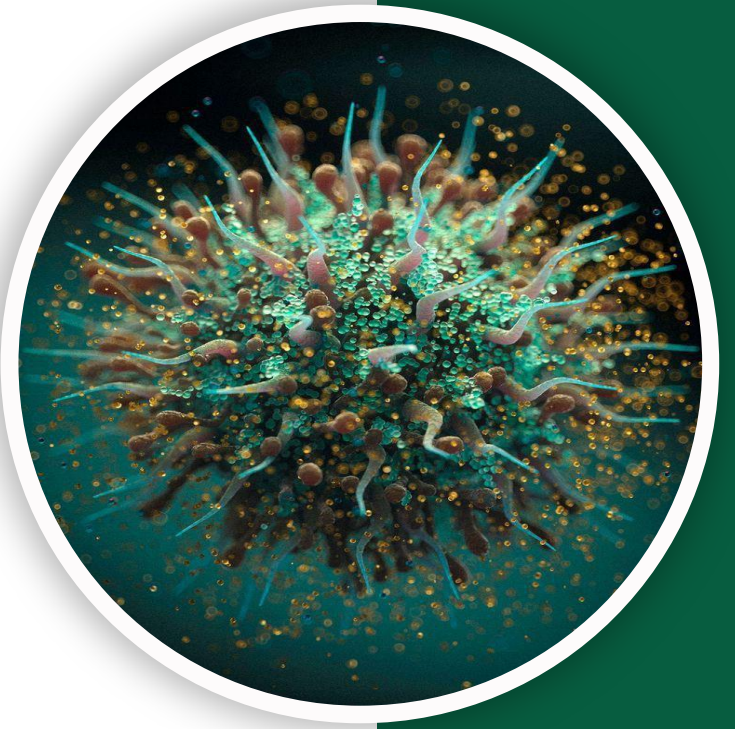
بسم الله الرحمـٰن الرحيم

(وَفَوْقَ كُلِّ ذِي عِلْمٍ عَلِيمٌ)

MSS Pathology | MID 7

Case Discussion MSS 1



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Reviewed by : NST member

CASE DISCUSSIONS
MSS (CASES 1-3)
2026 Al-Abbadi
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CASE 1

A 5-year-old boy is brought to clinic for recurrent fractures after minimal trauma. His parents report he fractured his femur at age 2 after falling from standing height. On exam, he has blue sclera, mild hearing difficulty, and joint hypermobility. Radiographs show generalized osteopenia. Genetic testing reveals mutation affecting type I collagen synthesis

Multiple fractures
The femur looks like a phone hand called phone handle deformity

Discussion points:

- **Q1. What is the most likely diagnosis?**
- **Q2. What is the underlying molecular defect?**
- **Q3. Why do patients develop blue sclera?**
- **Q4. What are the major systemic manifestations?**
- **Q5. What is the histologic abnormality?**
- **Q6. What is the major complication affecting prognosis?**

Q1. What is the most likely diagnosis?

ANSWER:

Osteogenesis imperfecta

One of the congenital anomalies of bone formation

Q2. What is the underlying molecular defect?

The responsible gene for structure formation is called COL1

ANSWER:

- Mutation affecting type I collagen synthesis (COL1A1 or COL1A2 genes) → structurally weak bone matrix.

There are many types of collagen, but the four most clinically important types are types I, II, III, and IV.
Type I ,enob ni nietorp larutcurts niam eht si dna ydob eht ni negalloc tnadnuba tsom eht si negalloc .snodnet dna ,niks
Type II collagen is the major collagen found in cartilage.
Type III collagen is found in reticular fibers, especially in blood vessels and granulation tissue.
Type IV collagen is a major component of the basement membrane and is associated with laminin.
Collagen is the most abundant protein in the body.

Q3. Why do patients develop blue sclera?

ANSWER:

Thin sclera poor collagen → **visualization of underlying choroidal veins** blue

Q4. What are the major systemic manifestations?

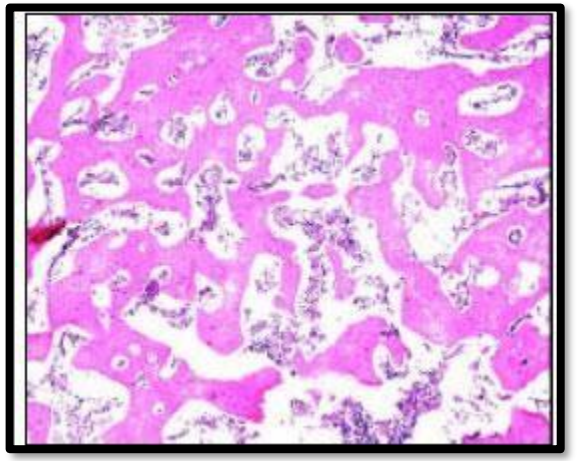
ANSWER:

- **Fragile bones → recurrent fractures**
- **Blue sclera**
- **Hearing loss (abnormal ossicles)**
- **Dentinogenesis imperfecta**
- **Ligament laxity** that's why you find that he can do hyperextention on elbow which isn't good

Q5. What is the histological features of OI?

ANSWER:

usually we don’t get biopsy to confirm osteogenesis imperfecta its diagnosed clinically



Reduced and abnormal osteoid with defective collagen framework

Q6. What is the major complication affecting prognosis?

