Radiology Pathology Conference

11/12/2012

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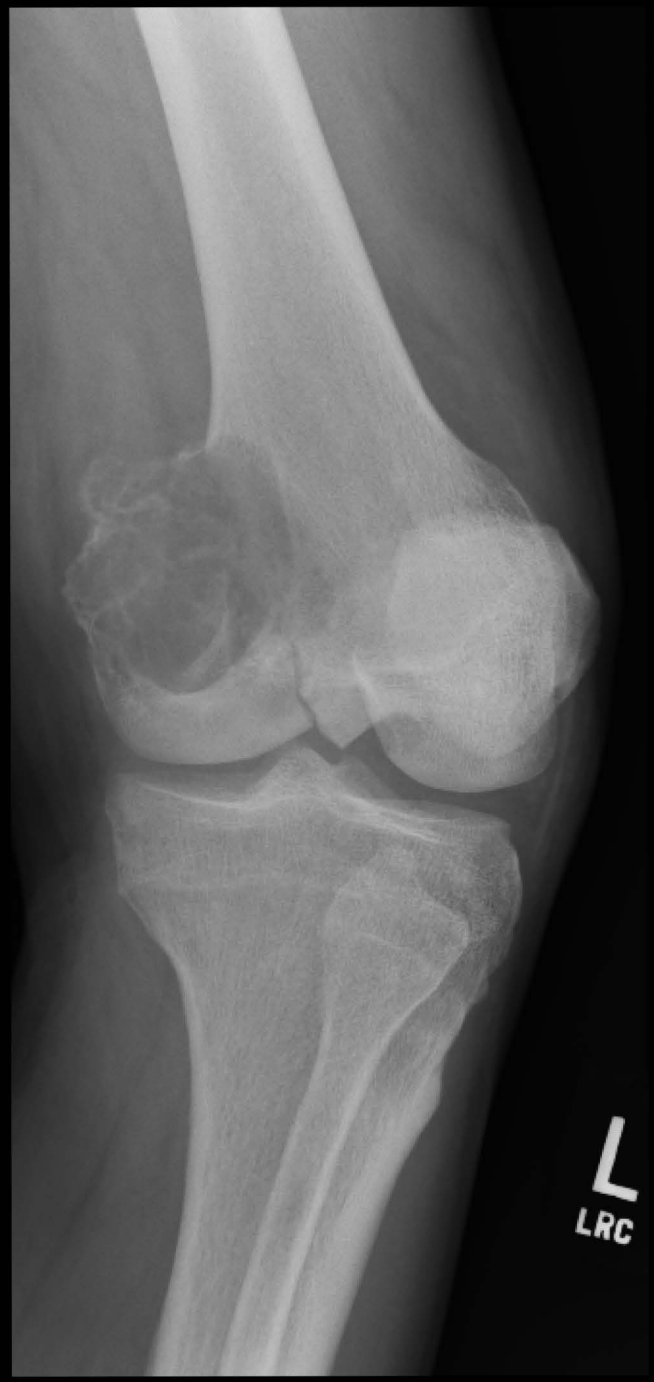
Case 1

History

- 84 y/o M with PMH prostate cancer s/p surgery and XRT with reportedly normal PSA felt “pop” about left knee, fell, and after which he was unable to bear weight.
- Crawled upstairs and called 911.
- Left knee has been giving him “some trouble for months.”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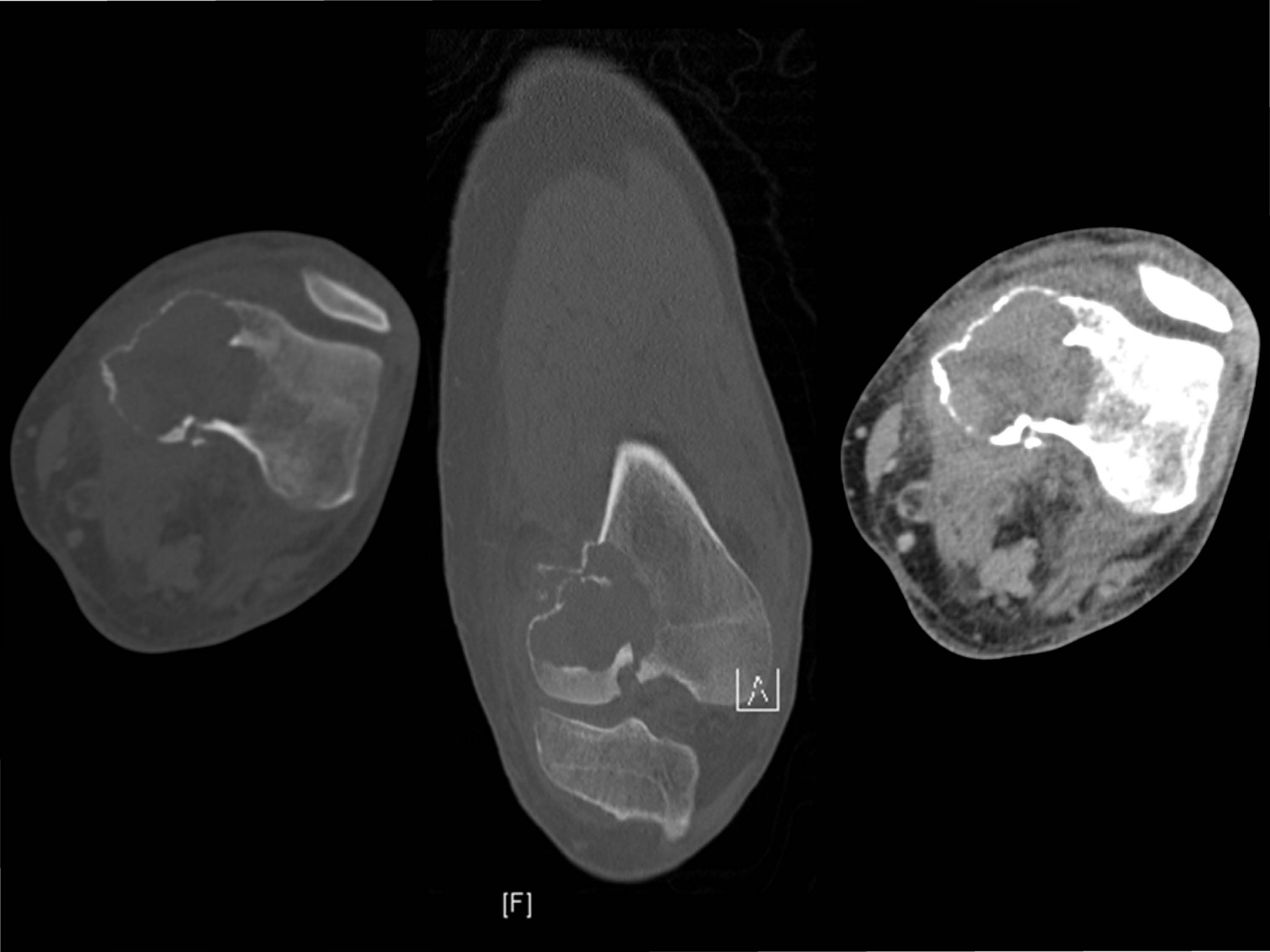
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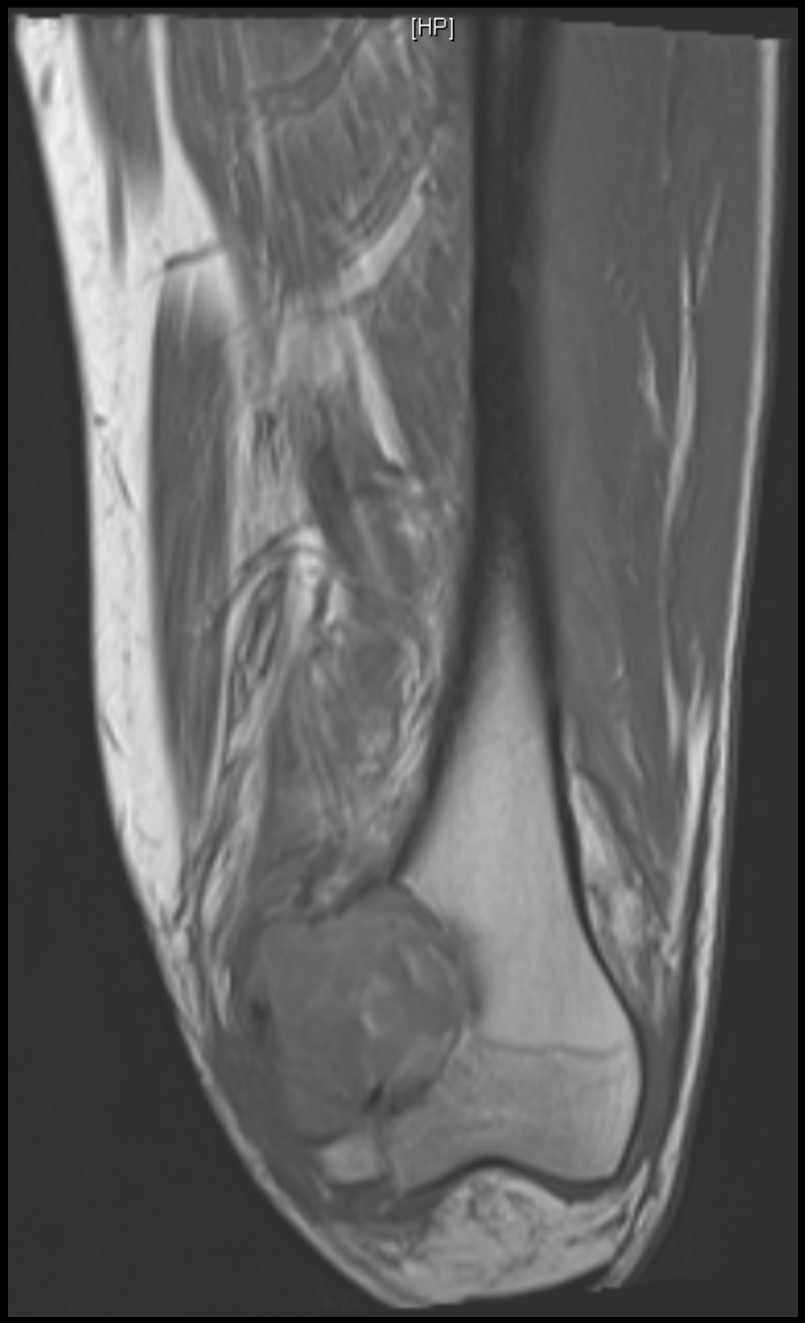

