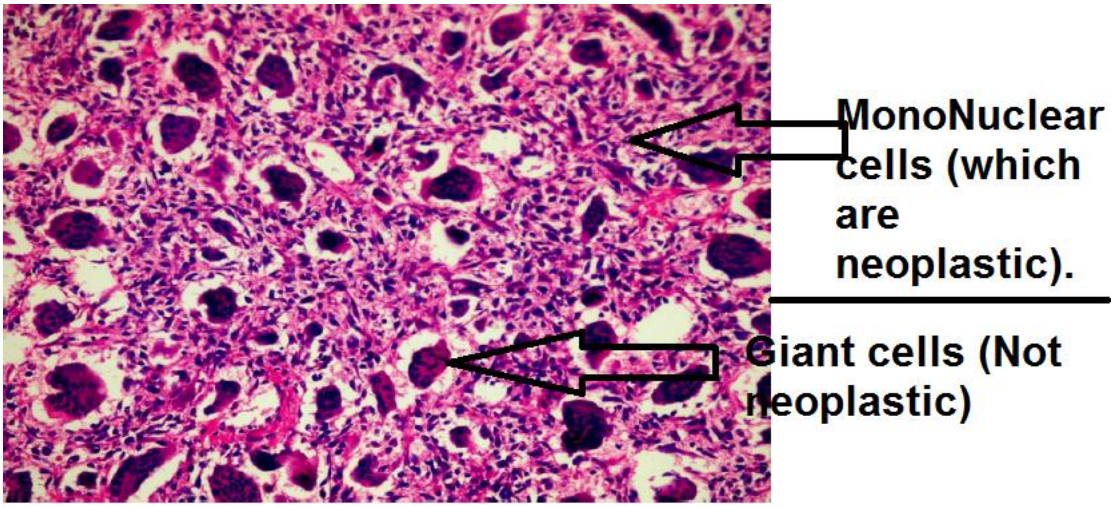
(refer to the pictures in the slides, they → low power)

Slide #5
*Despite the name, molecular analyses have shown that it is *the <u>mononuclear cells in the tumor that are neoplastic</u>*.

*Mononuclear cells express RANK ligand stimulate the development of surrounding non-neoplastic osteoclast-like cells. (The mononuclear cells in giant-cell tumors

express RANKL, and the giant osteoclast-like cells are believed to form via the RANK/RANKL signaling pathway.)
Mononuclear cells produce RANK ligand and the receptor is expressed on precursor osteoclast cells, activating it.
*Mononuclear cells here are abnormal, with abnormal behavior, so the result is a neoplasm.
*Although considered benign, (½ of cases) recur after surgery
Remember : it is a begin tumor, but it is has an aggressive behavior, so <u>there will be no metastasis</u> or invasion of adjacent tissue.

*This picture is from our slides :



Extra note :

Morphology:. These are large, red-brown tumors that frequently undergo cystic degeneration. They are mostly composed of uniform oval mononuclear cells that constitute
the proliferating component of the tumor. Scattered within this background are numerous
osteoclast-type giant cells having 100 or more nuclei that resemble those of the mononuclear
cells .Necrosis, hemorrhage, hemosiderin deposition, and reactive bone
formation are common secondary features.