- OI is a spectrum of diseases not one disease, severe forms causes death in utero or immediately after birth

ANSWER:

- Repeated fractures and skeletal deformities (severe forms → respiratory failure most common in children)

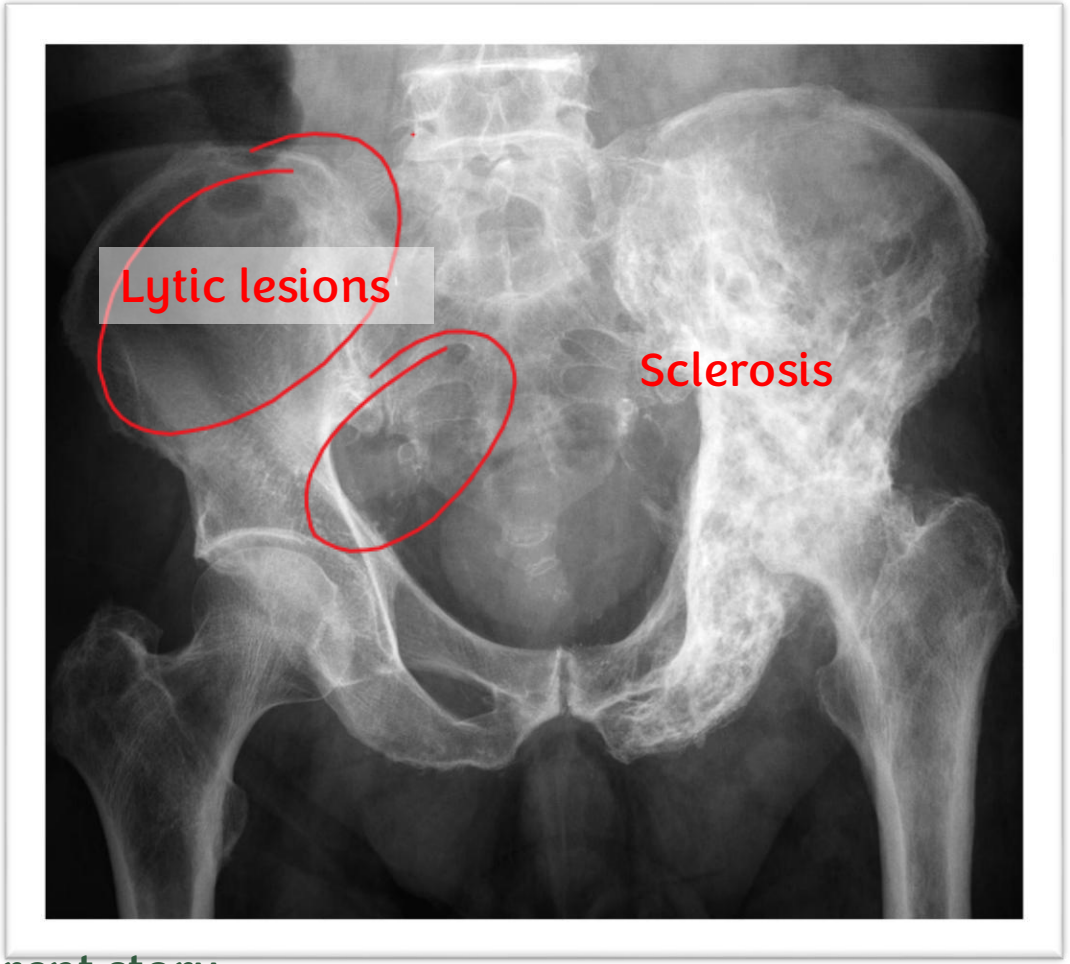
CASE 2

A 68-year-old man presents with increasing hat size and dull skull pain. Labs show markedly *elevated alkaline phosphatase with normal calcium and phosphate*. X-ray of skull shows *thickened bone with patchy sclerosis*. Bone biopsy shows *mosaic pattern* of lamellar bone.

