Tumores Ósseos & Radiografia

Fabrício M. Corrêa
R3 Radiologia e Diagnóstico por Imagem

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REVIEWS AND COMMENTARY ■ REVIEW FOR RESIDENTS

Bone Tumors and Tumorlike Conditions: Analysis with Conventional Radiography[1]

Theodore T. Miller, MD

The approach to the radiographic diagnosis of bone tumors consists of analyzing the lesion in an organized fashion, with attention to the specific radiographic features of tumor location, margins, and zone of transition; periosteal reaction; mineralization; size and number of lesions; and presence of a soft-tissue component. Patient age is also an important clinical factor in the diagnosis of bone tumors, because various lesions have predilections for specific age groups.

Radiology

Radiography in the Initial Diagnosis of Primary Bone Tumors

Colleen M. Costelloe[1]
John E. Madewell

Costelloe CM, Madewell JE

Radiography is the optimal initial imaging modality for evaluating undiagnosed primary bone tumors. The advantage of radiographic technique is to collapse the density of all points in the imaging plane into a 2D image. The resulting unique anatomic information allows the efficient evaluation of characteristics that reflect the biologic activity or growth rate of primary bone tumors, such as lesion margins, periosteal reaction, cortical expansion, thinning, and destruction.

Introdução

Semiologia radiológica

- Idade do paciente
- Localização do tumor
- Margens e zona de transição
- Reação periosteal
- Mineralização
- Tamanho e número de lesões
- Componente de partes moles

Pré-imagem

Imagem

Idade do Paciente

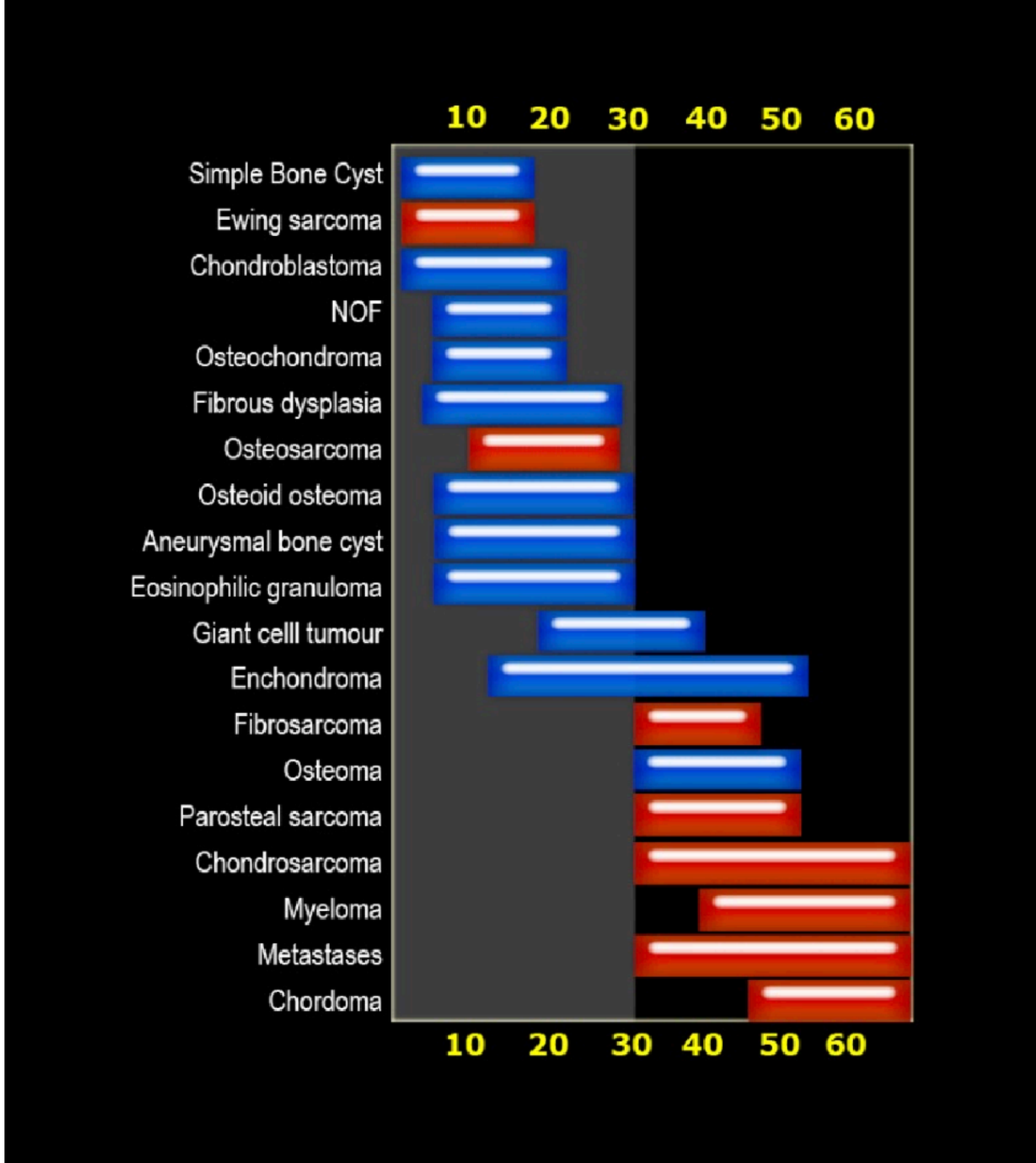
Quando?

Maioria dos tumores tem predileção por uma faixa etária; portanto, a informação clínica mais importante ao analisar um tumor ósseo é a idade do paciente

Table 1

Peak Age Predilection of Bone Lesions

Age (y)	Benign	Malignant
<20	Fibrous cortical defect, nonossifying fibroma, simple bone cyst, aneurysmal bone cyst, chondroblastoma, Langerhans cell histiocytosis, osteoblastoma, osteoid osteoma, osteofibrous dysplasia, chondromyxoid fibroma, fibrous dysplasia, enchondroma	Leukemia, Ewing sarcoma, osteosarcoma (conventional, periosteal, telangiectatic), metastatic disease (rare), neuroblastoma, retinoblastoma, rhabdomyosarcoma, Hodgkin lymphoma
20–40	Enchondroma, giant cell tumor, osteoblastoma, osteoid osteoma, chondromyxoid fibroma, fibrous dysplasia	Osteosarcoma (parosteal), adamantinoma
>40	Fibrous dysplasia, Paget disease, non-Hodgkin lymphoma, chondrosarcoma, malignant fibrous histiocytoma, osteosarcoma (secondary to Paget disease and radiation)	Metastatic disease (most common), myeloma



Localização do Tumor

Onde?

Maioria dos tumores, a despeito de serem malignos ou não, frequentemente ocorrem em um localização característica:

- Esqueleto axial ou apendicular
- Osso longo ou plano

Lesão em osso longo pode ser classificada por orientação:

- Longitudinal - epífise, metáfise ou diáfise
- Transversa - medular, cortical ou justacortical

Alguns tumores tem predileção por um particular osso e localização

Table 2

Typical Locations of Bone Lesions

Location	Benign	Malignant
Epiphyseal (end of bone)	Chondroblastoma (skeletally immature patient)	Clear cell chondrosarcoma (exceedingly rare tumor)
	Giant cell tumor (skeletally mature patient)	
	Osteomyelitis (pyogenic: starts in metaphysis and may spread to epiphysis if the person is <18 mo old; tuberculosis or fungus at end of bone in skeletally mature person)	
	Paget disease	
	Intraosseous ganglion/geode (should have associated arthritis)	
	Osteochondral injury	
Metaphyseal		
Medullary	Simple (unicameral) bone cyst (centrally located)	Conventional osteosarcoma
	Aneurysmal (multicameral) bone cyst (eccentrically located; may be engrafted on other lesions such as giant cell tumor and chondroblastoma)	Chondrosarcoma
	Enchondroma (centrally located)	Metastatic disease
	Fibrous dysplasia	Myeloma (over age 40)
	Osteomyelitis (typical location for pyogenic infection in children >18 mo and adults)	Lymphoma
	Localized Langerhans cell histiocytosis	Malignant vascular tumors (very rare; angiosarcoma, hemangiopericytoma)
	Chondromyxoid fibroma (eccentrically located)	
Cortical	Fibrous cortical defect and nonossifying fibroma (lytic in children, fills in and involutes in adults)	Metastatic disease (especially lung)
	Osteoid osteoma (small lucent nidus with surrounding fusiform reactive sclerosis)	
Juxtacortical	Juxtacortical chondroma (arises from periosteum)	Periosteal osteosarcoma (arises from deep cambian layer of periosteum)
		Parosteal osteosarcoma (arises from a superficial layer of periosteum)
		Juxtacortical chondrosarcoma (arises from the periosteum)
Diaphyseal (shaft)		
Medullary	Fibrous dysplasia	Ewing sarcoma (may also occur in the metaphysis and in flat bones: eg, calvarium, pelvis, mandible, ribs; reflecting red marrow distribution)
	Localized Langerhans cell histiocytosis (may also occur in metaphysis and flat bones, eg, calvarium, pelvis, mandible, ribs)	Lymphoma
		Myeloma (occurs in red marrow sites, eg, axial skeleton and proximal aspects of humeri and femora)
		Metastatic disease (may be medullary or cortical)
		Malignant vascular tumors (very rare; angiosarcoma, hemangiopericytoma)
Cortical	Ossifying fibroma (ie, osteofibrous dysplasia or Campanacci lesion)	Adamantinoma (mixed lytic and sclerotic lesion occurring almost exclusively in anterior cortex of tibia; tibia may be bowed; look for satellite lesion in tibia or adjacent fibular involvement)
		Metastatic disease (especially lung)