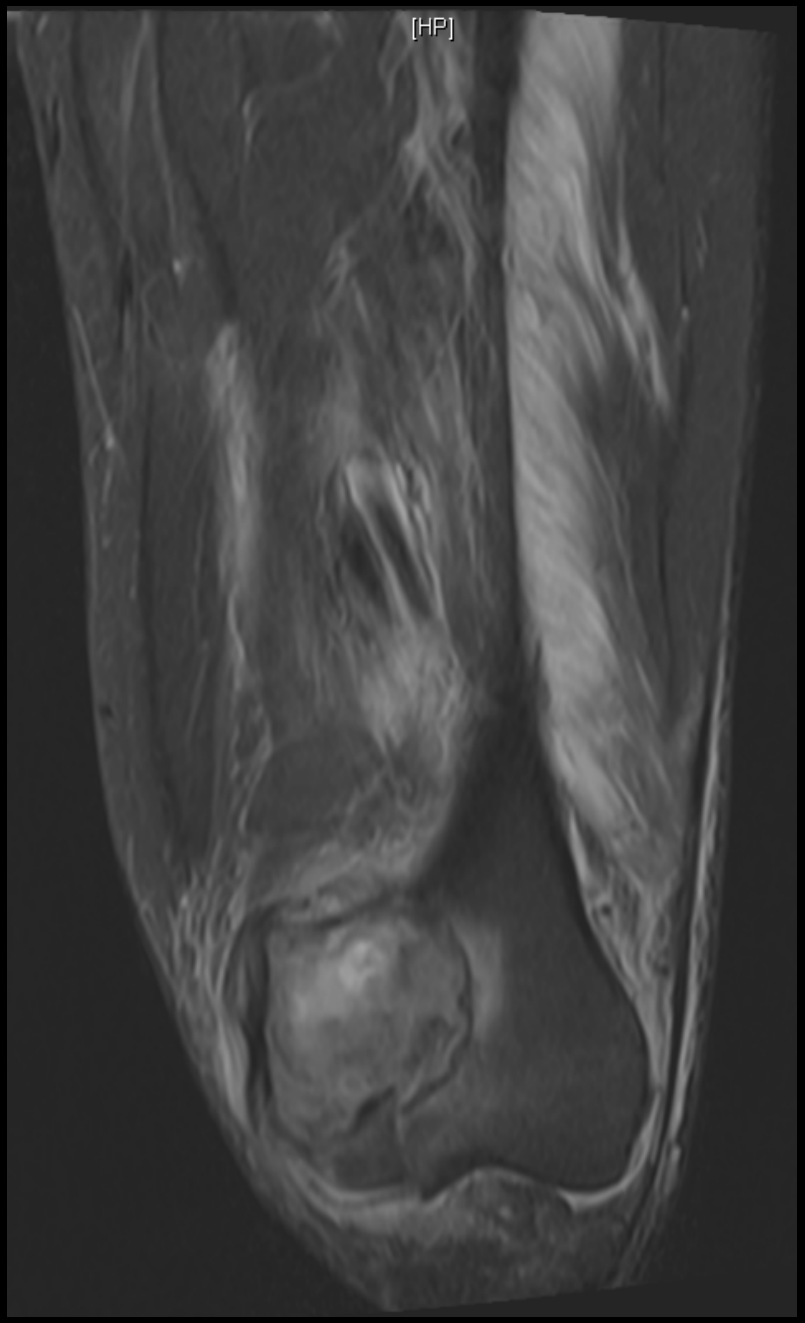

T1 Could not complete exam STIR

CR Findings

- Large lytic expansile metaphyseal lesion extending to the epiphysis with narrow zone of transition, no significant internal matrix, significant cortical thinning with pathologic vertical intercondylar fracture

CT Findings

- Confirms CR findings; argues against large soft tissue component, well-defined, lobulated lytic lesion with cortical thinning and erosion, no internal matrix

MRI Findings

- Limited sequences, predominantly T1 isointense to muscle, T2 intermediate signal; areas of T1 and T2 hyperintensity are present, possibly representing hemorrhage or necrosis; little marrow edema, no apparent soft tissue component but limited by lack of gadolinium enhanced sequences

Differential diagnosis

- F – fibrous dysplasia, fibrous cortical defect
- E – enchondroma, eosinophilic granuloma
- G – giant cell tumor
- N – non-ossifying fibroma
- O – osteoblastoma
- M – metastasis, myeloma
- A – aneurysmal bone cyst
- S – simple bone cyst
- H – hyperparathyroidism (brown tumor)
- I – infection (osteomyelitis)
- C – chondroblastoma, chondromyxoid fibroma

Differential diagnosis

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Under 30 years of age
Must have calcification
Closed epiphyses, abut the articular surface, well-defined with nonsclerotic margin, eccentric
>40 years

ACR Appropriateness Criteria

Variant 2: **Patient any age (excluding infants); fall or twisting injury, with one or more of the following: focal tenderness, effusion, inability to bear weight. First study.**

Radiologic Procedure	Rating	Comments	RRL*
X-ray knee	9		☢
MRI knee without contrast	5		O
US knee	2		O
CT knee without contrast	2	The RRL for the adult procedure is ☢.	☢☢
Tc-99m bone scan with SPECT lower extremity	2		☢☢☢
MRI knee without and with contrast	1		O
MRA knee without and with contrast	1		O
MRA knee without contrast	1		O
CT knee with contrast	1	The RRL for the adult procedure is ☢.	☢☢
CT knee without and with contrast	1	The RRL for the adult procedure is ☢.	☢☢

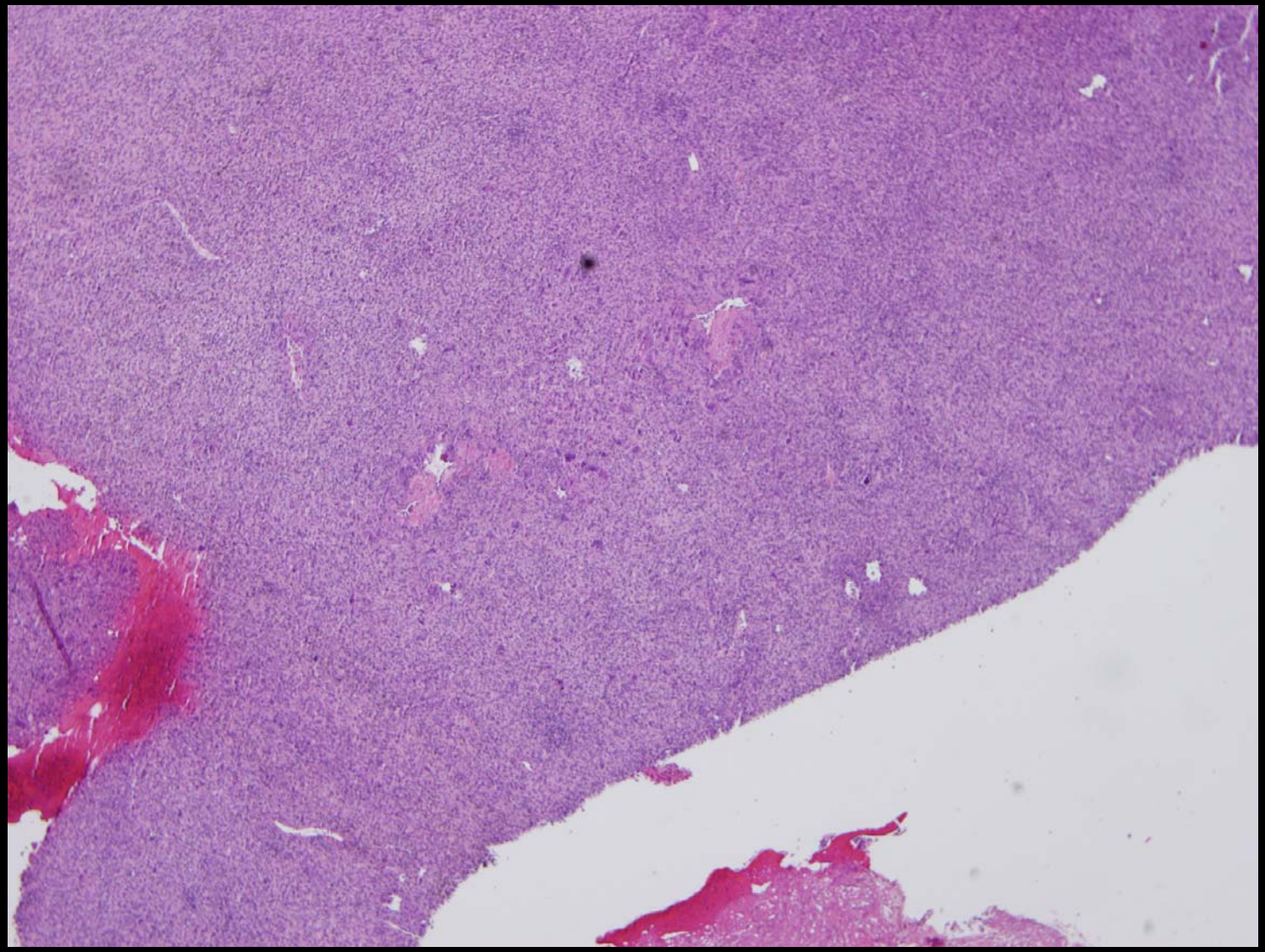
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate

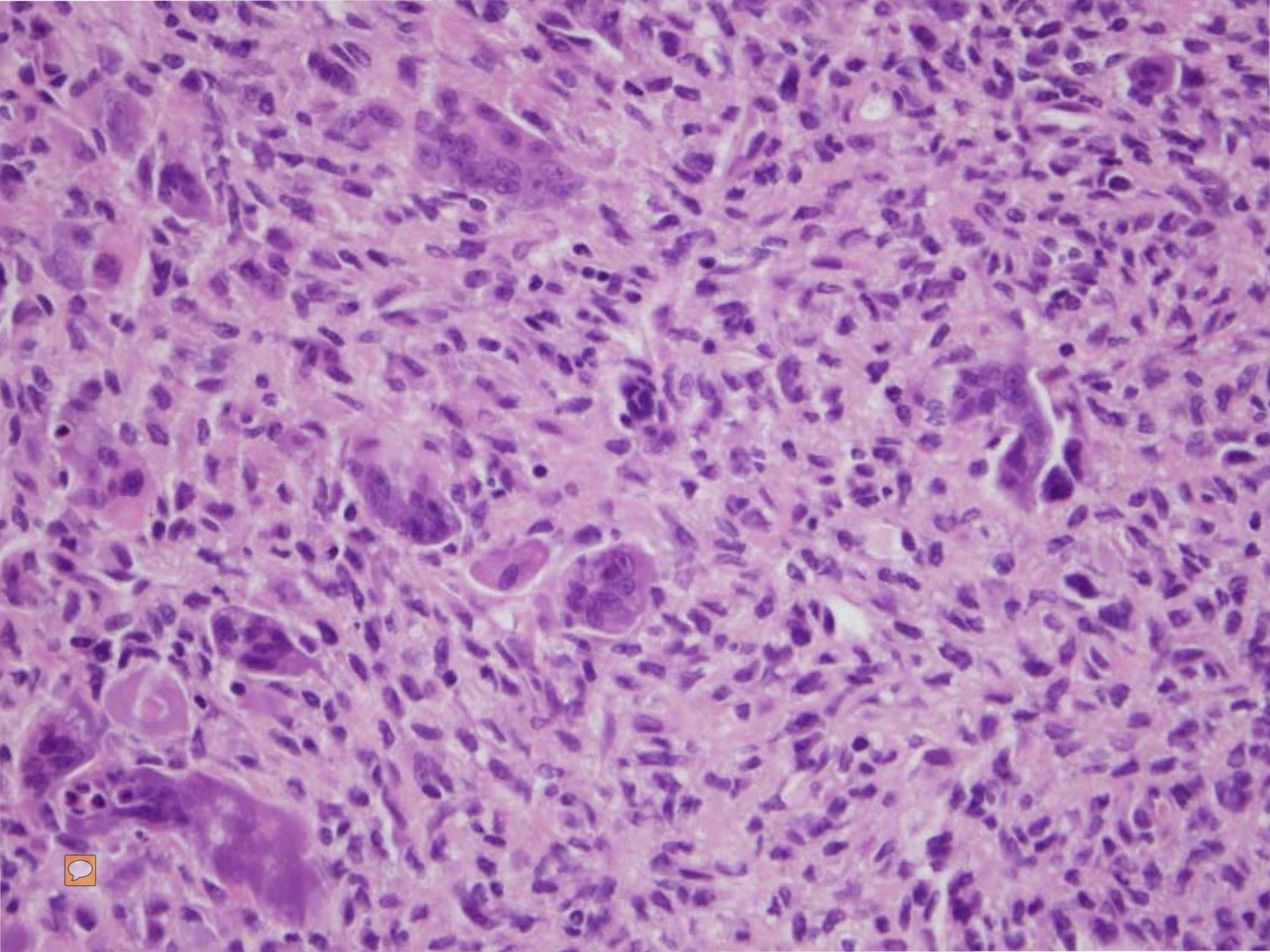
*Relative Radiation Level

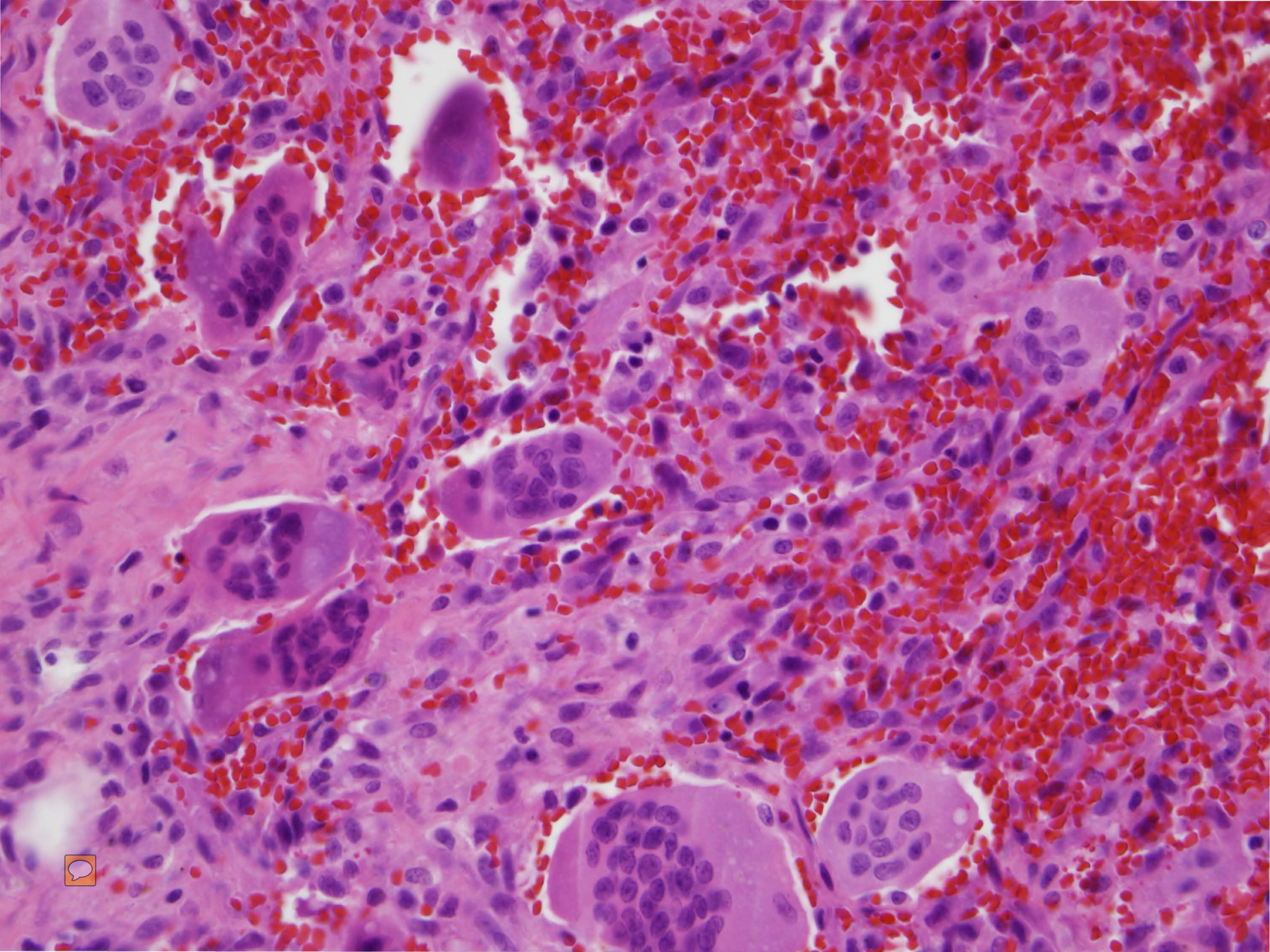
Pathology

Melanie Johncilla

Giant Cell Tumor

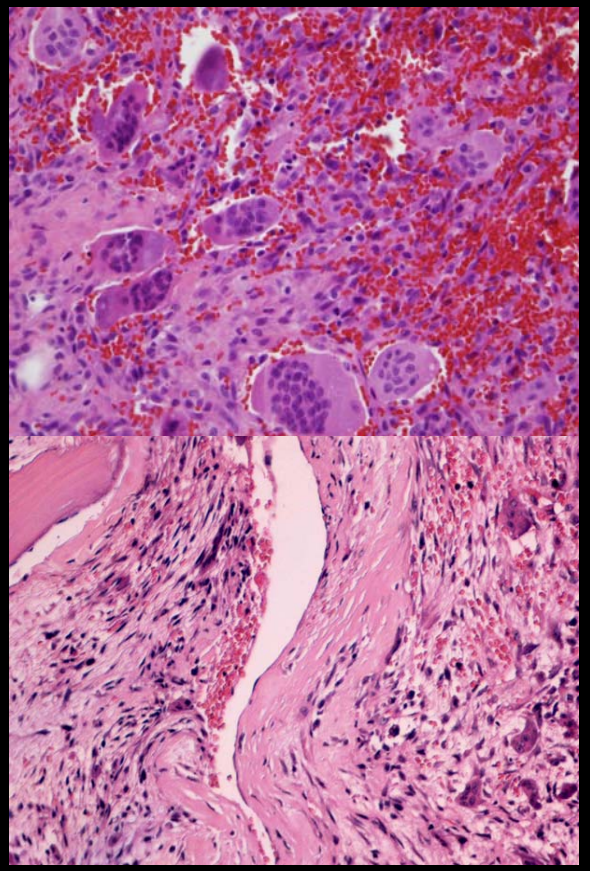






Giant cell tumor of bone

- Gross: Soft, dark brown, may have cystic changes and areas of yellow discoloration
- DDx:
  - Aneurysmal bone cyst: May have giant cells but, background shows fibrosis, cells are spindled rather than oval



Case 2

History

- 52 y/o M with chronic right knee pain.
- Status post right total knee arthroplasty with no improvement in his chronic pain.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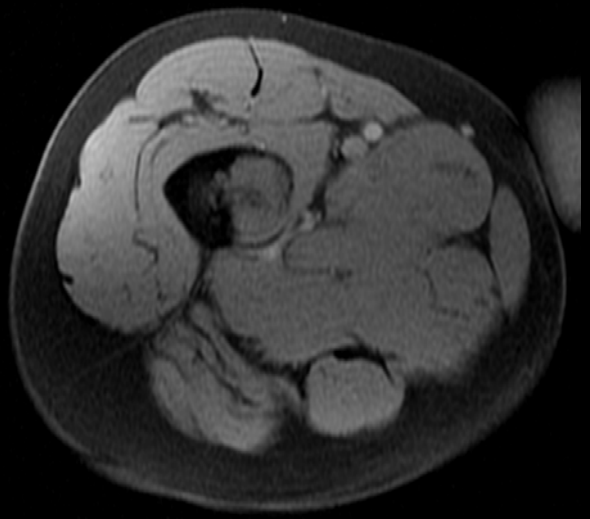
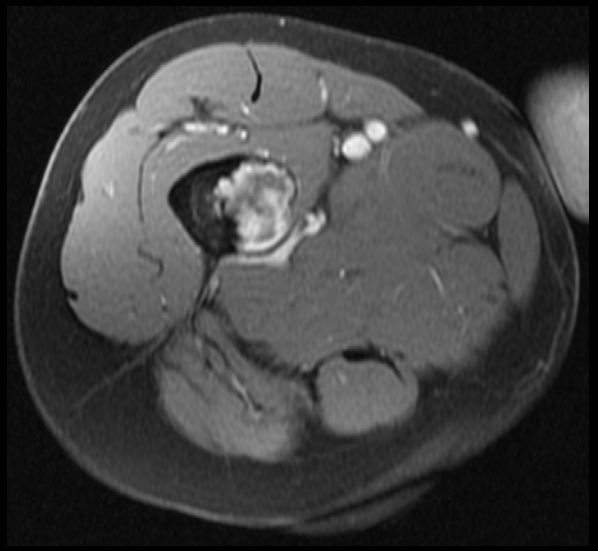
SUPINE

T1



T1 FS Pre



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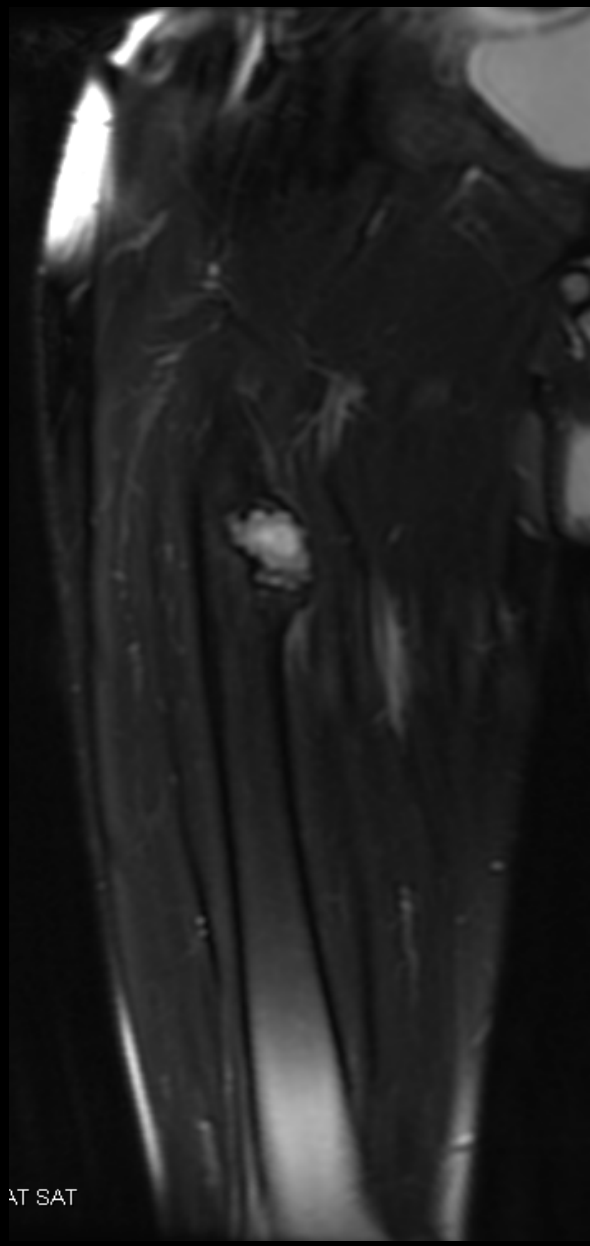

T2 FS


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CR Findings

- Eccentric, expansile lytic lesion; questionable chondroid matrix; narrow zone of transition with partially sclerotic border; questionable chronic-appearing periosteal periosteal reaction

MRI Findings

- Expansile, cortically based; isointense to muscle on T1, heterogeneously hyperintense on T2; well-defined rim but some extension into the medullary space; heterogeneous peripheral enhancement; no soft tissue, likely cartilaginous based on characteristics

Bone Scan

- Increased uptake; interpreter favored a hypervascular or metabolically active tumor .