SKULL

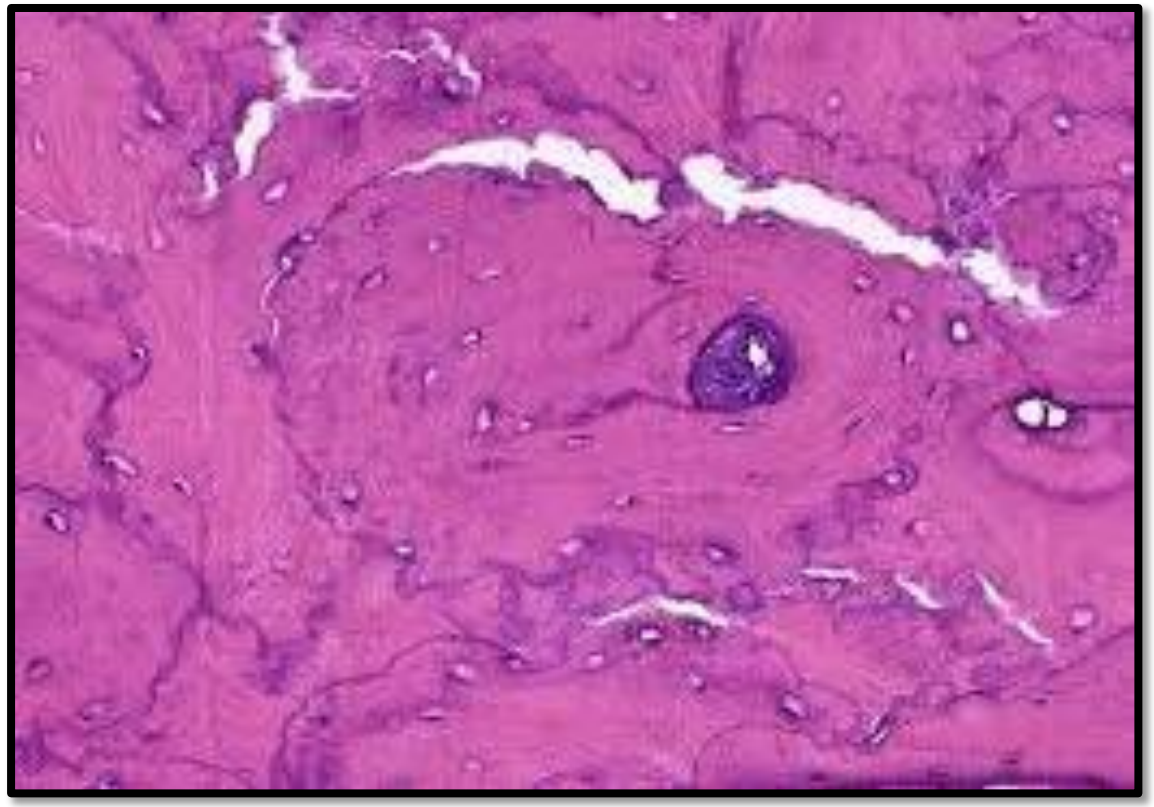
PELVIS

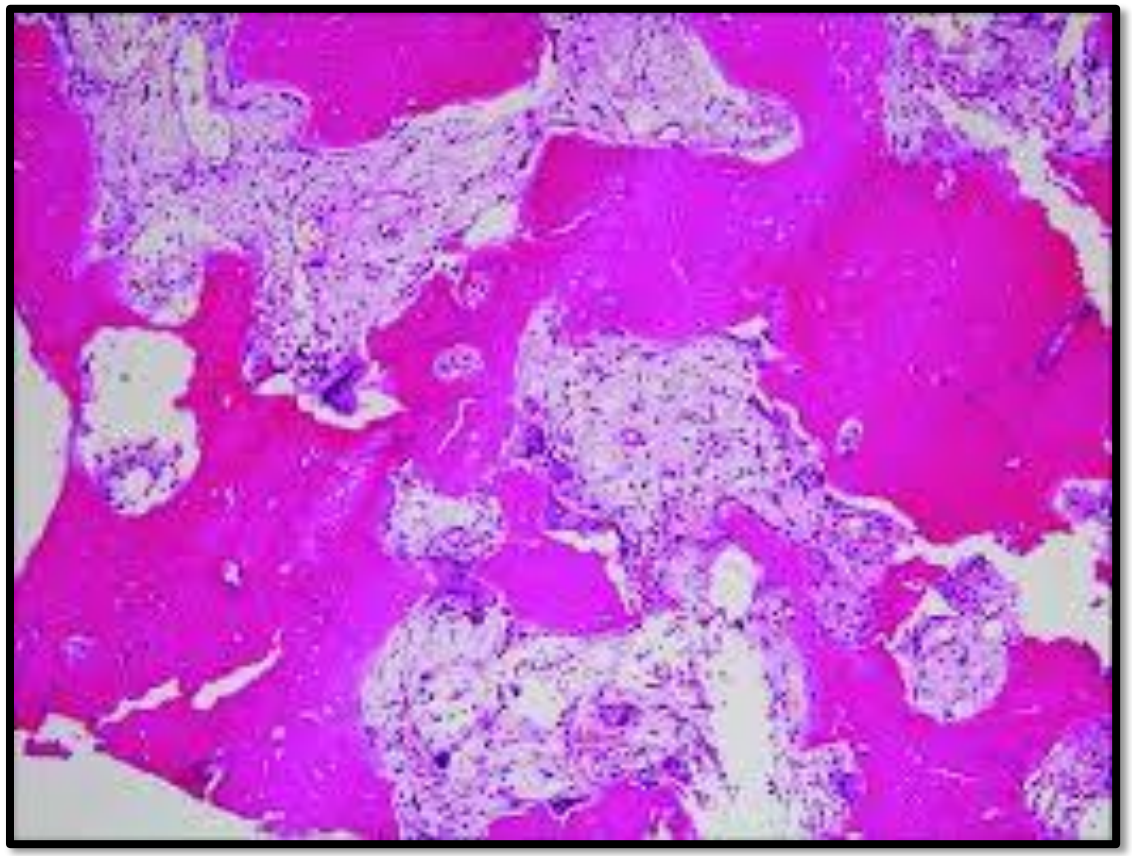
Mixed dark lytic and light sclerotic areas.
This is classic of paget disease