Figure 1

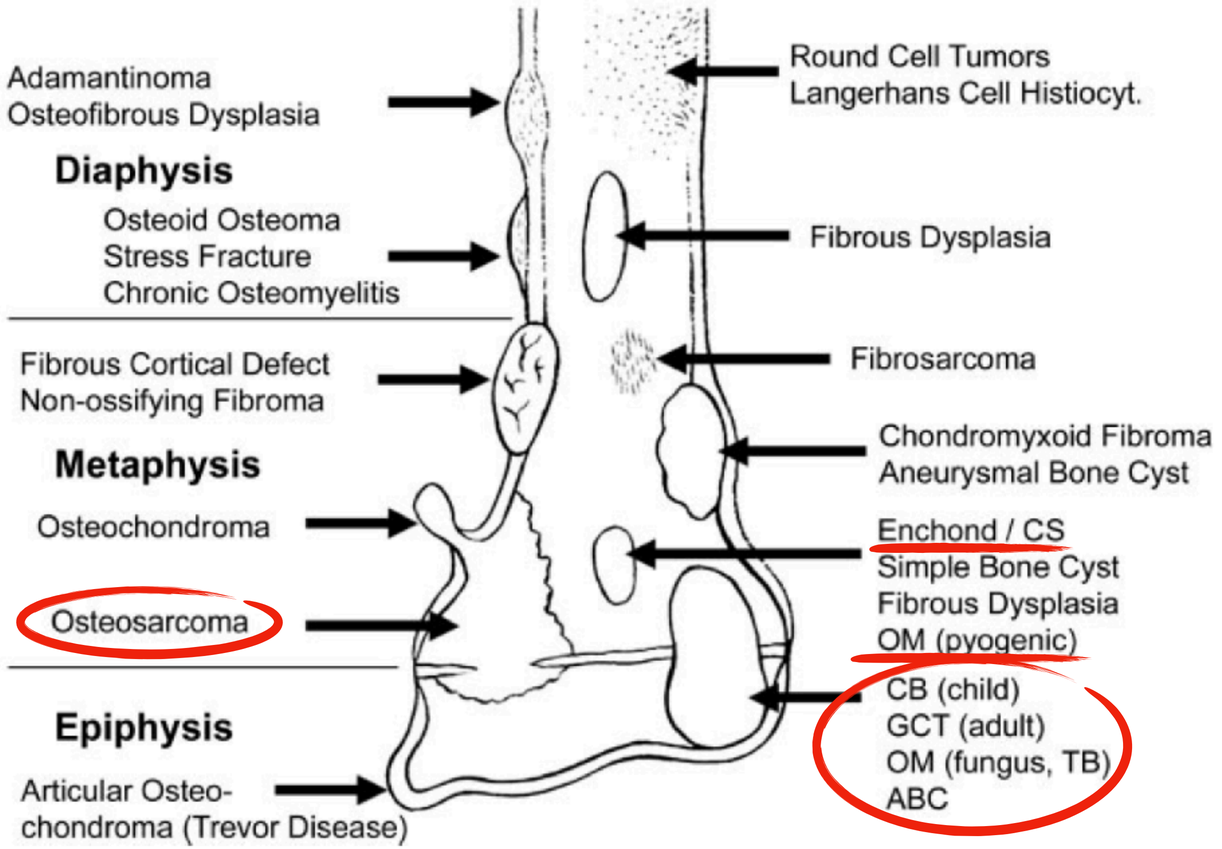


Figure 1: Diagram shows common locations of tumors and tumorlike conditions in transverse and longitudinal dimensions of a long bone. *ABC* = aneurysmal bone cyst, *CB* = chondroblastoma, *CS* = chondrosarcoma, *Enchond* = enchondroma, *GCT* = giant cell tumor, *OM* = osteomyelitis, *TB* = tuberculosis. (Adapted and reprinted, with permission, from reference 1.)

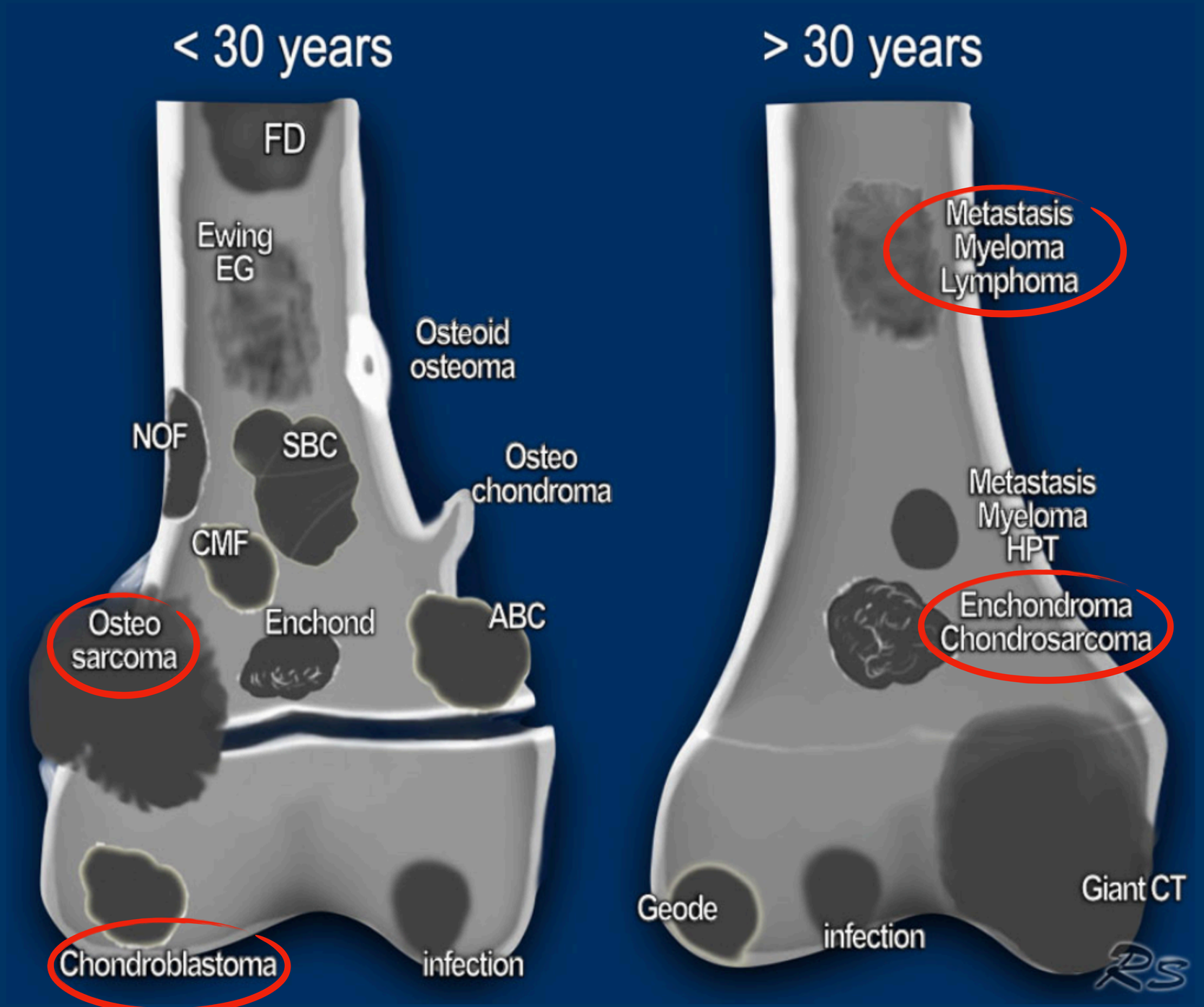
Table 3

Specific Sites of Selected Tumors

Tumor	Site
Adamantinoma	Anterior cortex of tibia
Osteofibrous dysplasia	Anterior cortex of tibia
Epidermal inclusion cyst	Terminal tuft of phalanx
Glomus tumor	Terminal tuft of phalanx
Periosteal desmoid	Posterior cortex of distal femur
Parosteal osteosarcoma	Posterior cortex of distal femur
Chordoma	Clivus, vertebral bodies, sacrum
Hemangioma	Vertebral bodies
Simple bone cyst	Calcaneus
Intraosseous lipoma	Calcaneus (may have focal calcification)
Osteoblastoma	Posterior elements of spine
Aneursymal bone cyst	Posterior elements of spine

Figure 2

Figure 2: Anteroposterior radiograph of the hip in a 17-year-old patient shows lucent, mildly expansile lesion (arrows) in the greater trochanter (an epiphyseal equivalent), representing chondroblastoma.


< 30 years
> 30 years
FD
Ewing
EG
Osteoid
osteoma
NOF
SBC
Osteo
chondroma
CMF
Osteo
sarcoma
Enchond
ABC
Chondroblastoma
infection
Metastasis
Myeloma
Lymphoma
Metastasis
Myeloma
HPT
Enchondroma
Chondrosarcoma
Geode
infection
Giant CT
RS

“O conhecimento dessas informações por si só é suficiente para estreitar o diagnóstico diferencial, sem nem mesmo olhar para nenhuma imagem.”