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Under 30 years of age
Must have calcification
Closed epiphyses, abut the articular surface, well-defined with nonsclerotic margin, eccentric
> 40 years of age

ACR Appropriateness Criteria

Clinical Condition: **Imaging After Total Knee Arthroplasty**

Variant 1: **Routine follow-up of asymptomatic patient with TKA.**

Radiologic Procedure	Rating	Comments	RRL*
X-ray knee	9		☢
Fluoroscopy knee	1		☢
X-ray arthrography knee	1		☢
CT knee without contrast	1		☢
MRI knee without contrast	1		O
US knee	1		O
Tc-99m bone scan knee	1		☢☢☢
In-111 WBC and sulfur colloid scan knee	1		☢☢☢☢
FDG-PET/CT knee	1		☢☢☢☢
Ga-67 scan knee	1		☢☢☢☢
Aspiration knee	1		Varies
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

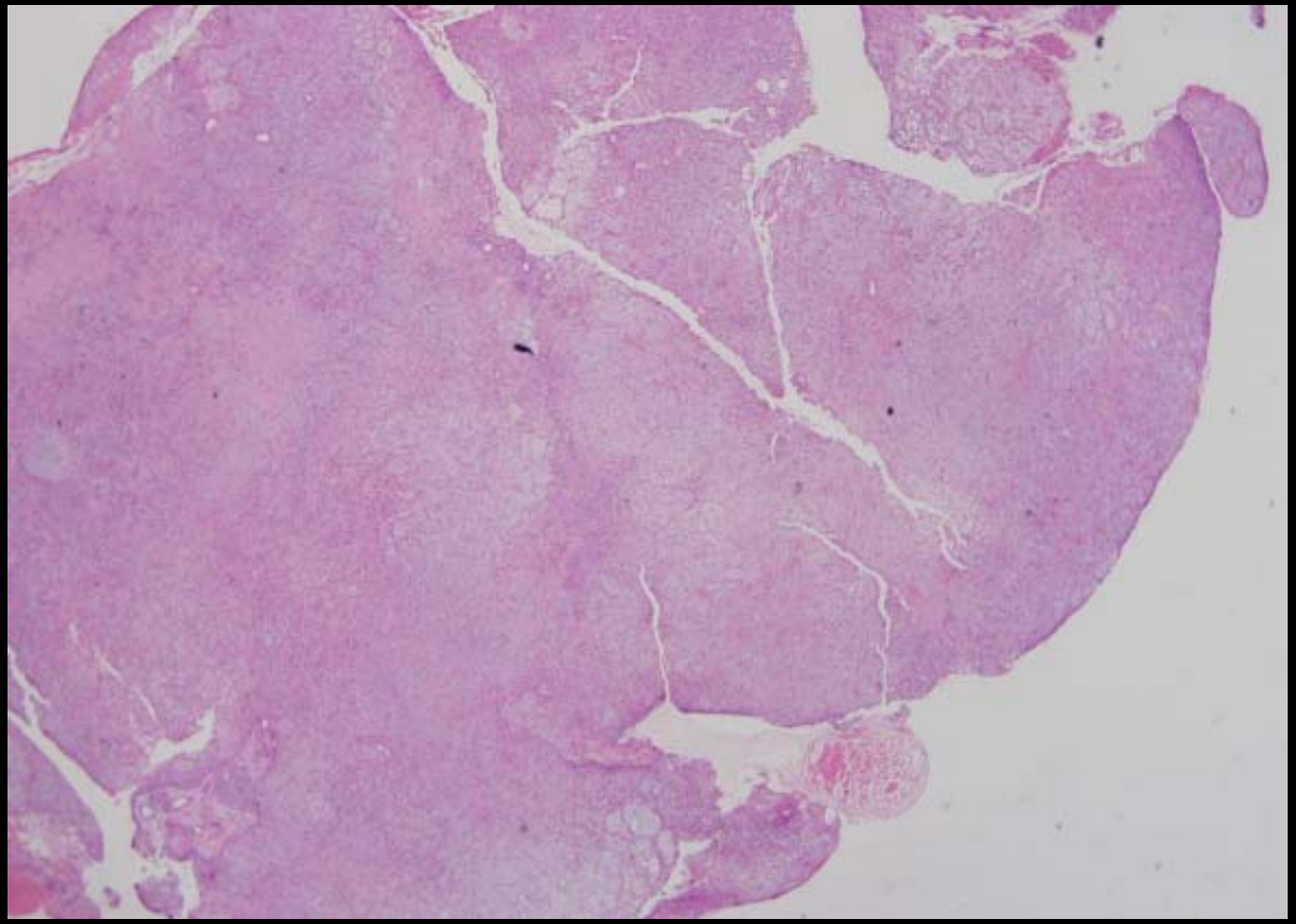
Variant 2: **Pain after TKA: initial evaluation, suspect periprosthetic infection.**

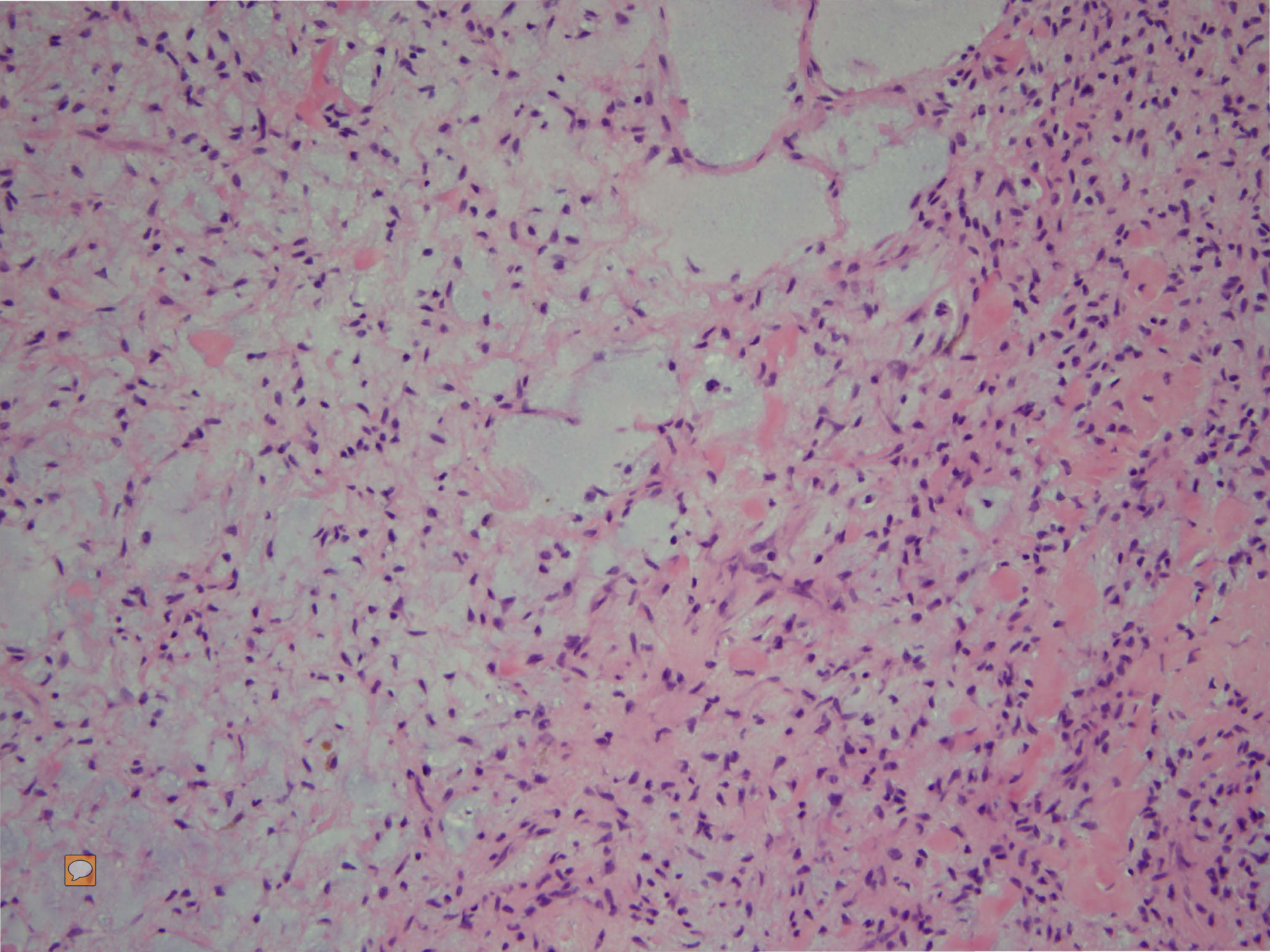
Radiologic Procedure	Rating	Comments	RRL*
X-ray knee	9	Both x-ray and joint aspiration are appropriate procedures at this time.	☢
Aspiration knee	9	Both x-ray and joint aspiration are appropriate procedures at this time.	Varies
Fluoroscopy knee	1		☢
X-ray arthrography knee	1		☢
CT knee without contrast	1		☢
MRI knee without contrast	1		O
US knee	1		O
Tc-99m bone scan knee	1		☢☢☢
In-111 WBC and sulfur colloid scan knee	1		☢☢☢☢
FDG-PET/CT knee	1		☢☢☢☢
Ga-67 scan knee	1		☢☢☢☢
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