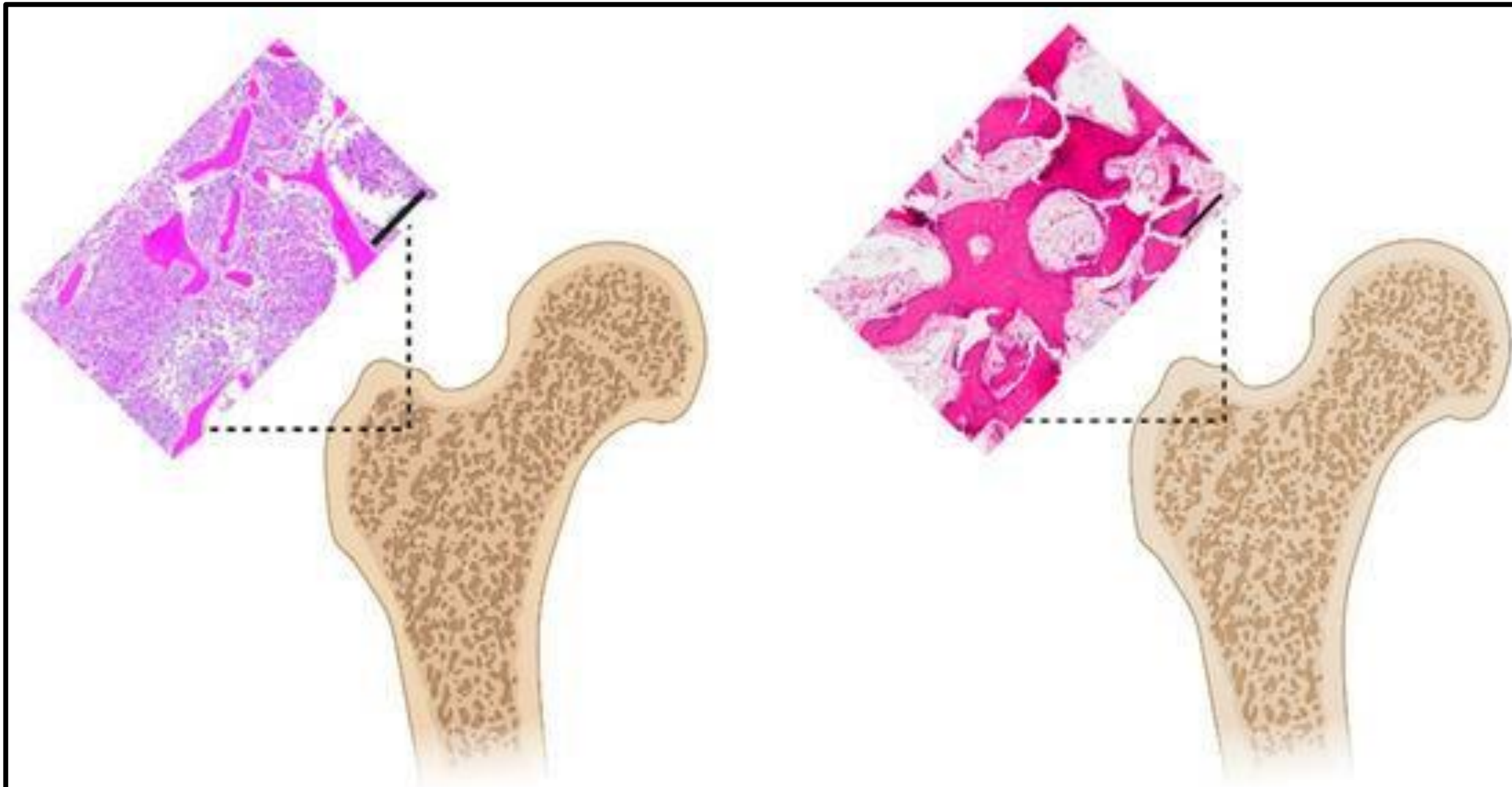


Paget disease of the breast, vulva, and vagina is a different story.
In the breast, it is a malignant adenocarcinoma of the breast that involves the skin, specifically the epidermis.
The same story applies to the vulva and the vagina.

HISTOLOGY: MOSAIC PATTERN






Normal Bone
Paget's Disease

DISCUSSION POINTS:

Q1. What is the most likely diagnosis?

Q2. What are the three classic phases of Paget disease?

Q3. Why is alkaline phosphatase elevated?

Q4. What causes the mosaic bone pattern?

Q5. What are important clinical complications?

Q6. Why is calcium usually normal?

Q1. What is the most likely diagnosis?

ANSWER:

Paget disease of bone

Q2. What are the three classic phases of Paget disease?

ANSWERS:

There's no communication between osteoclast and osteoblast

- **Osteolytic phase → ↑ osteoclast activity**
  Mixed phase → osteoclast + osteoblast activity
- **Sclerotic phase → disorganized osteoblast bone formation**

Not always we receive a biopsy of Paget disease most of them are mild and asymptomatic sometimes they reach 80-70and then get a fracture form from osteoporosis or osteoarthritis and we discover that they have paget disease


LYTIC
SCLEROTIC
MIXED

Q3. Why is alkaline phosphatase elevated?

ANSWER:

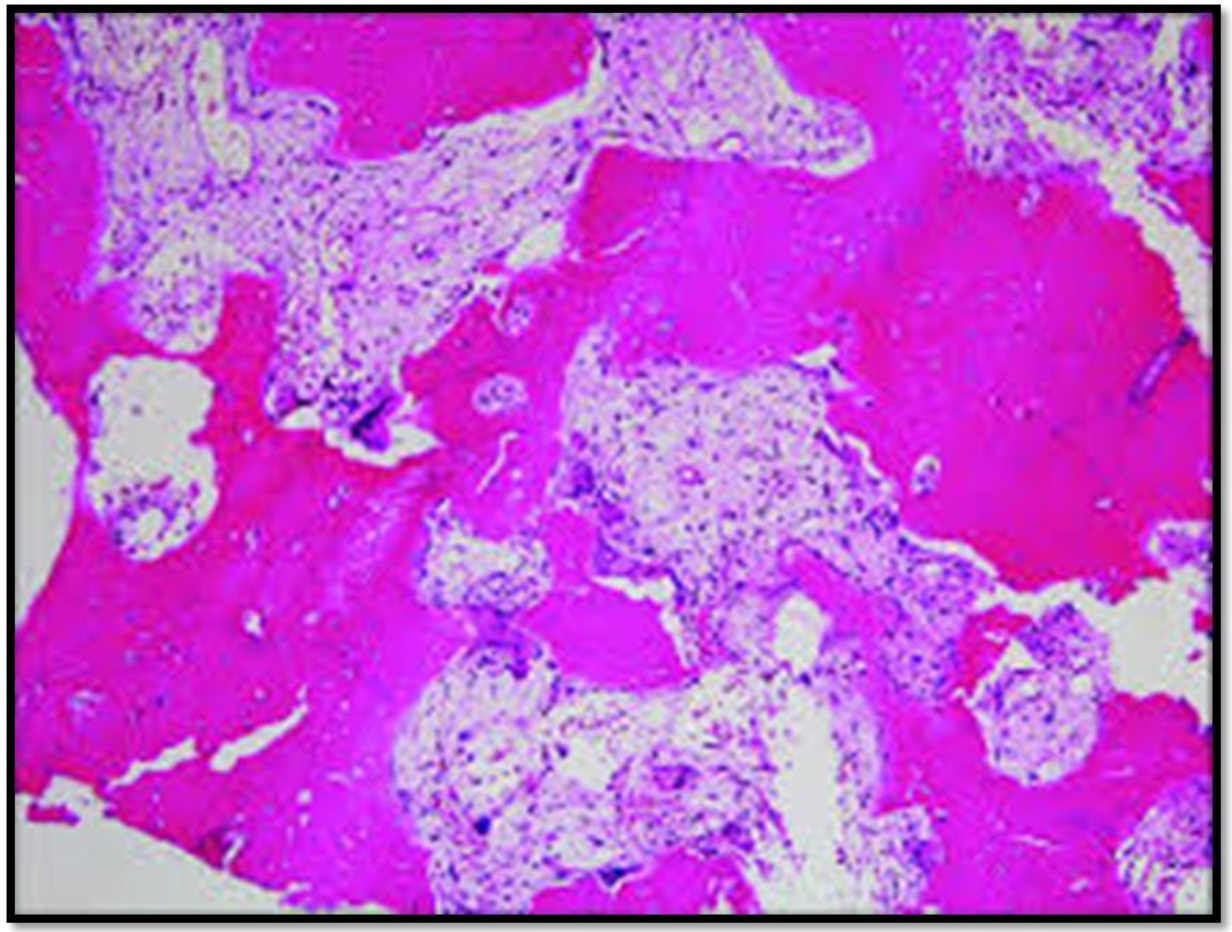
It reflects increased osteoblastic bone formation activity

Q4. What causes the mosaic bone pattern?

ANSWER:

The osteoclast and osteoblast aren't communicating properly

Disorganized lamellar **bone deposition with irregular cement lines.**



Q5. What are important clinical complications?

The complications only in severe cases, the mild ones they live normally

ANSWER:

- **Bone deformity**
- **Hearing loss (skull involvement)**
- **Pathologic fractures**
- **Rare: secondary osteosarcoma transformation (long term, rare)**

Q6. Why is calcium usually normal?

The calcium metabolism isn't only controlled by osteoclast activity, it's also controlled by vitamin D activity and parathyroid glands which are normal

ANSWER:

Bone turnover is increased. but balanced systemically unless immobilized.

Usually, during the highly lytic phase, hypercalcemia would be expected. However, because kidney function is normal, vitamin D levels are normal, and the parathyroid glands are functioning properly, calcium levels remain systemically balanced.

Case 3

- **A 67-year-old postmenopausal woman presents with back pain and progressive loss of height. She has history of vertebral compression fracture after minor trauma. DEXA scan shows T-score −2.9.**

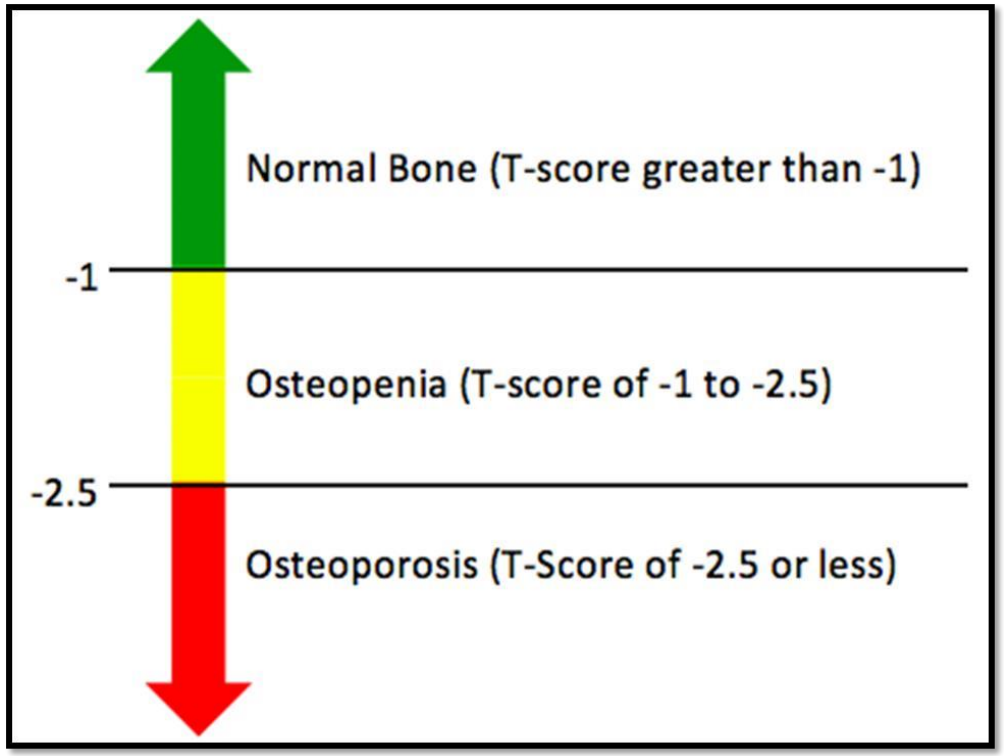
DISCUSSIONS POINTS:

- **Q1. What is the most likely diagnosis?**
- **Q2. What is the WHO diagnostic definition?**
- **Q3. What is the fundamental pathophysiology?**
- **Q4. What are the most common fracture sites?**
- **Q5. What are the major risk factors?**
- **Q6. What is the microscopic appearance?**

Q1. What is the most likely diagnosis?

ANSWER:

OSTEOPOROSIS



The T score indicated that it's osteoporosis not osteopenia

Q2. What is the WHO diagnostic definition?

ANSWER:

DEXA scan results:

T-score ≤ −2.5

Q3. What is the fundamental pathophysiology?

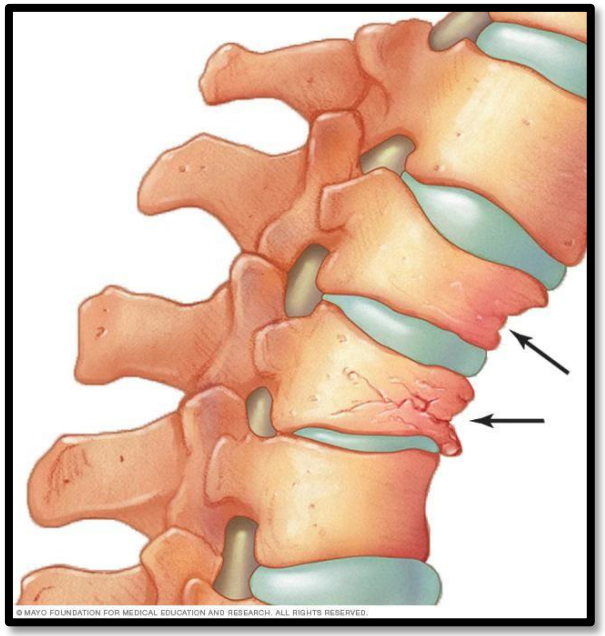
ANSWER:

The basic pathophysiology/pathogenesis that

Bone resorption > bone formation → loss of bone mass and microarchitecture. Osteoporotic bone

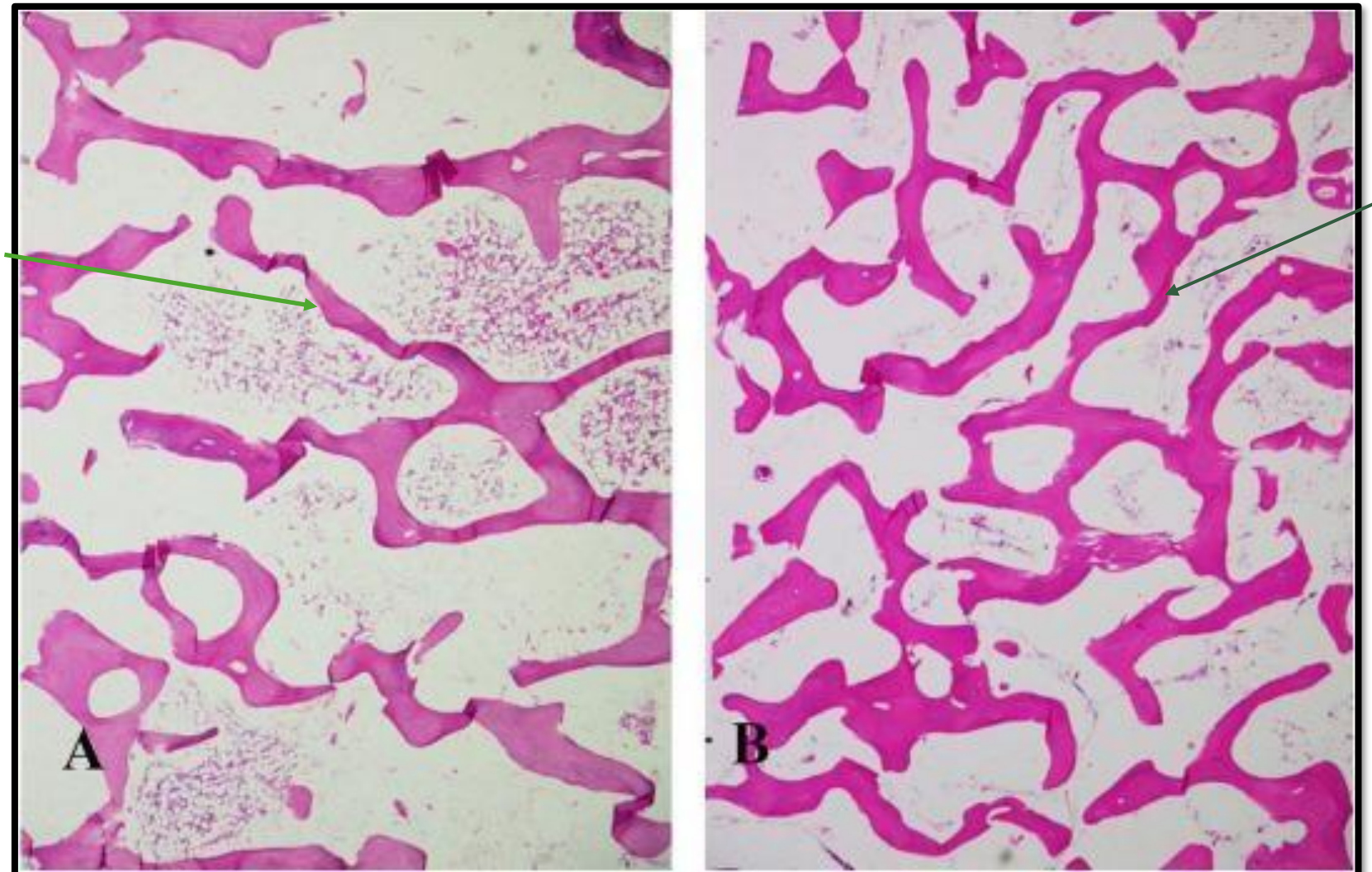
(which is weak and thin)