56 anos, surgiu uma lesão na diáfise do fêmur…

Margens

Indício de agressividade, mas nem sempre de malignidade

Característica de imagem que mais reflete a agressividade do tumor ósseo primário, indicadora da taxa de crescimento da lesão

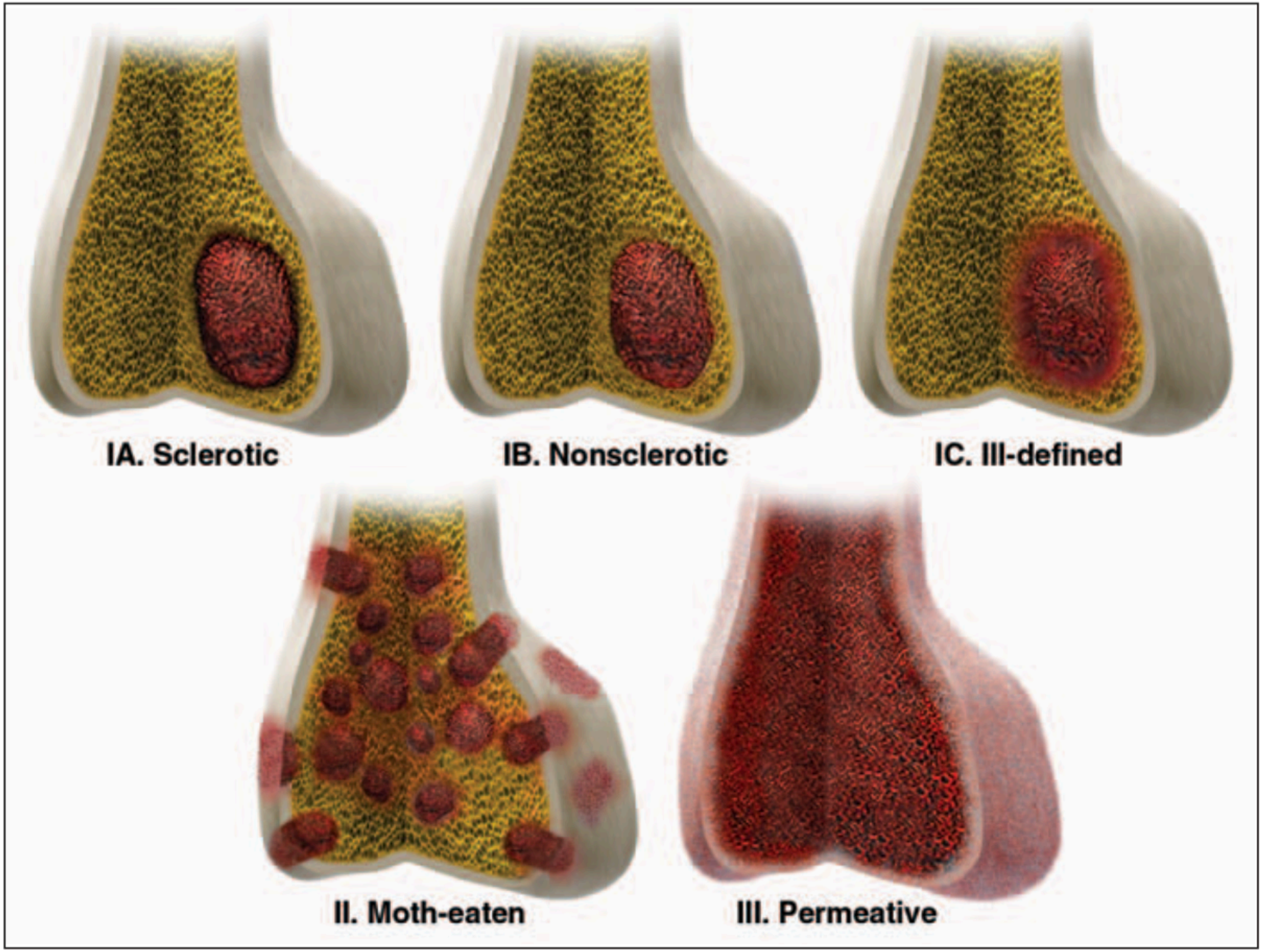
Contudo, enquanto uma aparência não agressiva sugere um processo benigno e uma aparência agressiva sugere um processo maligno, este nem sempre é o caso

Processos benignos com aparência agressiva - osteomielite, histiocitose de células de Langerhans

Processos malignos com aparência não agressiva - tumor de células gigantes e, em raras ocasiões, até metástase

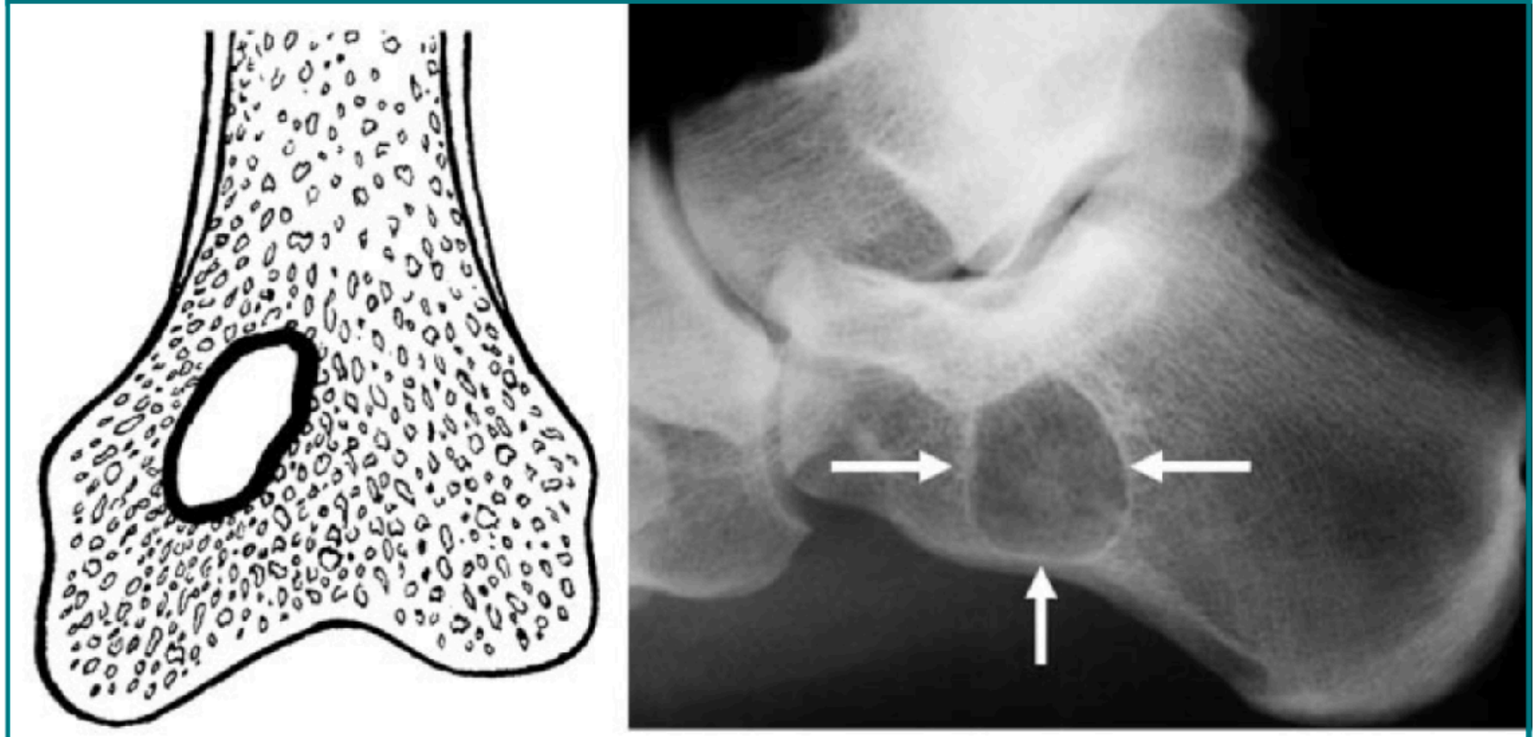
Existe uma classificação; a agressividade é crescente:

1. Tumores com forma redonda ou ovóide (geográficos):
    A. Margens bem definidas e escleróticas
    B. Margens bem definidas, sem aro esclerótica
    C. Margens mal definidas
2. Campos mal definidos de destruição óssea - lesão não geográfica (roído de traça)
3. Permeativo



IA - Geográfico, bordas escleróticas

Figure 3



a. b.

Figure 3: Type 1a geographic lesion. **(a)** Diagram shows well-defined lucency with sclerotic rim. (Adapted and reprinted, with permission, from reference 1.) **(b)** Lateral radiograph shows intraosseous lipoma of the calcaneus, with a sclerotic rim (arrows).

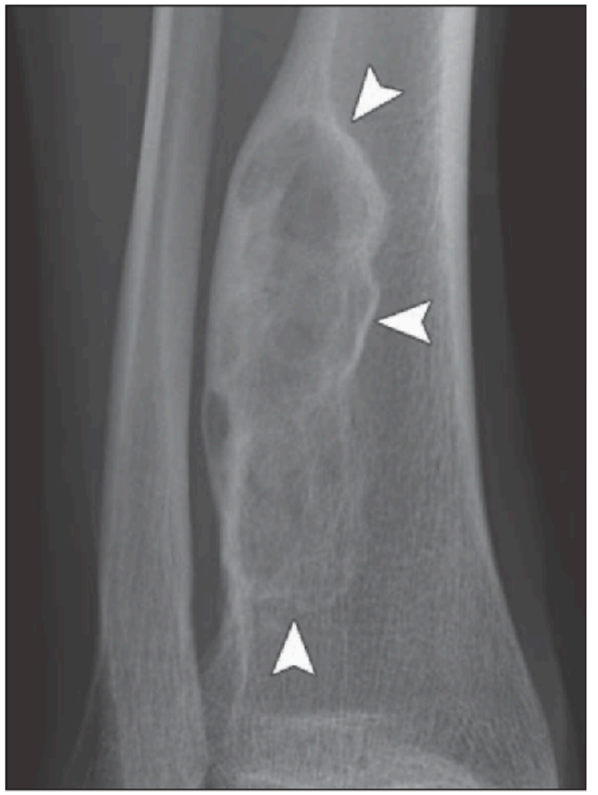
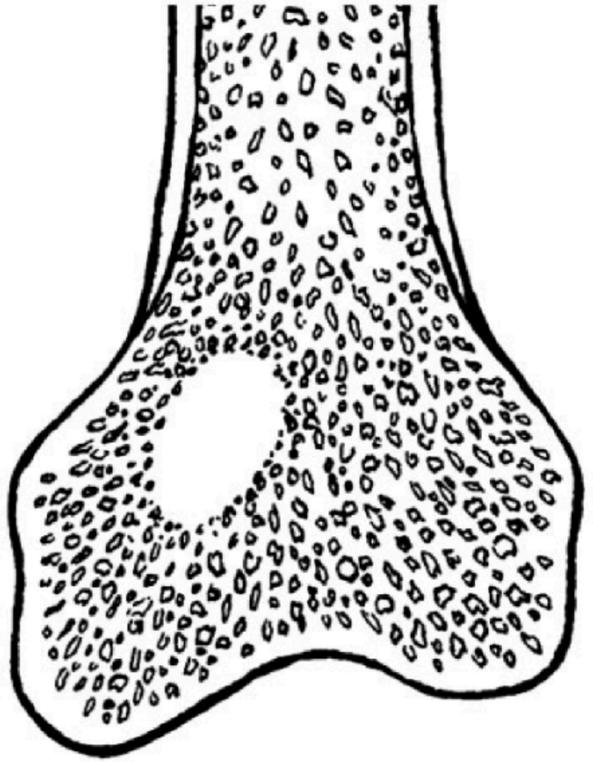
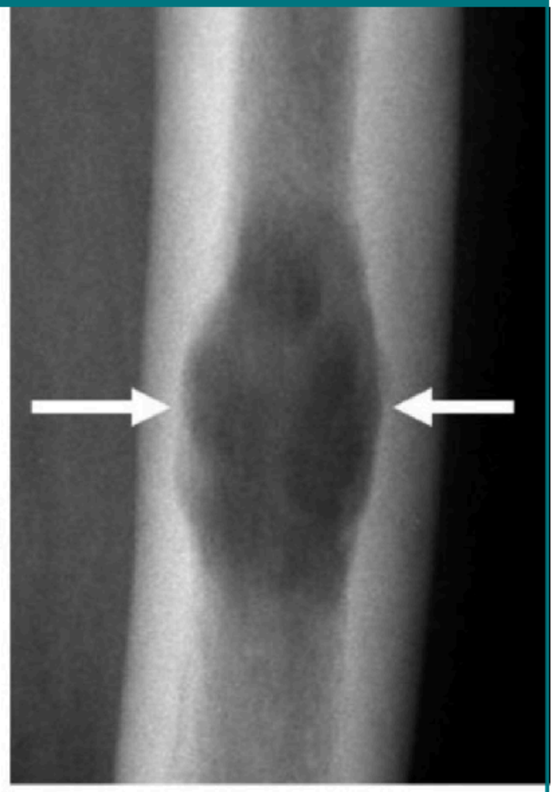