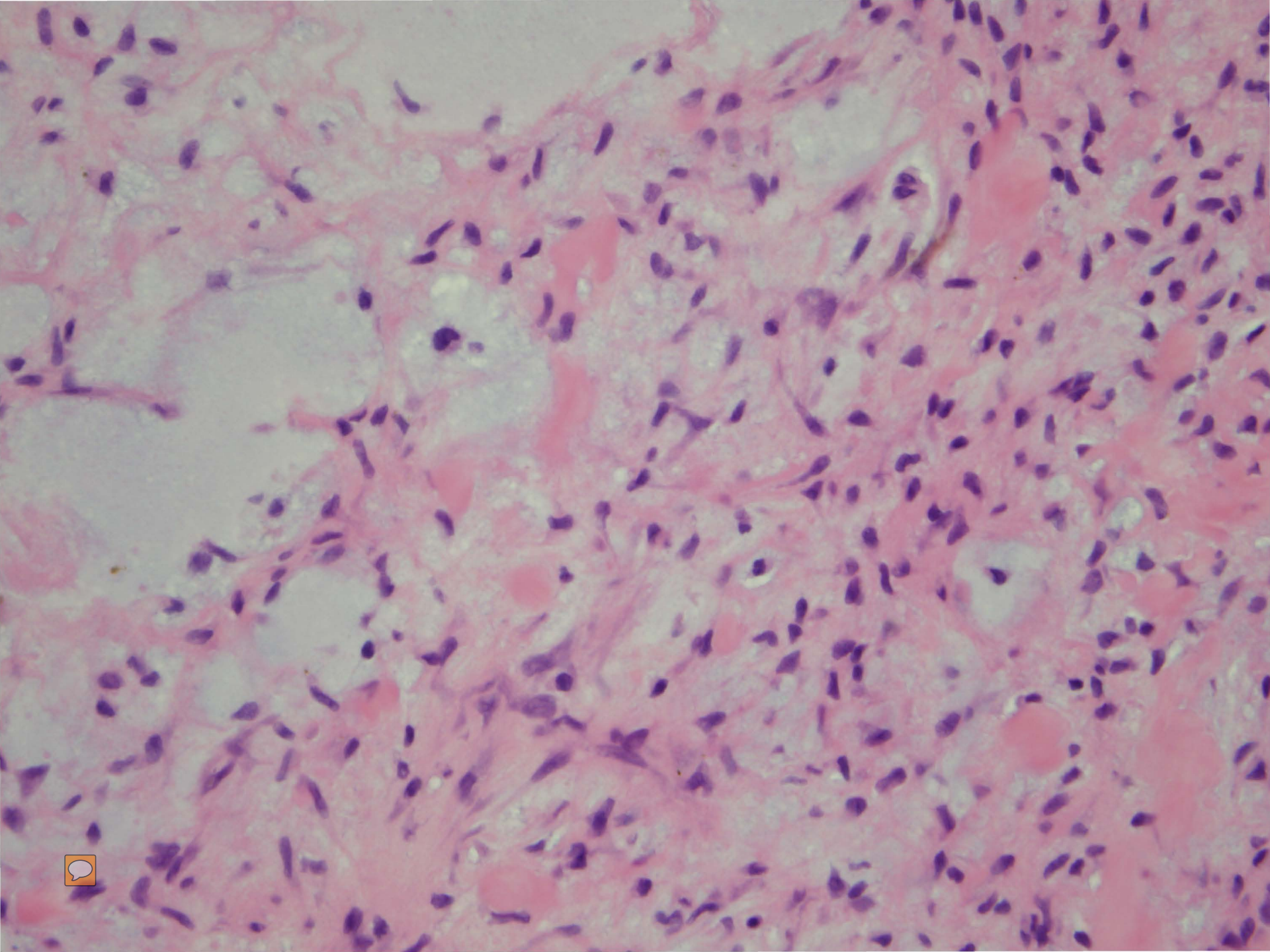
Pathology

Melanie Johncilla

Chondromyxoid fibroma







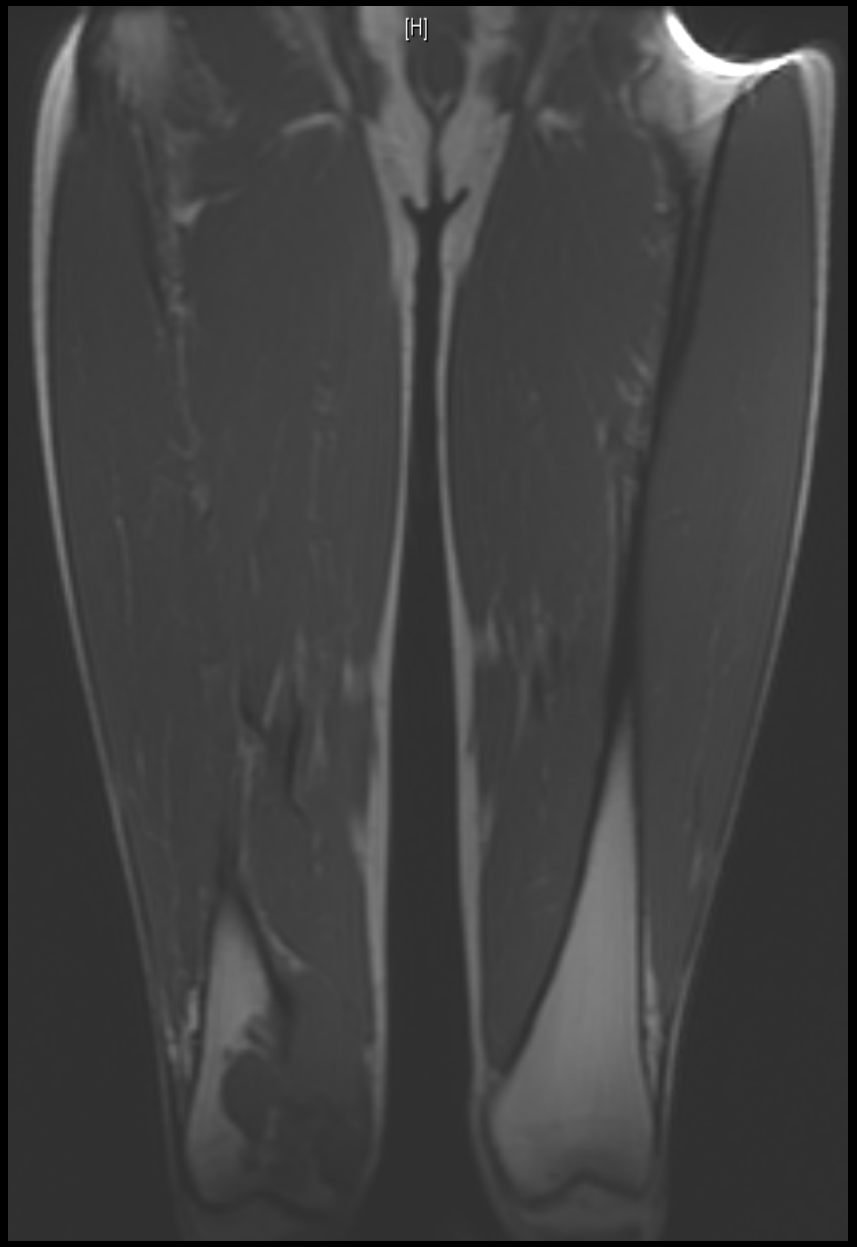
Chondromyxoid fibroma

- Gross: Gray to white, lobulated, “pops out of surrounding bone”
- Rearrangements of chromosome band 6q13
- DDx:
  - Chondroblastoma: No lobulation
  - Fibrous dysplasia: No lobulation
  - Chondrosarcoma: More hypercellular

Case 3

History

- 24 y/o M with 1 year history of right knee pain.
- Ran a 10K 1 year ago and has had pain since then with minimal exercise.
- Noticeable worsening over the last 1 month causing him to limp with focal pain medially.



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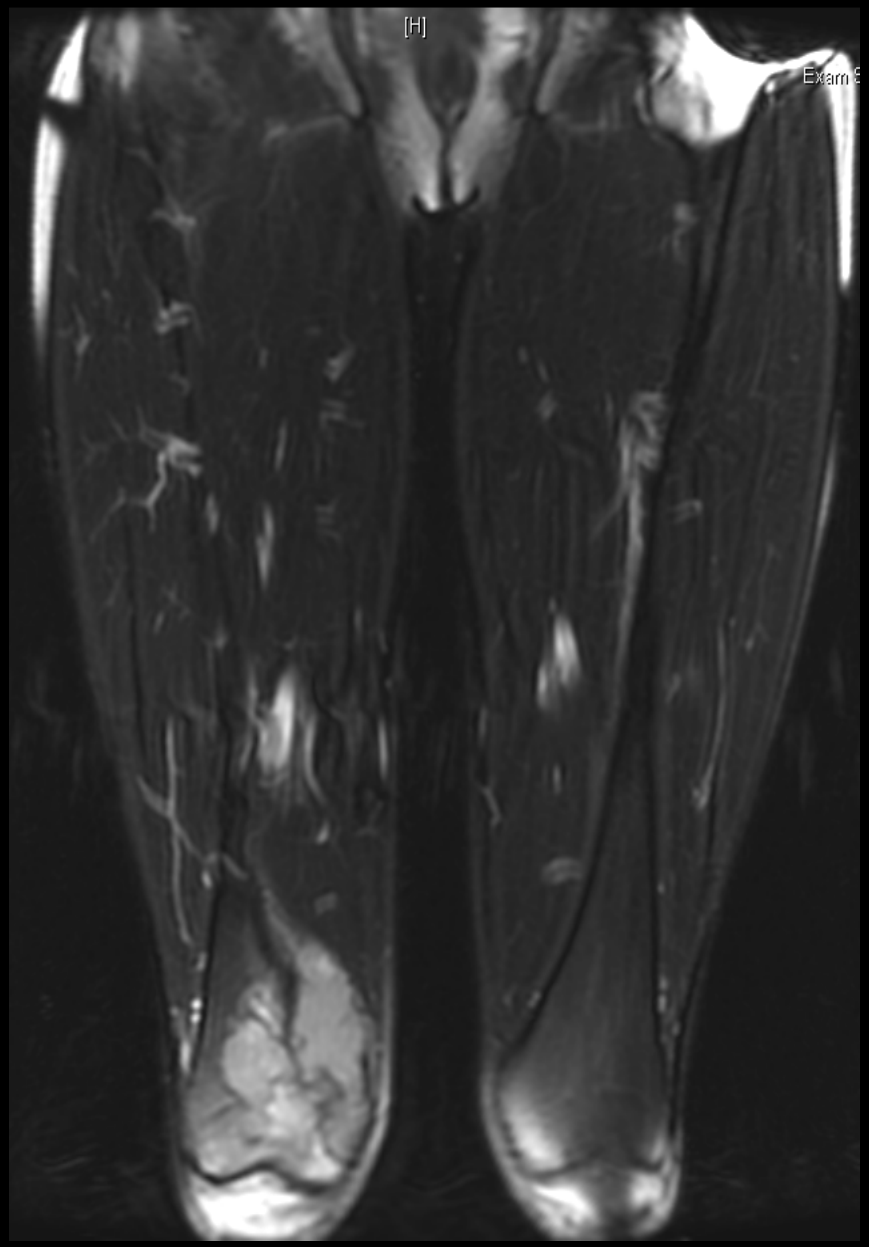
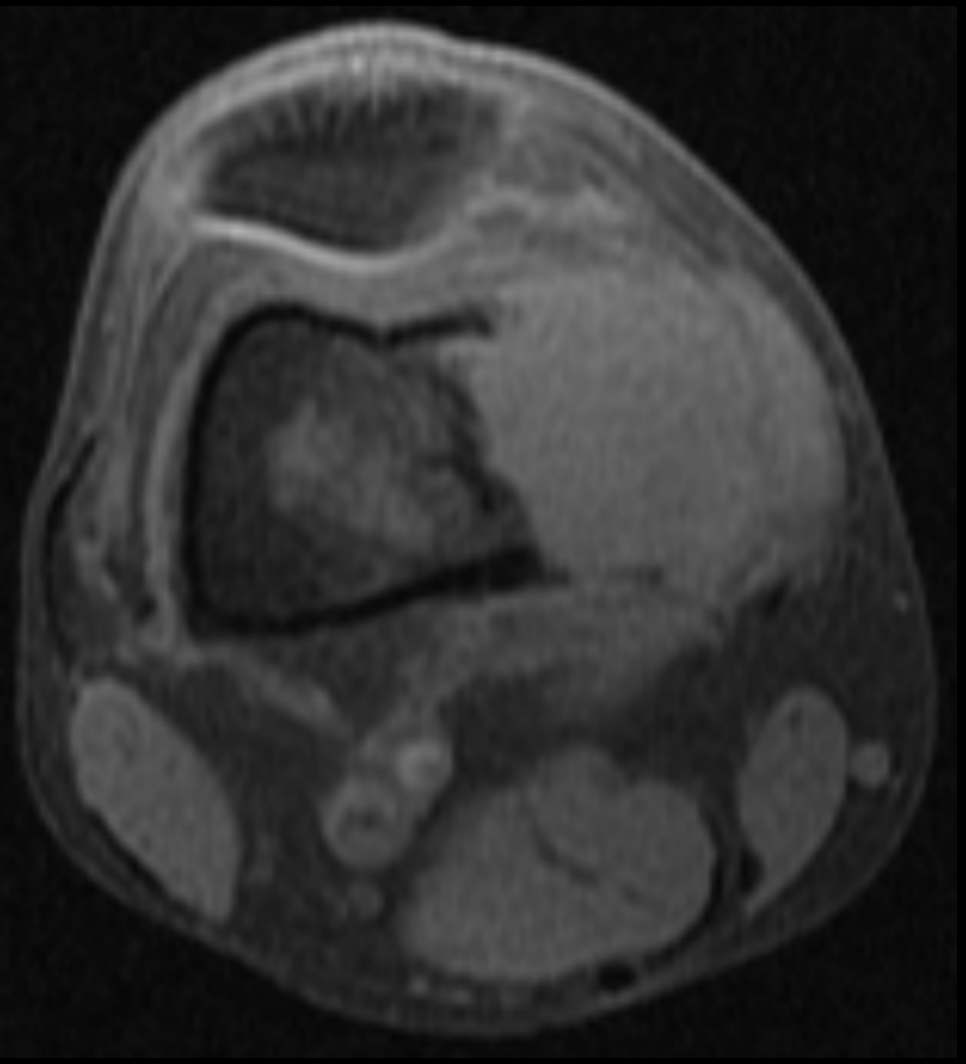