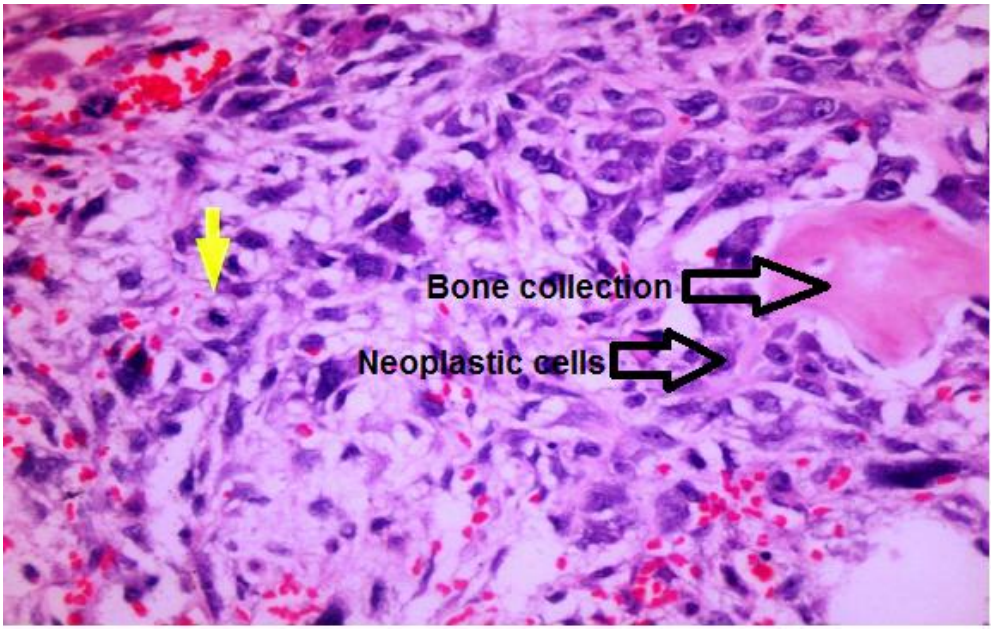
Slide #6

Osteosarcoma:

-is a bone-producing malignant tumor.
-It is invasive tumor.
- metastasis.
Most tumors arise in the **metaphyseal region of the long bones of the extremities (knee)Ex: In the Femur.**
More common in male patients younger than 20s.

Q1) **This is a microscopic picture of a femur tumor in a 21 year old male. What is your diagnosis?** Osteosarcoma , Which is a malignant bone Tumor.

Q2) What is the diagnostic histopathological finding?
Malignant (Neoplastic) bone with a surrounding malignant cells (lace-like appearance). Refer to the following picture :



Q3) **Describe the Anaplastic features you can see in the cells**.

1) variation in the size and the shape.
2) pleomorphism.
3) Increased mitosis.
4) disorganized growth
5) Abnormal mitotic figures (tripolar,quadripolar)
6) Hyperchromasia
7) High N/C ratio – Nucleus to cytoplasm ratio.
8) Neoplastic cells.

Q4) **Name 2 genetic syndromes associated with this lesion**

Retinoblastoma syndrome→ mutation in **RB** gene.
- **Li-Fraumeni syndrome→ TP53** mutation.
Remember: it can occur sporadically.

Slide #7
Jars from the pathology lab:

•**chondrosarcoma**

malignant sarcoma whose cells produce neoplastic cartilage.
commonly arise in the pelvis, shoulder, and ribs; **rarely** involve the distal extremities.
It is cartilaginous in origin, with Grayish/whitish appearance of normal cartilage with some nodularity and cystic formation. It is viscous when touched, and it is malignant, so it destructs the bone.

•osteosarcoma (Codman's triangle)

A triangular shadow on the x-ray film between the cortex and raised periosteum
It is a characteristic of osteosarcomas.
Osteosarcoma is a malignant tumor, it invade to the cortex, joint and the surrounding soft tissue . It might metastasize to the lung.
Codman's triangle can be noticed between the cortex and the periostium of the femur.

•sequestra (osteomyelitis)

Entrapped ,necrotic ,non-viable bone. It is found in osteomyelitis.
Ischemic blood supply lead to this Necrosis.

osteomyelitis →Acute inflammatory reaction
acute→ Chronic (if not treated).
Reactive bone is deposited forming a shell of living tissue around a sequestrum is:
involucrum

يلّا تسلّوا :

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مختارات حكم (ما تحفظوهم .. مش داخلين بالامتحان :p)

الفرصة الذهبية التي تبحث عنها توجد بداخلك أنت؛ وليست في البيئة المحيطة بك ولا في ما تتلقاه من الآخرين من مساعدات ولكنها بداخلك. - أوريسون سويت ماردن

الحياة لوحة زيتية ضخمة وعظيمة ؛ ويجب عليك أن تضع فيها كل ما تستطيعه من تفاصيل وألوان وخطوط وظلال. - داني كاي

إذا انتقمت لنفسك من المسيء إليك ساويت نفسك به.. وإذا صفحت عنه استعبدته. - فرانسيس بيكون

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