Fig. 2—Fibroxanthoma (nonossifying fibroma) of distal tibial metadiaphysis in 23-year-old man. Radiograph shows shape of lesion is well-defined oval (geographic) indicating that margin is type I. Narrow zone of transition (*arrowheads*) between tumor and normal bone indicates least aggressive margin (IA). Slowly expansile nature of tumor has resulted in mild bowing of adjacent distal fibula.

IB - Geográfico, bordas bem definidas, não-escleróticas

Figure 4





a. b.

Figure 4: Type 1b geographic lesion. **(a)** Diagram shows well-defined lucent lesion without sclerotic rim. (Adapted and reprinted, with permission, from reference 1.) **(b)** Anteroposterior radiograph of femur shows well-defined geographic lytic focus of myeloma without a sclerotic rim. Notice the endosteal scalloping (arrows).

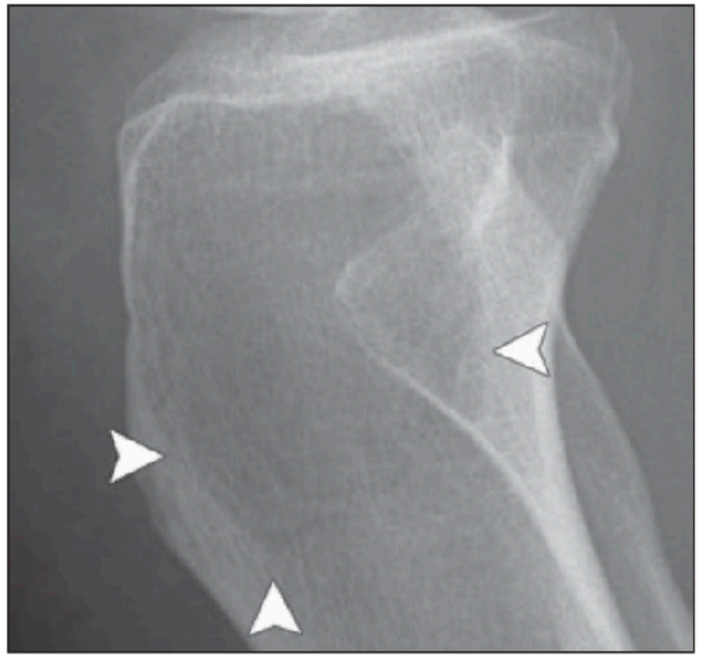
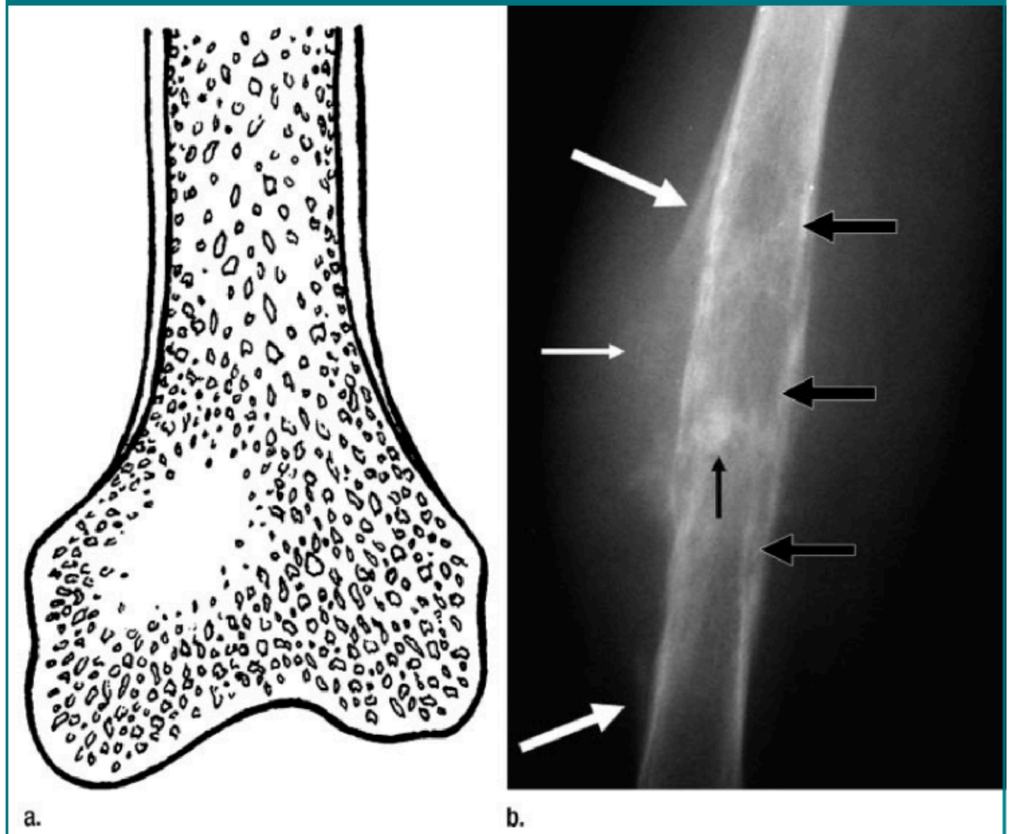


Fig. 3—Giant cell tumor of bone of proximal tibial epiphysis in 28-year-old woman. Radiograph shows round/oval lesion is geographic (type I) with narrow zone of transition (*arrowheads*) but no sclerotic rim (type IB). Lack of sclerotic rim indicates that lesion is of indeterminate biologic potential and could be benign or malignant. Lesions with IB margins can be subtle in appearance on radiographs. Biopsy indicated giant cell tumor of bone, which is locally aggressive benign lesion.

IC - Geográfico, bordas mal definidas

Figure 5



a. b.

Figure 5: Type 1c geographic lesion. **(a)** Diagram shows ill-defined lytic lesion. (Adapted and reprinted, with permission, from reference 1.) **(b)** Lateral radiograph of femur in patient with osteosarcoma shows large ill-defined lytic lesion (large black arrows). Note Codman triangles (large white arrows), periosteal interruption (small white arrow), and tumor-induced new bone production (small black arrow). The diaphyseal location is unusual for osteosarcoma.

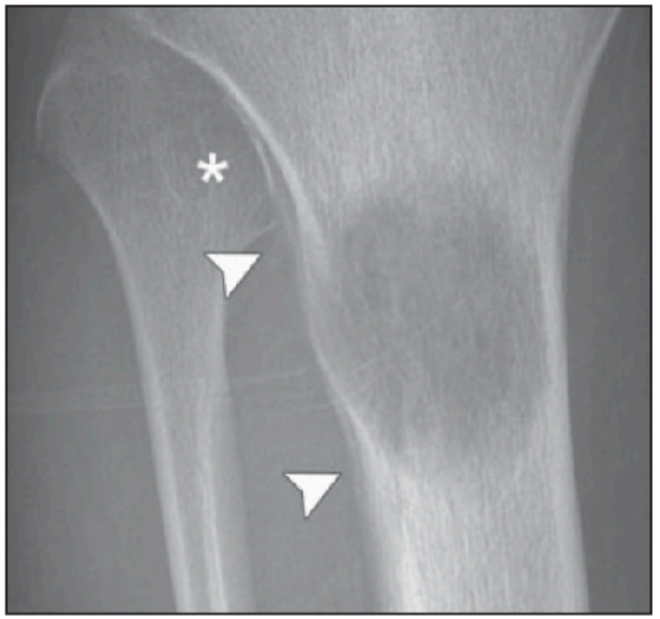
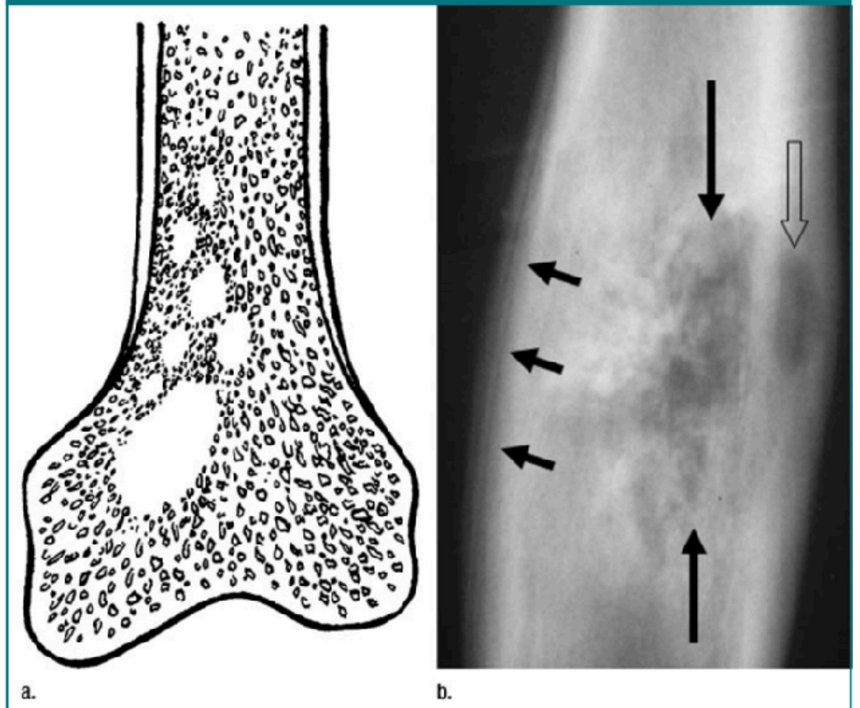