T2 FS



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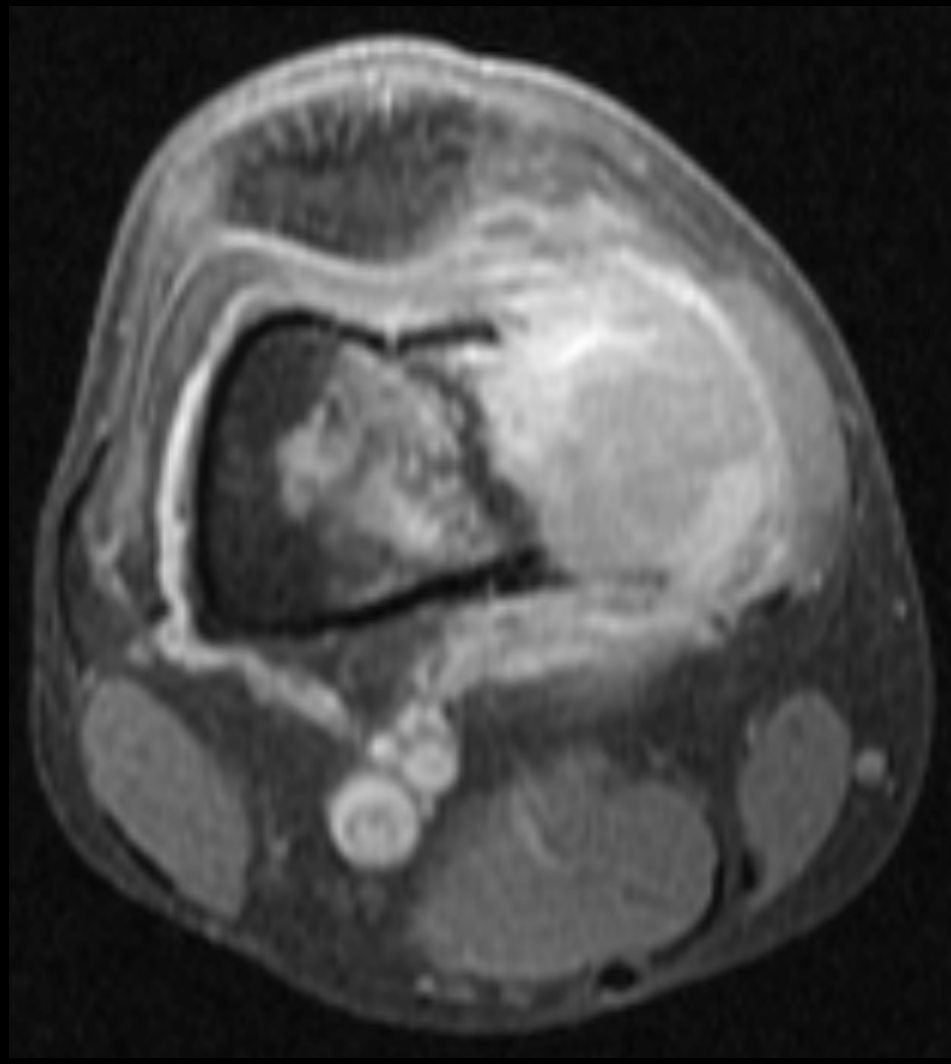
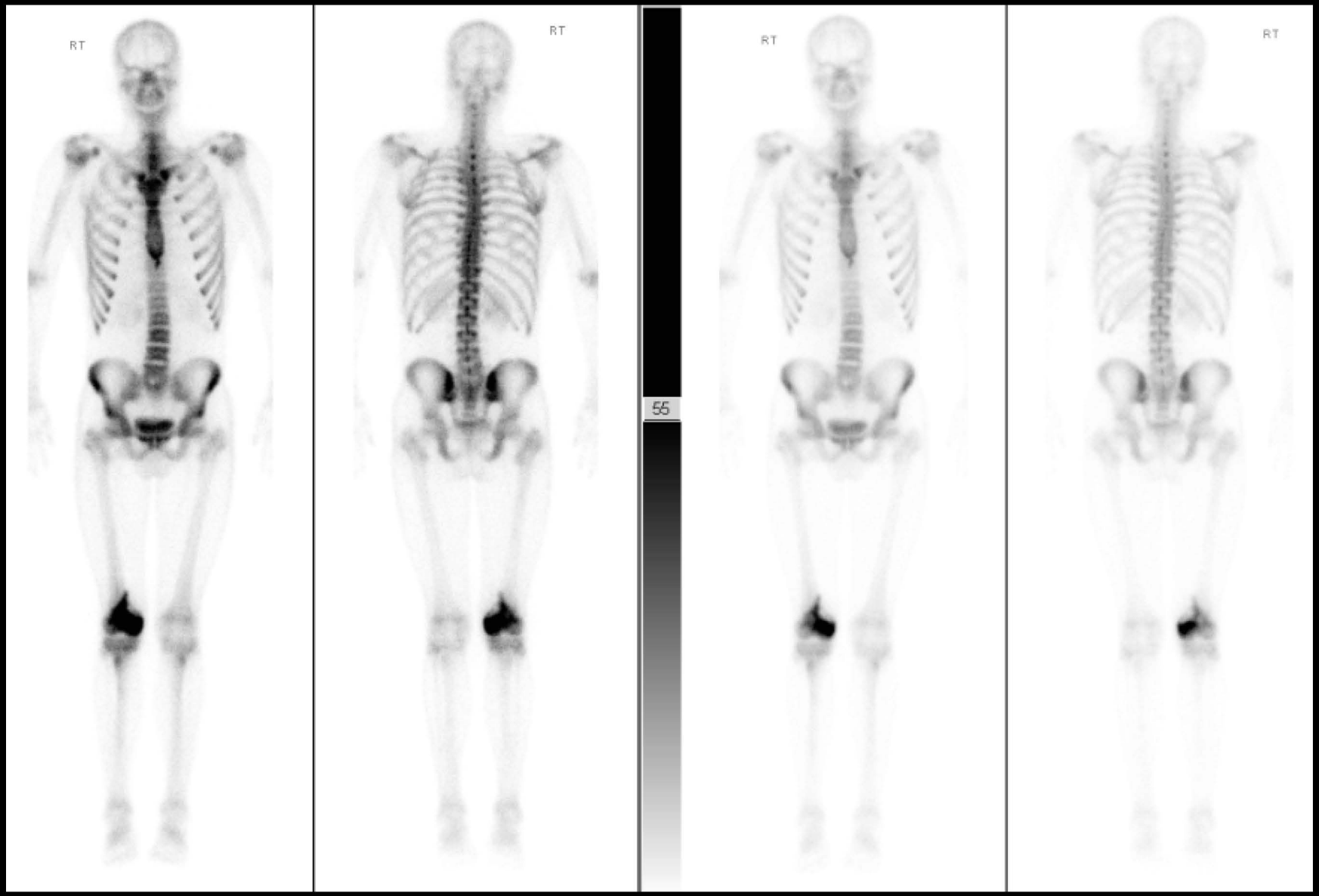


SPGR Post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CR Findings

- Destructive, eccentric, moth-eaten lytic lesion of the medial femoral metaphysis; wide zone of transition; no apparent soft tissue mass; no internal matrix

MRI Findings

- T1 isointense to muscle, T2 hyperintense; lobular enhancing lesion with cortical destruction and associated soft tissue mass

Bone Scan

- Intensely increased uptake; felt to be concerning for malignancy

Differential diagnosis

- 1 – 30 years
  - Ewing's
  - Osteosarcoma
- 30 – 40 years
  - Fibrosarcoma and malignant fibrous histiocytoma
  - Malignant giant cell tumor
  - Reticulum cell sarcoma
  - Parosteal sarcoma
- > 40 years
  - Metastasis
  - Myeloma
  - Chondrosarcoma

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ACR Appropriateness Criteria

Clinical Condition: **Nontraumatic Knee Pain**

Variant 1: **Child or adolescent: nonpatellofemoral symptoms. Mandatory minimal initial examination.**

Radiologic Procedure	Rating	Comments	RRL*
X-ray knee	9		☢
X-ray hip ipsilateral	1		☢☢☢
CT knee without contrast	1		☢☢
CT arthrography knee	1		☢☢
MRI knee without contrast	1		O
MR arthrography knee	1		O
US knee	1		O
Tc-99m bone scan lower extremity	1		☢☢☢

Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate

*Relative Radiation Level

ACR Appropriateness Criteria

Clinical Condition: **Primary Bone Tumors**

Variant 1: **Screening, first study.**

Radiologic Procedure	Rating	Comments	RRL*
X-ray area of interest	9	Absolute requirement in patient with suspected bone lesion.	Varies
US area of interest	1		O
MRI area of interest with or without contrast	1		O
Tc-99m bone scan whole body	1		☢☢☢
CT area of interest without contrast	1		Varies
FDG-PET/CT whole body	1		☢☢☢☢
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			***Relative Radiation Level**