shows thinning of trabeculae and cortex, predisposing to fragility fractures.



OSTEOPOROSIS NORMAL

Thinning and weakness of the bone trabeculae, exposing to fractures especially compression fractures



Notice the Bone trabeculae compared to the total area

Q4. What are the most common fracture sites?

ANSWER:

- **Vertebral bodies**
- **Femoral neck**
- **Distal radius**

Q5. What are the major risk factors?

ANSWER:

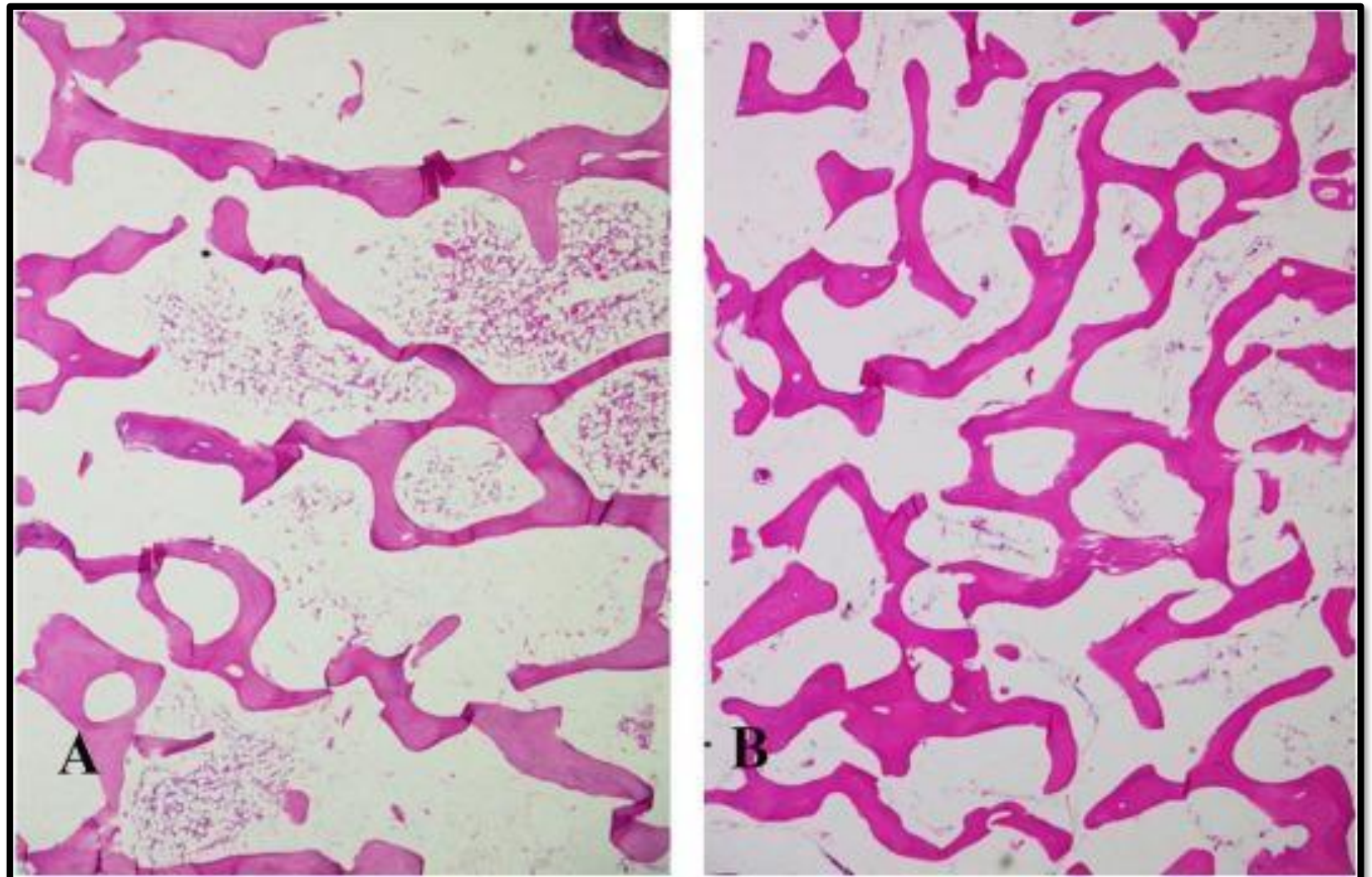
- **Postmenopausal estrogen deficiency**
- **Aging**
- **Smoking**
- **Steroid use** especially chronic glucocorticoid
- **Low BMI**
- **Vitamin D deficiency**
- **Sedentary lifestyle**

Q6. What is the microscopic appearance?