Fig. 4—Osteosarcoma of proximal tibial metadiaphysis in 15-year-old boy. Radiograph shows lesion is round/oval and therefore geographic but wide zone of transition is present between ill-defined periphery of lesion and normal bone. This type IC margin is typical of aggressive bone tumors. Cortical thinning is seen laterally with deceptively mild periosteal reaction (*arrowheads*). Osteoid produced by osteosarcomas is microscopically apparent and may or may not be appreciable on imaging studies. Incidental osteochondroma of fibular head is partially visualized (*asterisk*).

II - Roído de Traça

Figure 6



a. b.

Figure 6: Type 2 moth-eaten lesion. **(a)** Diagram shows patchy lysis of medullary cavity. (Adapted and reprinted, with permission, from reference 1.) **(b)** Anteroposterior radiograph of osteosarcoma shows ill-defined patchy lytic lesion involving medullary cavity (long solid arrows) and cortex (open arrow). Also note multilamellated periosteal reaction (short solid arrows).

Table 4

Tumors with a Permeated or Moth-eaten Appearance, by Age

Tumor Type	Patient Age
Benign	
Localized Langerhans cell histiocytosis	5–15 yr
Acute pyogenic osteomyelitis	Any age
Malignant	
Neuroblastoma metastases	Young child
Retinoblastoma metastases	Young child
Rhabdomyosarcoma metastases	Young child
Leukemia	Young child
Ewing sarcoma and variants (primitive neuroectodermal tumor, Askin tumor)	5–20 yr
Osteosarcoma	10–25 yr
Lymphoma	>20 yr
Myeloma	>40 yr

III - Permeativo

Figure 7

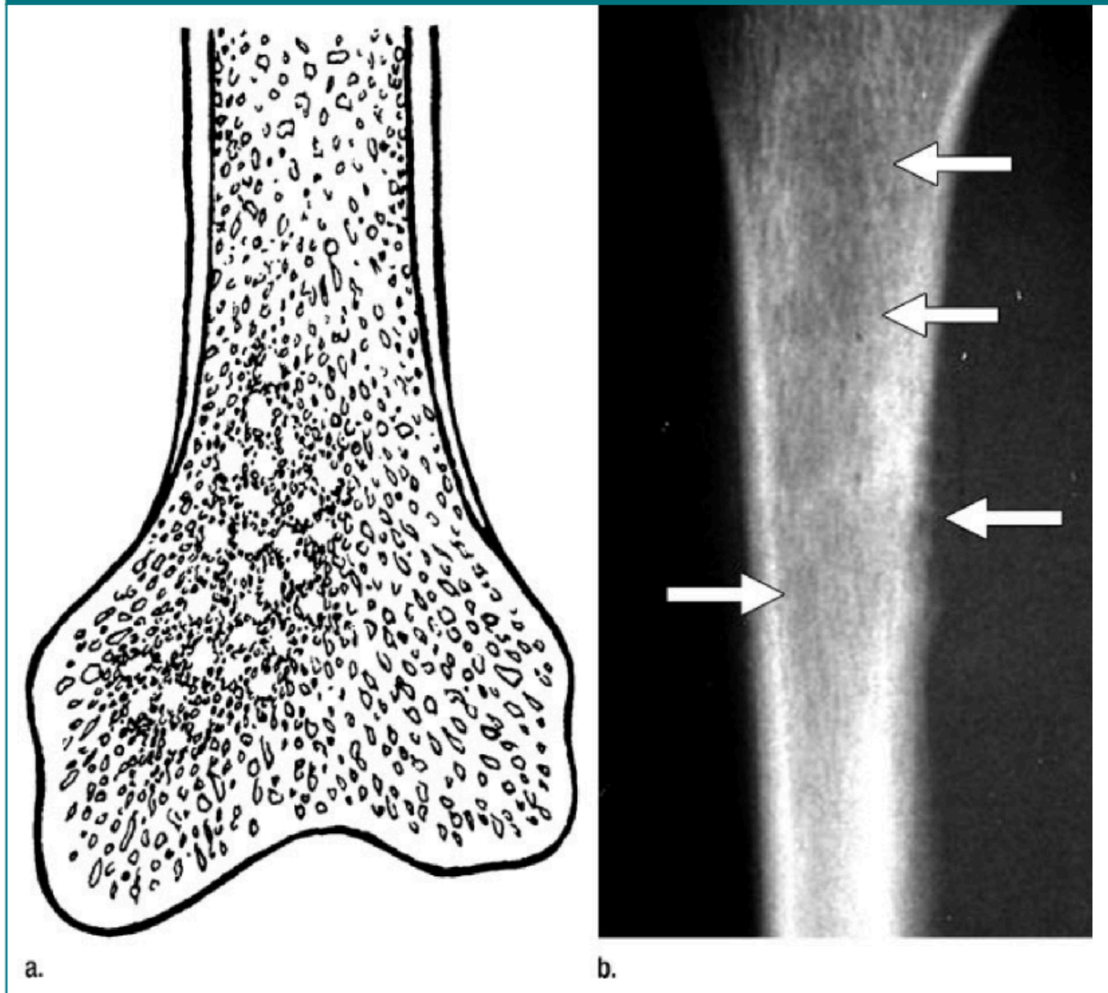


Figure 7: Type 3 permeated lytic lesion. **(a)** Diagram shows small patchy lucencies in medullary cavity. (Adapted and reprinted, with permission, from reference 1.) **(b)** Anteroposterior radiograph shows fine permeated pattern involving cortex and medullary space of diametaphysis of proximal portion of tibia (arrows) in a patient with Ewing sarcoma. (Image courtesy of Marcia Blacksin, MD, University of Medicine and Dentistry of New Jersey, Newark, NJ.)

Fig. 5—Primary Burkett lymphoma of distal femur in 23-year-old woman. Radiograph shows numerous lytic foci of varying size are seen throughout distal femoral diaphysis (*brackets*). They are not round or oval in distribution and are illustrative of type II (moth-eaten margin). More severe osteolysis is seen in lateral femoral condyle and distal epiphysis, showing fine or fuzzy osteolysis of type III (permeative) margin (*arrowheads*). Fracture is present at level of lateral metaphyseal region.

Reação Periosteal

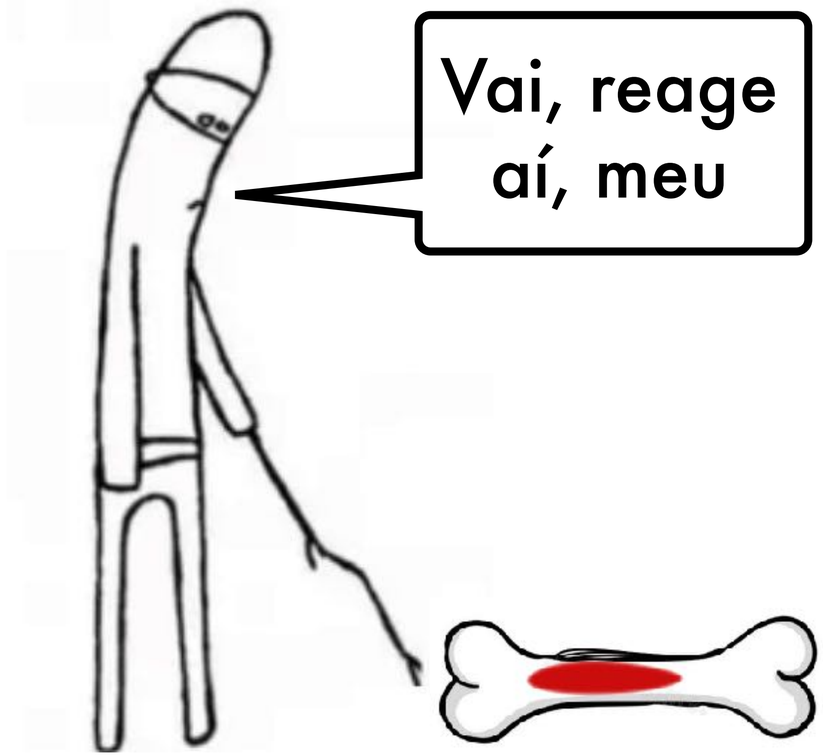
Também indica agressividade

Reação periosteal sólida ou unilamelar tem aparência não agressiva, o que indica que a lesão cresce lentamente e “dá a chance” para o osso “isolar” a lesão

Aparência multilamelar ou em “casca de cebola” sugere um processo intermediário, como que “cresce e diminui” ou aquele que o osso continuamente tenta isolar a lesão, mas não consegue

Reação espiculada, em “cabelo em pé” ou “raio de sol” é altamente sugestiva de malignidade

O triângulo de Codman se refere à elevação do periósteo acima do córtex, com um ângulo formado onde o periósteo elevado e o osso se encontram



Vínculo prático:

- **Reação periosteal exclui os diagnósticos de displasia fibrosa, encondroma, fibroma não-ossificante e cisto ósseo simples, a menos que exista uma fratura**
- **Tumores malignos nunca apresentam reação periosteal benigna**