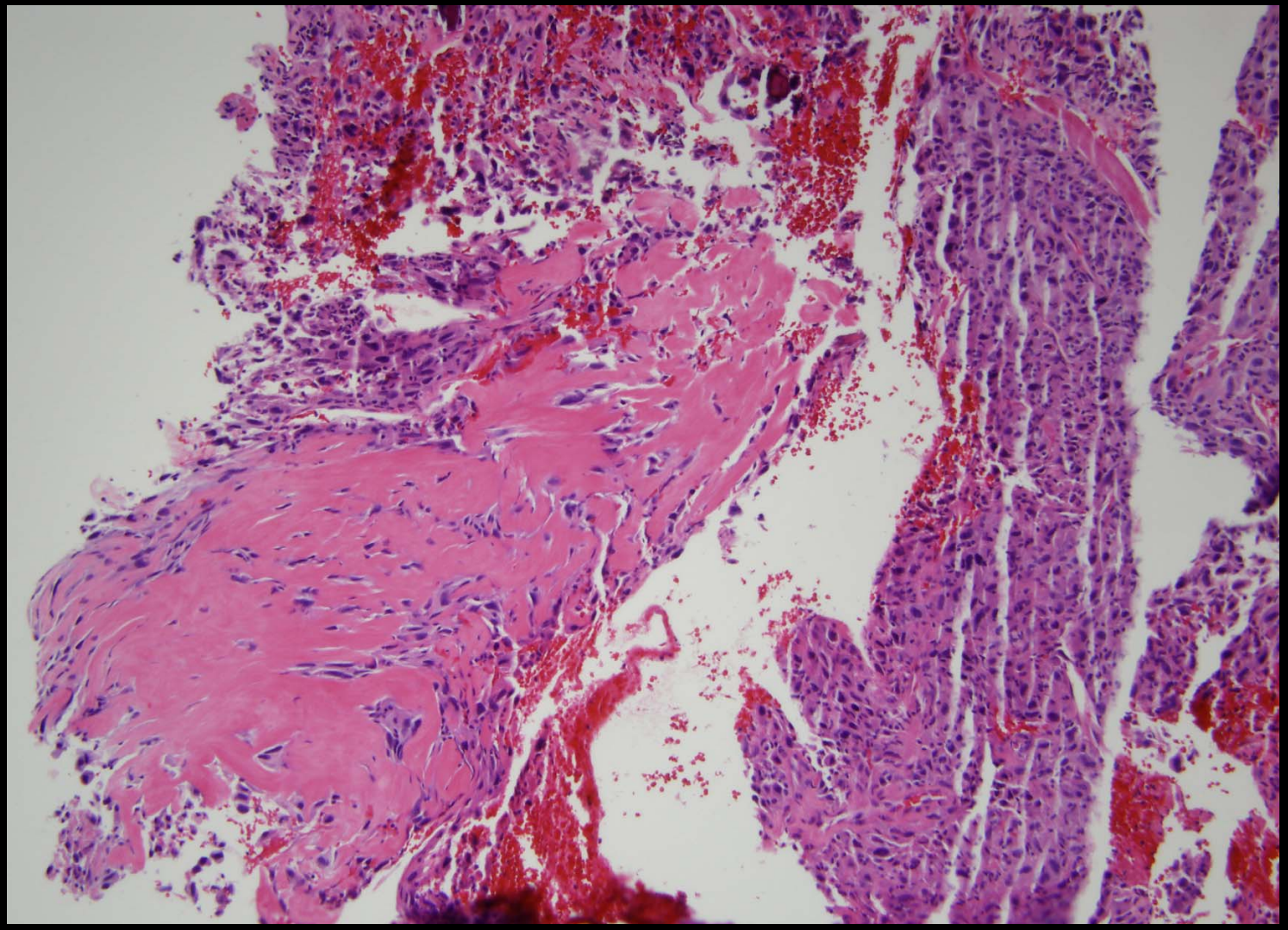
Variant 5: **Suspicious for malignant characteristics on radiograph.**

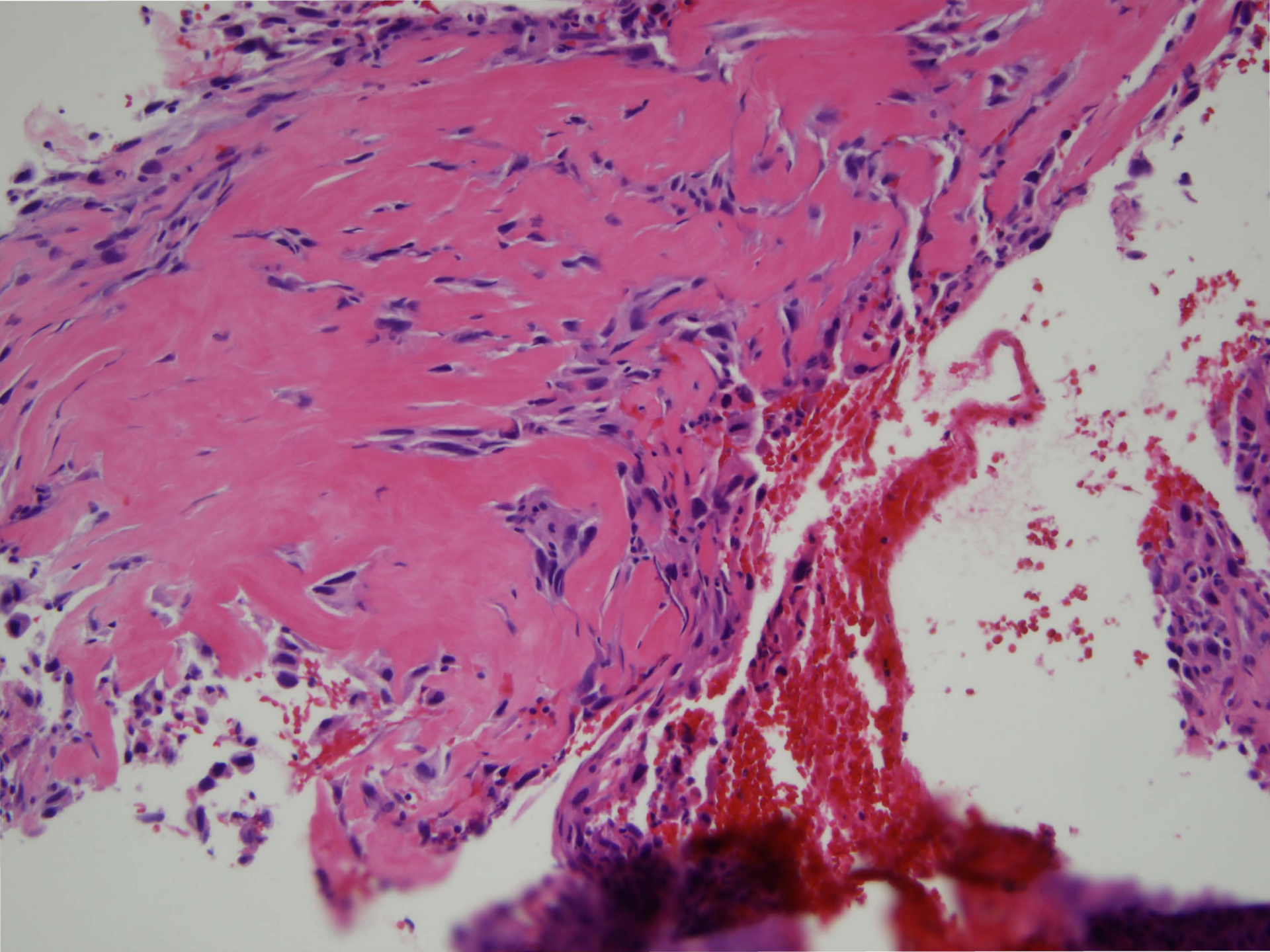
Radiologic Procedure	Rating	Comments	RRL*
MRI area of interest with or without contrast	9	Contrast can provide more information. Useful for vascularity and necrotic areas. See statement regarding contrast in text under "Anticipated Exceptions."	O
CT area of interest without contrast	5	May be useful if MRI not available or possible. Useful for evaluation of calcification, cortical breakthrough and pathological fractures.	Varies
FDG-PET/CT whole body	5	Can be useful for problem solving. See narrative.	☢☢☢☢
Tc-99m bone scan whole body	3	Probably not indicated, except to look for additional lesions.	☢☢☢
US area of interest	1		O
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			***Relative Radiation Level**

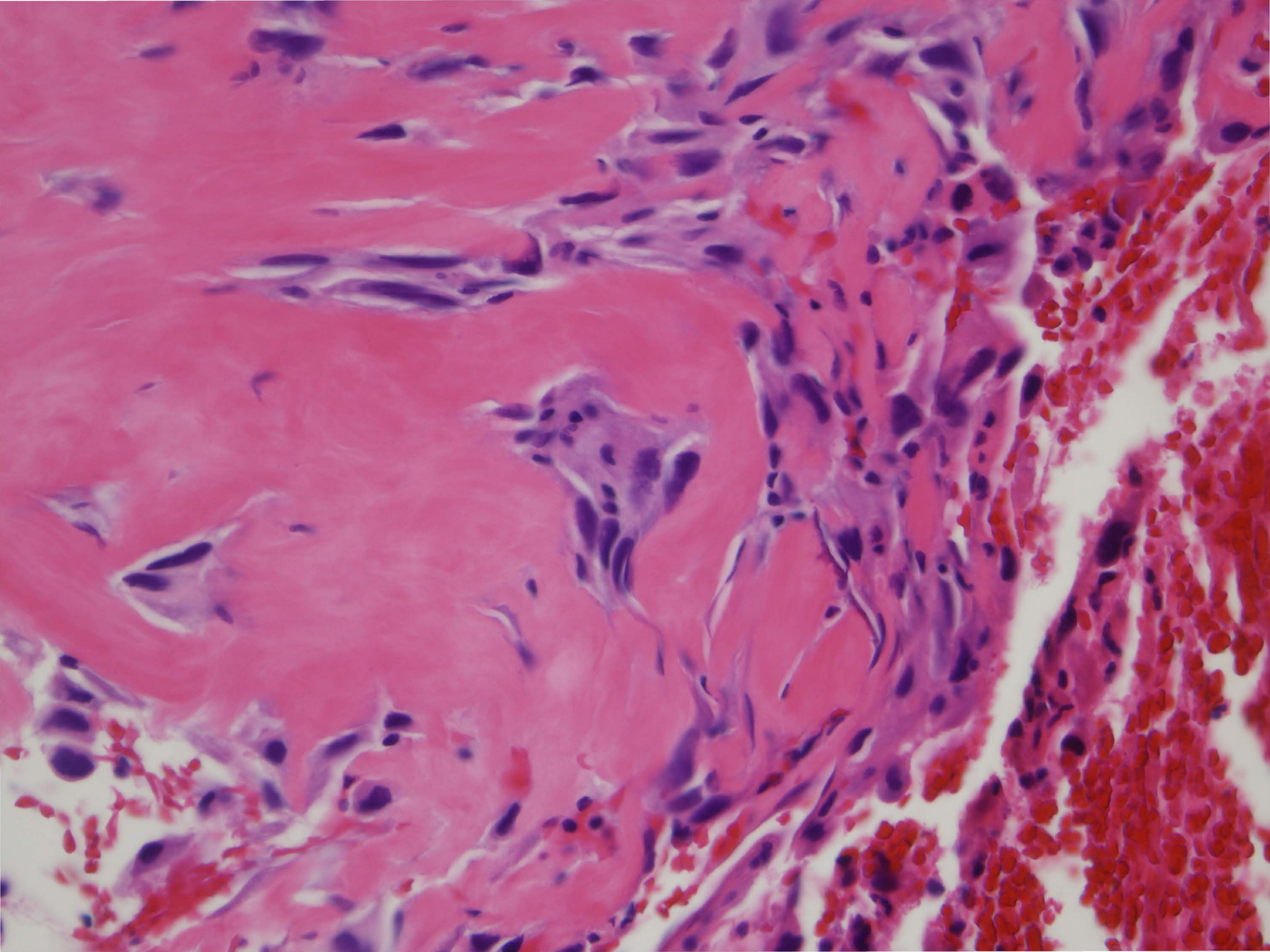
Pathology

Melanie Johncilla

Osteosarcoma







Osteosarcoma

- Gross: variable, fish fleshed, heavily mineralized, large areas of blue cartilage
- 25% of osteosarcomas: *fibroblastic:* predominantly spindle cell and have minimal amounts of matrix production

Case 4

History

- 87 y/o F with h/o anaplastic meningioma (cranial) s/p multiple resections and radiation therapy.