ANSWER:

Normal mineralization but decreased bone quantity (thin trabeculae, cortical thinning).

OSTEOPOROSIS NORMAL



رسالة من الفريق العلمي:

- لا تَزولُ قَدَمَا عَبْدٍ يومَ القيامةِ، حتَّى يُسأَلَ عن عُمُرِه؛ فيمَ أفناه؟ وعن عِلْمِه؛ فيم فعَلَ فيه؟ وعن مالِه؛ من أين اكتسَبَه؟ وفيم أنفَقَه؟ وعن جِسمِه؛ فيمَ أبلاه؟

خلاصة حكم المحدث : صحيح

الراوي : أبو برزة الأسلمي نضلة بن عبيد | المحدث : شعيب الأرناؤوط | المصدر : تخريج سير أعلام النبلاء | الصفحة أو الرقم : 9/ 316

| التخريج : أخرجه الترمذي (2417)، والدارمي (554)، والبيهقي في ((المدخل إلى السنن)) (494) باختلاف يسير

بَيَّنَ النَّبيُّ صلَّى اللهُ عليه وسلَّمَ أنَّ لِكُلِّ عَبدٍ وَقفةً بَينَ يَدَيِ اللهِ تَعالى يَومَ القيامةِ، يَسألُه اللهُ عَزَّ وجَلَّ عن كُلِّ شَيءٍ؛ وذلك حَثًّا منه صلَّى اللهُ عليه وسلَّمَ على لا تَتحَرَّكُ وتَنصَرِفُ :والمَعنى "لا تَزولُ قَدَما عَبدٍ يَومَ القيامةِ" :وفي هذا الحَديثِ يَقولُ النَّبيُّ صلَّى اللهُ عليه وسلَّمَ .الاستِعدادِ لِهذا المَوقِفِ، وإعدادِ الجَوابِ له عن حَياتِه وزَمانِه الذي عاشَه، ماذا "حتى يُسألَ عن عُمُرِه؛ فيمَ أفناه؟" :قَدَمُ كُلِّ إنسانٍ مِن مَوضِعِ الحِسابِ يَومَ القيامةِ حتى يَسألَه اللهُ عَزَّ وجَلَّ عن عِدَّةِ أشياءَ ويَسألُه رَبُّه عَزَّ وجَلَّ عن عِلْمِه الذي تَعَلَّمَه، ماذا فَعَلَ بهذا العِلْمِ؟ هل تَعَلَّمَه لِوَجهِ اللهِ خالِصًا أم "وعن عِلْمِه؛ فيمَ فَعَلَ فيه؟"عَمِلَ فيه؟ وكيف استَغَلَّ أوقاتَه؟ ويَسألُه رَبُّه عَزَّ وجَلَّ عن أموالِه التي جَمَعَها، أمِن حَلالٍ أم مِن "وعن مالِه؛ مِن أينَ اكتَسَبَه؟ وفيمَ أنفَقَه؟"رِياءً وسُمعةً؟ وهل عَمِلَ فيما عَلِمَ أم لم يَنفَعْه عِلْمُه؟ ويَسألُه رَبُّه عَزَّ وجَلَّ عن قُوَّتِه ماذا فَعَلَ بها؟ وفيمَ أضاعَ شَبابَه وصِحَّتَه؟وهذا إرشادٌ "فيمَ أبلاه"والمُرادُ به الصِّحَّةُ؛ "وعن جِسمِه"حَرامٍ؟ وفيمَ أنفَقَها؟ أفي طاعةٍ أم في مَعصيةٍ؟ ، وعن قُوَّتِه ماذا فَعَلَ بها؟ وفيمَ أضاعَ شَبابَه وصِحَّتَه؟وهذا إرشادٌ "فيمَ أبلاه"والمُرادُ به الصِّحَّةُ؛ "وعن جِسمِه"حَرامٍ؟ وفيمَ أنفَقَها؟ أفي طاعةٍ أم في مَعصيةٍ؟ مِنَ النَّبيِّ صلَّى اللهُ عليه وسلَّمَ لِأُمَّتِه إلى **اغتِنامِ الفُرَصِ في الحياةِ؛ لِلعَمَلِ لِلآخِرةِ بِمَلْءِ الأوقاتِ بالطَّاعاتِ؛ لِأنَّها هي عُمُرُ الإنسانِ في الدُّنيا، وذَخيرَتُه في** .بَيانُ صِفةِ سُؤالِ اللهِ عَزَّ وجَلَّ لِلعَبدِ يَومَ القيامةِ :وفيه .بَيانُ أنَّ لِكُلِّ عَبدٍ وَقفةً لِلحِسابِ بَينَ يَدَيِ اللهِ تَعالى :وفي الحَديثِ .**الآخِرةِ**

For any feedback, scan the code or click on it.

Corrections from previous versions:

Versions	Slide # and Place of Error	Before Correction	After Correction
V0 → V1			
V1 → V2			