Unilamelar

Figure 8

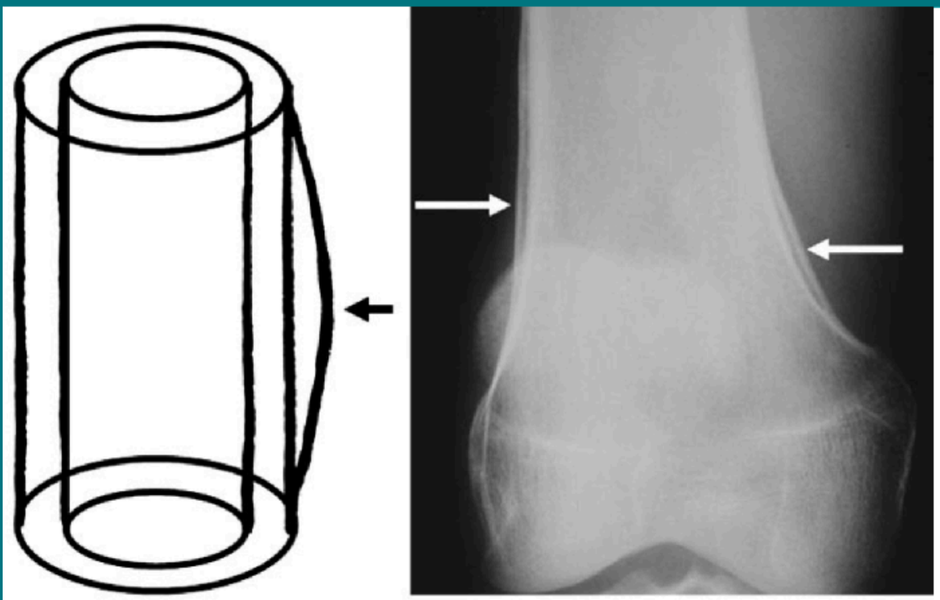


Figure 8: Unilamellated periosteal reaction. **(a)** Diagram shows single layer of reactive periosteum (arrow). (Adapted and reprinted, with permission, from reference 2.) **(b)** Anteroposterior radiograph of the knee in patient with hypertrophic osteoarthropathy shows thick unilamellated periosteal reaction (arrows).

Multilamelar

Figure 9

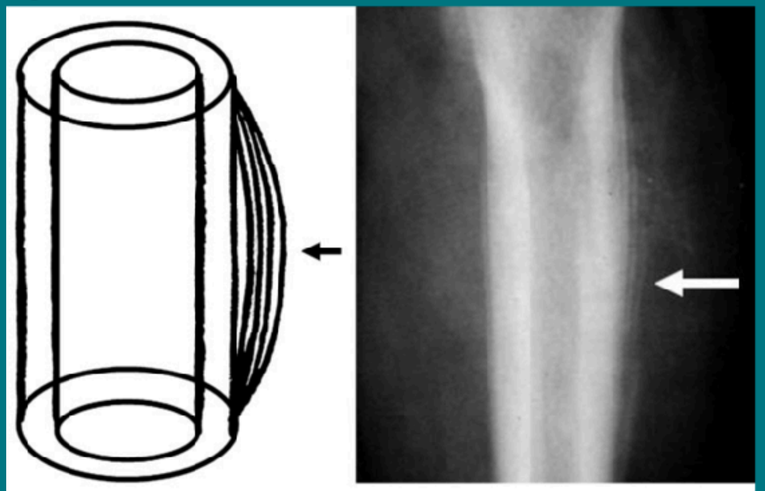


Figure 9: Multilamellated periosteal reaction. **(a)** Diagram shows multilamellated, or onionskin, periosteal reaction (arrow). (Adapted and reprinted, with permission, from reference 2.) **(b)** Anteroposterior radiograph in a patient with osteosarcoma shows multilamellated periosteal reaction (arrow) in proximal portion of femur. Note also large surrounding soft-tissue mass. See also Figure 6b. (Image courtesy of David Disler, MD, Commonwealth Radiology, Richmond, Va.)

Cabelo em Pé e Raio de Sol

Figure 10

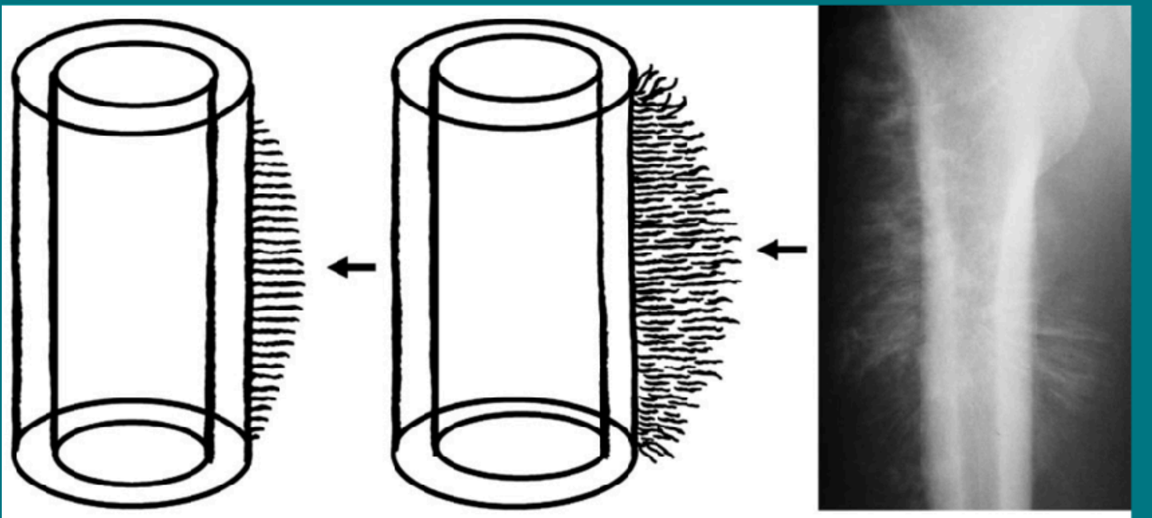


Figure 10: Perpendicular periosteal reaction. **(a)** Diagram shows spiculated, or hair-on-end, periosteal reaction (arrow). **(b)** Diagram shows radial, or sunburst, periosteal reaction (arrow). (Fig 10a, 10b adapted and reprinted, with permission, from reference 2.) **(c)** Anteroposterior radiograph in patient with osteosarcoma shows marked perpendicular periosteal reaction in proximal portion of femur. (Image courtesy of Marcia Blacksin, MD, University of Medicine and Dentistry of New Jersey, Newark, NJ.)

Figure 11

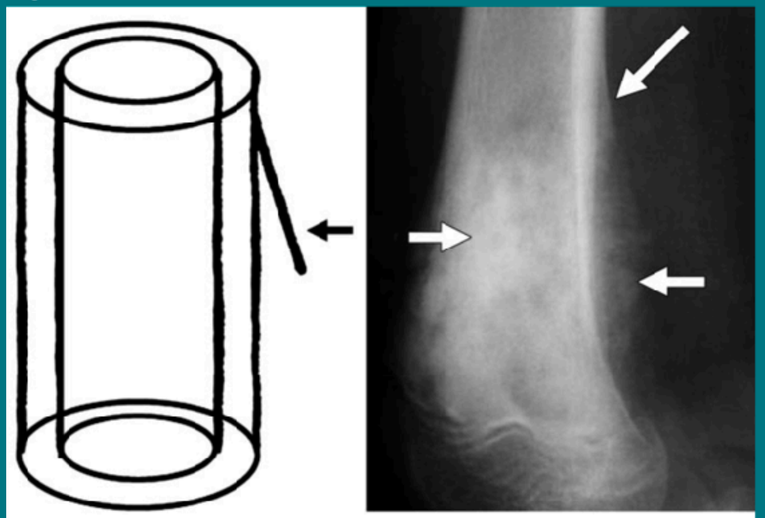


Figure 11: Codman triangle. **(a)** Diagram shows elevated periosteum (arrow) forming an angle with the cortex. (Adapted and reprinted, with permission, from reference 2.) **(b)** Lateral radiograph in patient with osteosarcoma shows the elevated periosteum forming Codman triangle (long arrow). Notice the tumor-induced new bone formation (short arrows.) See also Figure 5b.