- Now with 2 weeks of left thigh pain and left hip weakness.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Findings

- CR – aggressive-appearing centrally-located lytic lesion with cortical thinning and endosteal scalloping, no internal matrix, impending fracture by cortical thinning criteria; no periosteal reaction, no apparent soft tissue mass; relatively ill-defined zone of transition superiorly and inferiorly
- Bone scan – increased uptake

CR Findings

- Aggressive-appearing, centrally-located, lytic lesion with cortical thinning and endosteal scalloping; no internal matrix, impending fracture by cortical thinning criteria; no periosteal reaction; no apparent soft tissue mass; relatively ill-defined zone of transition superiorly and inferiorly

Bone Scan

- Increased uptake

Differential diagnosis

- 1 – 30 years
  - Ewing's
  - Osteosarcoma
- 30 – 40 years
  - Fibrosarcoma and malignant fibrous histiocytoma
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  - Chondrosarcoma

ACR Appropriateness Criteria

Clinical Condition: **Chronic Hip Pain**

Variant 1: **Initial evaluation for chronic hip pain. First test.**

Radiologic Procedure	Rating	Comments	RRL*
X-ray pelvis	9		☢☢
X-ray hip	9	AP and lateral views of the affected hip.	☢☢☢
MRI hip without contrast	1		O
MRI hip without and with contrast	1		O
US hip	1		O
CT hip without contrast	1		☢☢☢
CT arthrography hip	1		☢☢☢
MR arthrography hip	1		O
Tc-99m bone scan hip	1		☢☢☢
X-ray arthrography hip with anesthetic ± corticosteroid	1		Varies

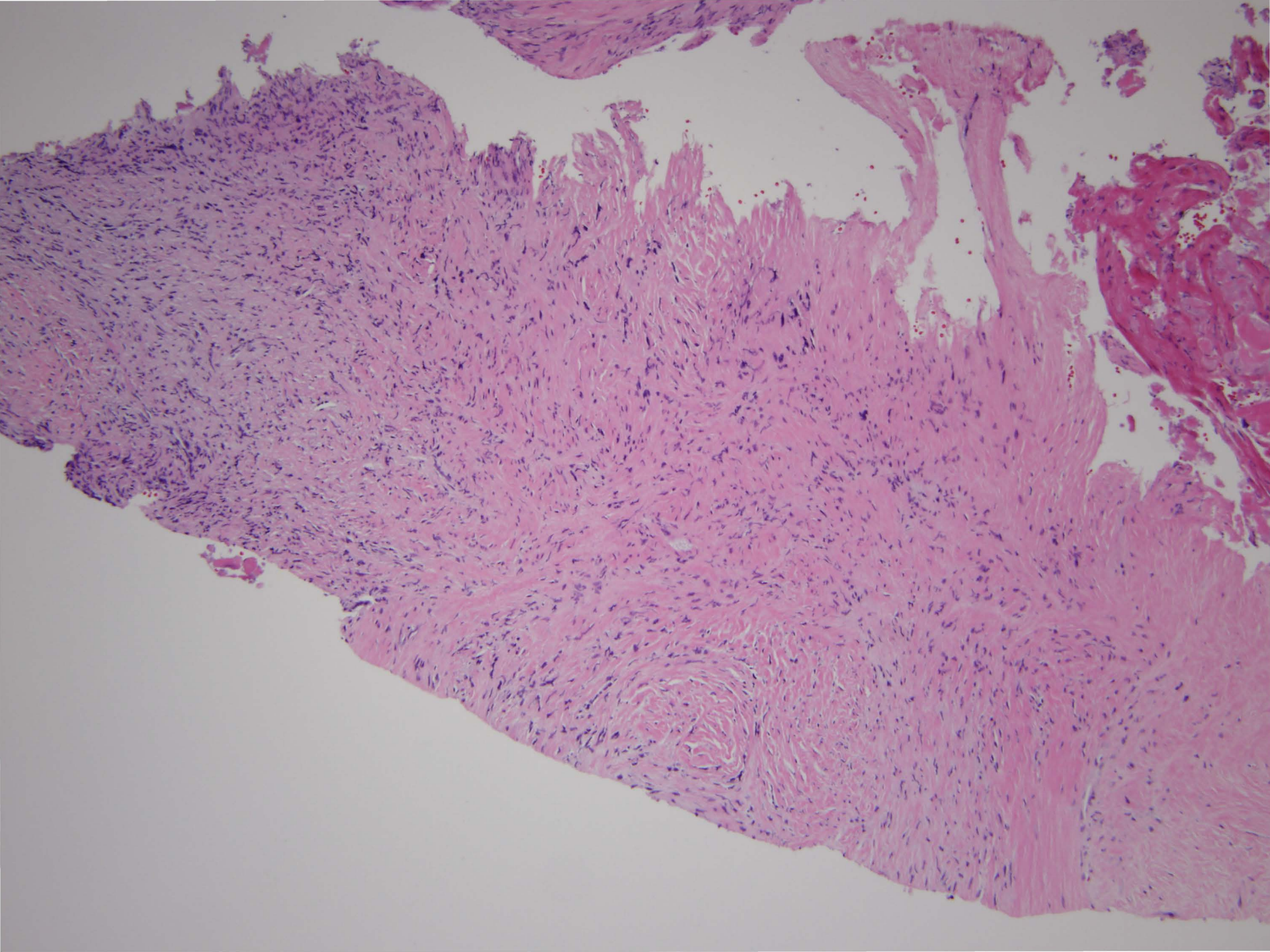
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate

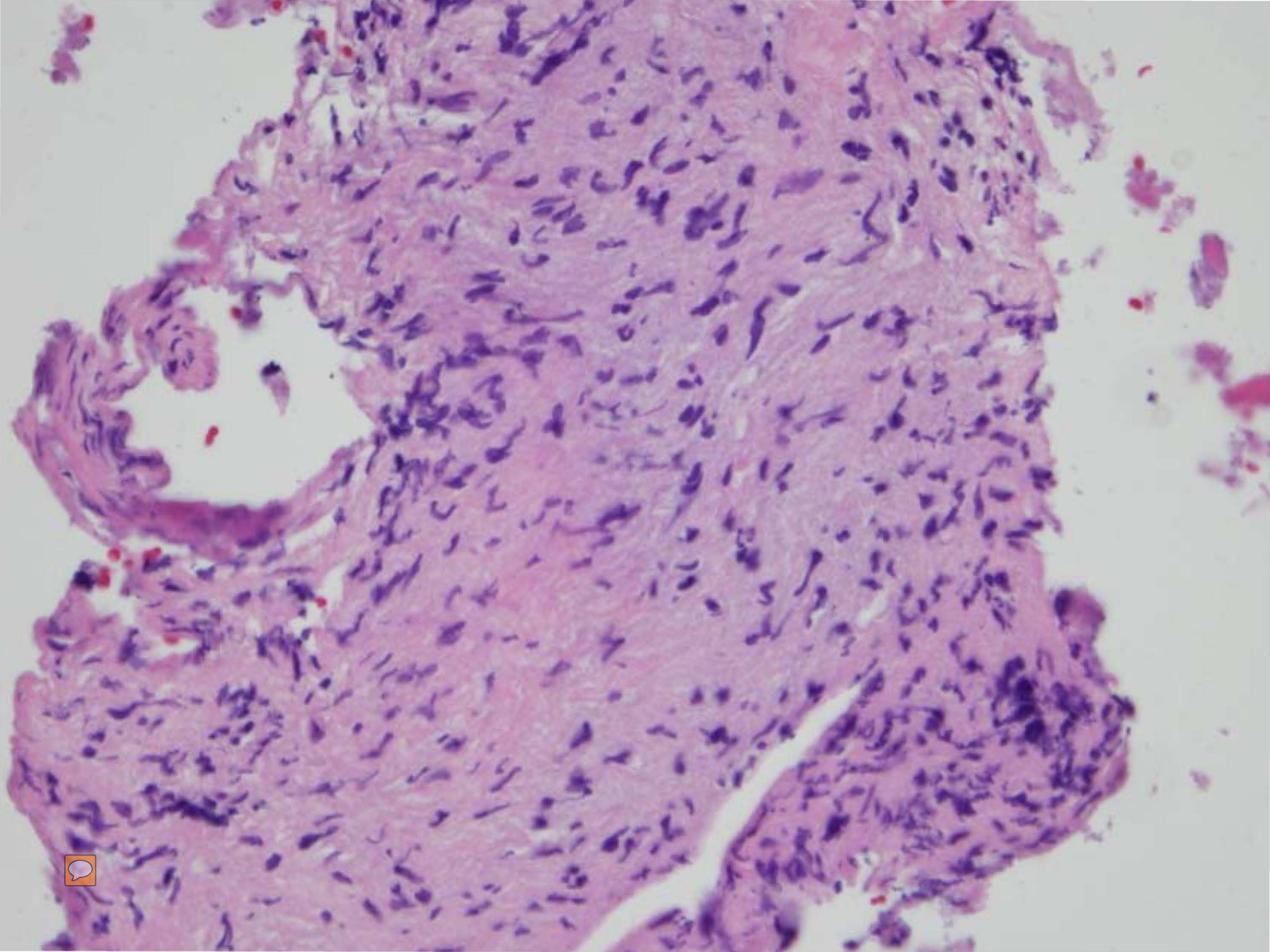
*Relative Radiation Level

Pathology

Melanie Johncilla

Malignant spindle cell neoplasm





Malignant Spindle Cell Neoplasm

- Minute fragments of MALIGNANT SPINDLE CELL NEOPLASM and necrotic bone.

- Immunohistochemistry
  - Positive - CAM5.2 (focal)
  - Negative - pan-keratin, AE1/AE3, PAX-8, SMA, desmin, CD34