Triângulo de Codman

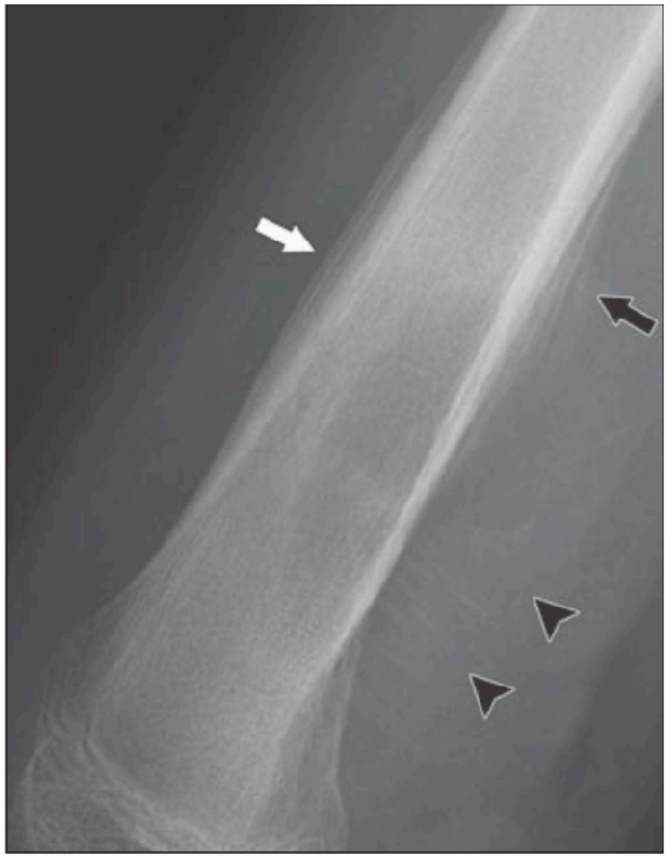
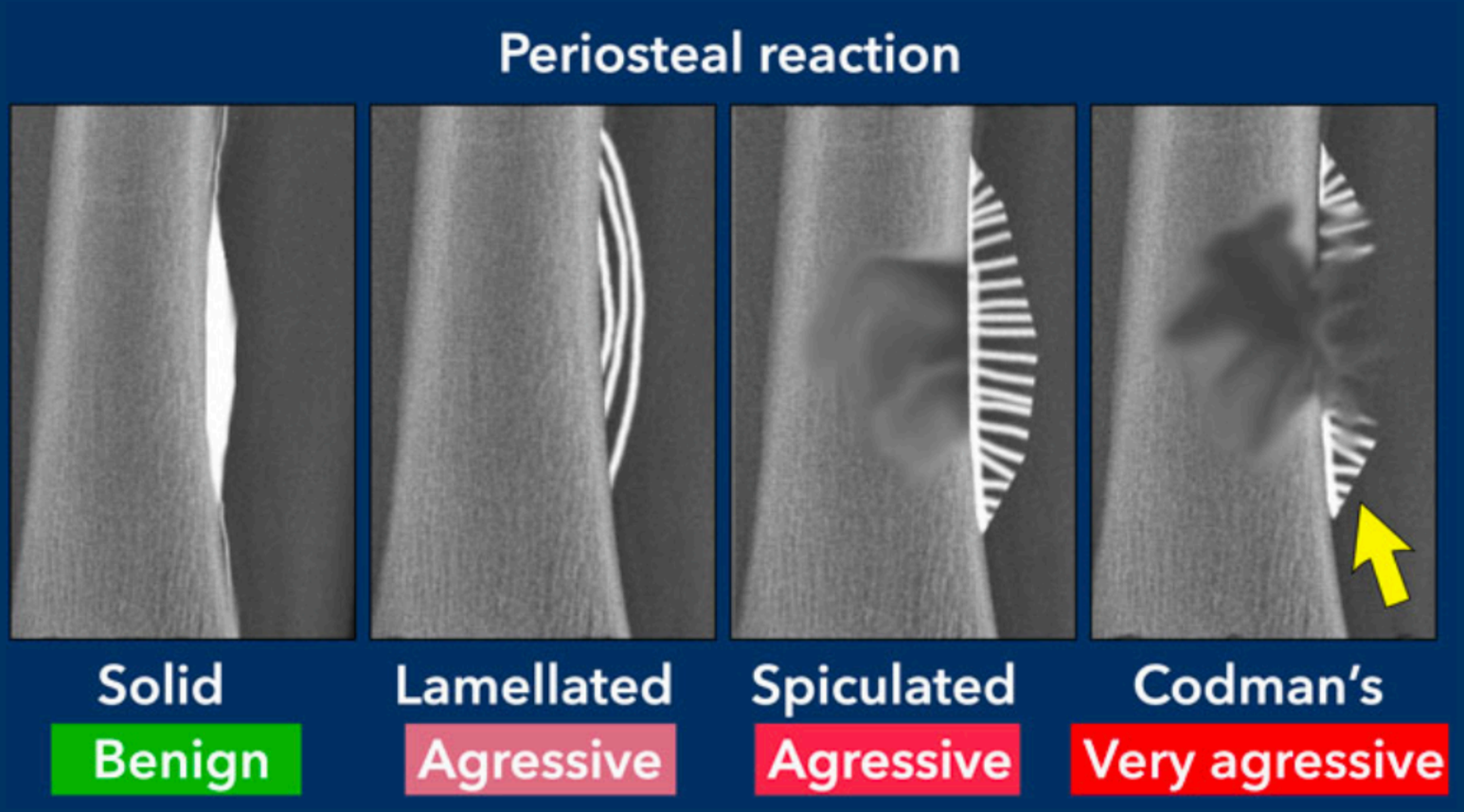


Fig. 9—Osteosarcoma of distal femoral metadiaphysis in 14-year-old boy. Radiograph shows multilaminar onionskin periosteal reaction anteriorly (*white arrow*). Interrupted periosteal reaction and Codman's triangle (*black arrow*) are seen posteriorly and proximally, and hair-on-end or sunburst periosteal reaction (*arrowheads*) is seen posteriorly and distally. Although multilaminar periosteal reactions are commonly seen with Ewing sarcoma, each type of reaction can be seen in each type of tumor. Cortical and trabecular margins of this aggressive tumor are permeative (type III).



Opacidade e Mineralização

Natureza do tumor

Tumores podem ser líticos, escleróticos ou mistos e usualmente possuem uma opacidade típica

Transparência e esclerose associadas às verdadeiras neoplasias são devidas ao estímulo de osteoclastos e osteoblastos, respectivamente

Algumas vezes a destruição do osso causará o sequestro de um fragmento ósseo dentro da área lítica

Ocasionalmente, o padrão trabecular da lesão pode ser a chave para o diagnóstico

Opacidade e Mineralização

Natureza do tumor

A opacidade da lesão também pode ser afetada pela mineralização de sua matriz:

- Matriz se refere ao tipo de tecido do tumor - osteoide, condral, fibroso ou adiposo
- Mineralização é a calcificação da matriz

Calcificação da matriz condral frequentemente produz mineralização puntiforme, floculenta, em forma de vírgula, arco ou anel:

- Encondroma, condrossarcoma ou condroblastoma

Calcificação da matriz óssea tem mineralização “fofinha”, amorfa ou em forma de nuvem, o que causa uma aparência radiográfica opaca

Matriz fibrosa pode ter densidade ligeiramente densa, “vidro fosco” ou mineralização madura e densa que pode ser uniforme ou heterogênea

Figure 14

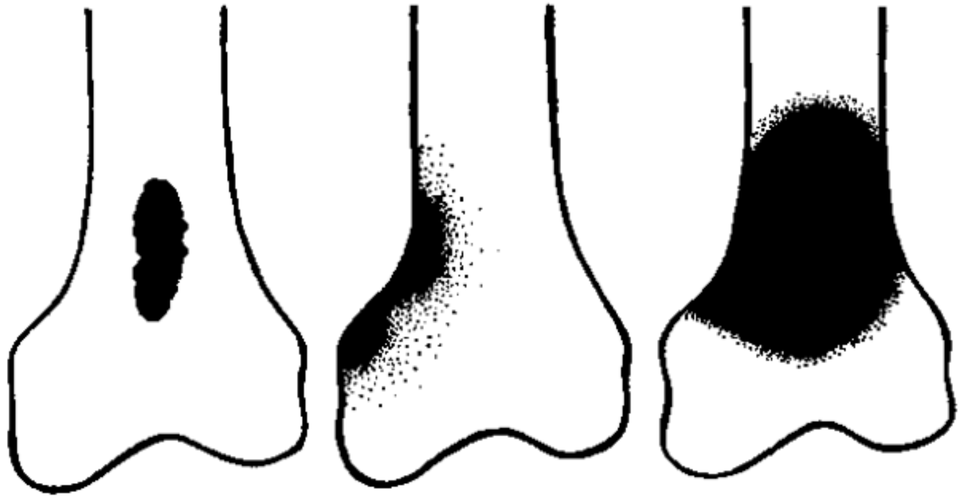
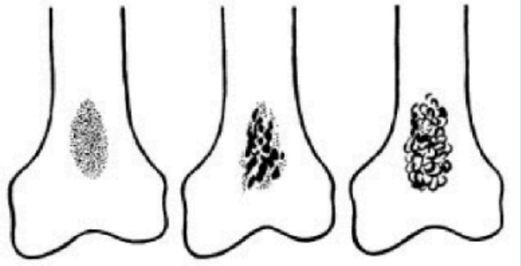
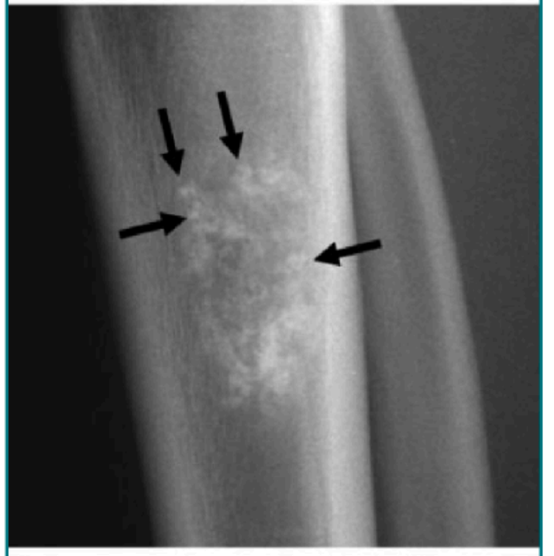


Figure 14: Diagram shows patterns of mineralization of osseous matrix with solid (left), cloud-like (middle), and ivory-like (right) opacity. (Adapted and reprinted, with permission, from reference 3.) See also Figures 5b, 11b, and 16.

Figure 13



a.



b.

Figure 13: Chondral mineralization. **(a)** Diagram shows patterns and of mineralization of cartilaginous tumor matrix: stippled (left), flocculent (middle), and ring and arc (right). (Adapted and reprinted, with permission, from reference 3.) **(b)** Lateral radiograph of proximal portion of tibia shows enchondroma with punctate and arclike mineralization (arrows).

Fig. 10—Dedifferentiated parosteal osteosarcoma of posterior metaphysis of distal femur in 33-year-old man. Radiograph shows proximal aspect of lesion is dedifferentiated and shows fluffy or cloudlike osteoid matrix (*arrowhead*) within soft-tissue mass. Distal aspect of lesion is more typical of parosteal osteosarcoma and shows dense ivory osteoid (*arrow*).

Fig. 11—This chondrosarcoma of calcaneus in 26-year-old male originated from sessile osteochondroma (not readily identified on radiograph). Radiograph shows arcs and rings of mineralized chondroid matrix (*arrowhead*) throughout lesion. Mineralized matrix is stippled posteriorly at periphery of lesion (*arrow*).

Fig. 12—Fibrous dysplasia of tibia in 30-year-old woman. Lesion shows spectrum of opacities. Radiograph shows mineralized fibrous matrix is dense and mature proximally (*arrow*), whereas it has ground-glass appearance distally (*arrowheads*).

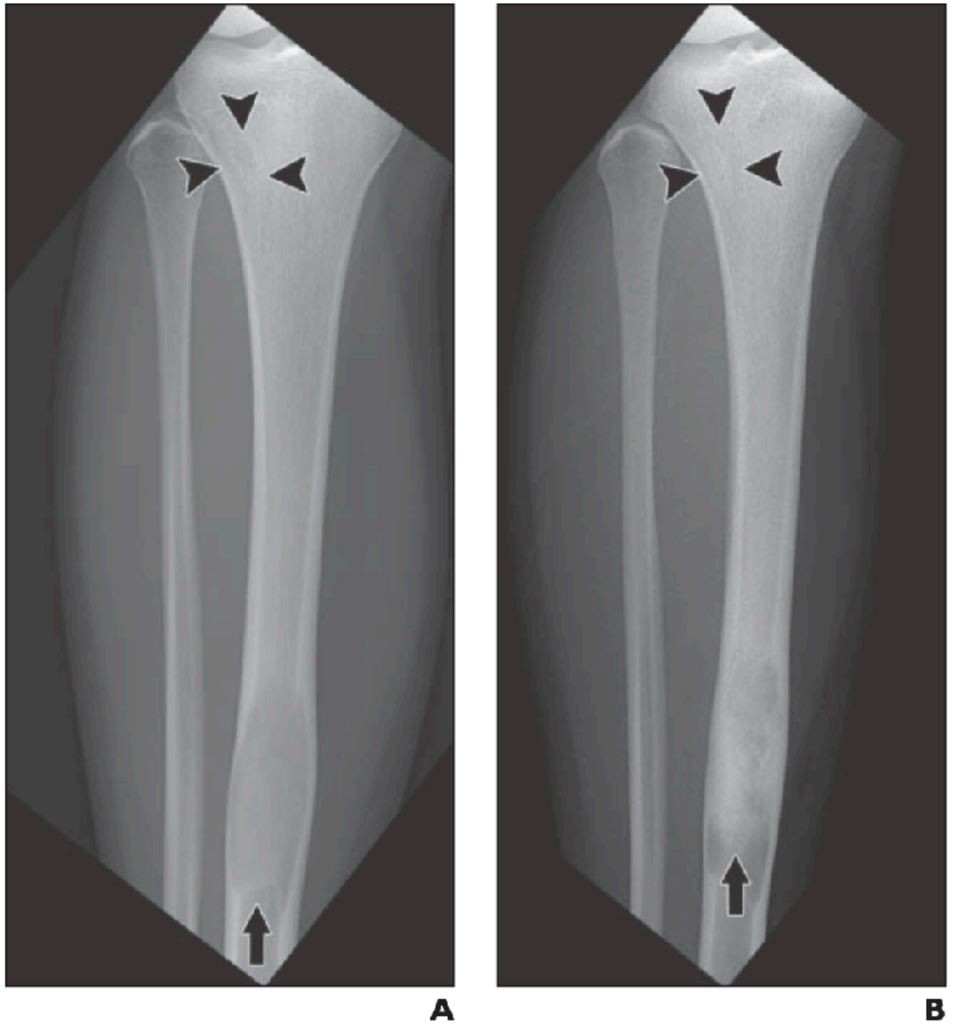


Fig. 13—Fibrous cortical defect of proximal tibial metaphysis with fibrous dysplasia in distal diaphysis of 15-year-old girl.
A, Radiograph shows small fibrous cortical defect is markedly eccentric because it is located in lateral cortex (*arrowheads*). Nonaggressive lesion shows sclerotic rim (IA margin). Fibrous dysplasia in distal diaphysis is centered in medullary cavity and expands entire circumference of bone. In some respects, this lesion resembles low-grade chondrosarcoma in Figure 6. Nevertheless, it shows ground-glass fibrous matrix and sclerotic distal rim (*arrow*).
B, Radiograph obtained 3 years later shows fibrous cortical defect (*arrowheads*) has matured and become dense. Because of risk of pathologic fracture caused by cortical thinning, fibrous dysplasia was curetted and packed with dense bone graft, which has incorporated into surgical defect (*arrow*).

Fig. 14—Osteosarcoma of proximal tibial metaphysis in 31-year-old woman after chemotherapy. Radiograph shows periphery of lesion has mineralized after therapy and could be confused with type IA margin (*arrowheads*). Nevertheless, focal areas of moth-eaten osteolysis remain visible centrally (*arrow*). Review of medical history is essential for proper interpretation of primary bone tumors.

Table 5

Lesions That May Contain a Sequestrum

Lesion Character	Lesion
Benign	Chronic osteomyelitis
	Localized Langerhans cell histiocytosis
	Osteochondral fracture (osseous fragment in donor pit)
	Intraosseous lipoma (ossification of fat necrosis rather than true sequestrum)
Malignant	Fibrosarcoma
	Malignant fibrous histiocytoma
	Primary lymphoma of bone

Tamanho e Número

Tamanho importa

Osteoma osteoide e osteoblastoma são lesões histologicamente similares, mas diferentes em tamanho:

- “Ninho" do osteoma osteoide < 1,5 cm
- Osteoblastoma > 1,5 cm

Lesão lítica bem definida e com aro esclerótico no córtex do osso longo:

- Defeito cortical fibroso < 3 cm
- Fibroma não ossificante > 3 cm
- Alguns autores preferem o termo genérico “fibroxantoma”

Lesão condral no osso longo:

- 1-2 cm: provavelmente encondroma
- O risco de condrossarcoma de baixo grau aumenta se maior que 4-5 cm

Tamanho e Número

O número de lesões também importa

Múltiplas lesões escleróticas podem representar metástases ou osteopoiquilose

- Na osteopoiquilose, as lesões são semelhantes em tamanho e periarticulares

As causas mais comuns de múltiplas opacidades em > 40 anos:

- Carcinoma metastático
- Mieloma múltiplo
- Linfoma não-Hodgkin metastático
- Tumor marrom

Table 6

Multiple Bone Lesions

Lesion Characteristic	Lesion
Sclerotic	Multiple bone islands (osteopoikilosis)
	Osteoblastic metastatic carcinoma (prostate, breast, lung, colon, mucin-producing adenocarcinoma)
Lytic	Osteolytic metastatic carcinoma (prostate, breast, lung, colon, etc)
	Myeloma
	Non-Hodgkin lymphoma
	Benign vascular lesions: hemangioma, cystic angiomatosis (rare tumor)
	Malignant vascular lesions (rare tumors): hemangioendothelioma, angiosarcoma, hemangiopericytoma
	Brown tumors of hyperparathyroidism (should have other radiographic features of hyperparathyroidism)
	Multiple enchondromatosis (Ollier and Maffuci disease; may have internal mineralization or appear as lucent linear seams of cartilage within bone)
	Fibrous dysplasia (usually ground-glass lytic but may be mixed lytic and sclerotic; bone may be deformed)

Envolvimento Cortical

Tumores extracorticais que se relacionam com o córtex

Processos originados da medula, do periósteo ou de partes moles adjacentes

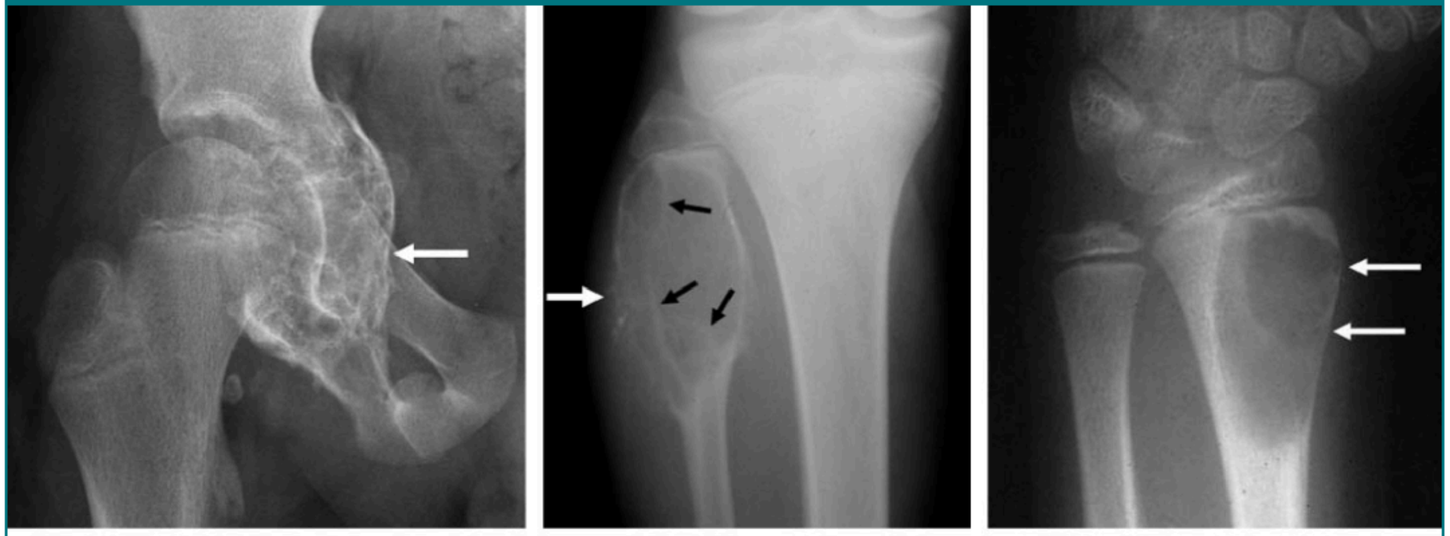
Endosteal Scalloping - reabsorção da superfície interna do córtex por expansão de um processo medular

A depender da agressividade da lesão, o osso expandido pode ser espesso ou fino

Se menos agressiva, o osso pode formar novo periósteo na superfície externa do córtex e aparentar “expandido"

Se a lesão for agressiva, pode ocorrer ruptura ou destruição completa do córtex

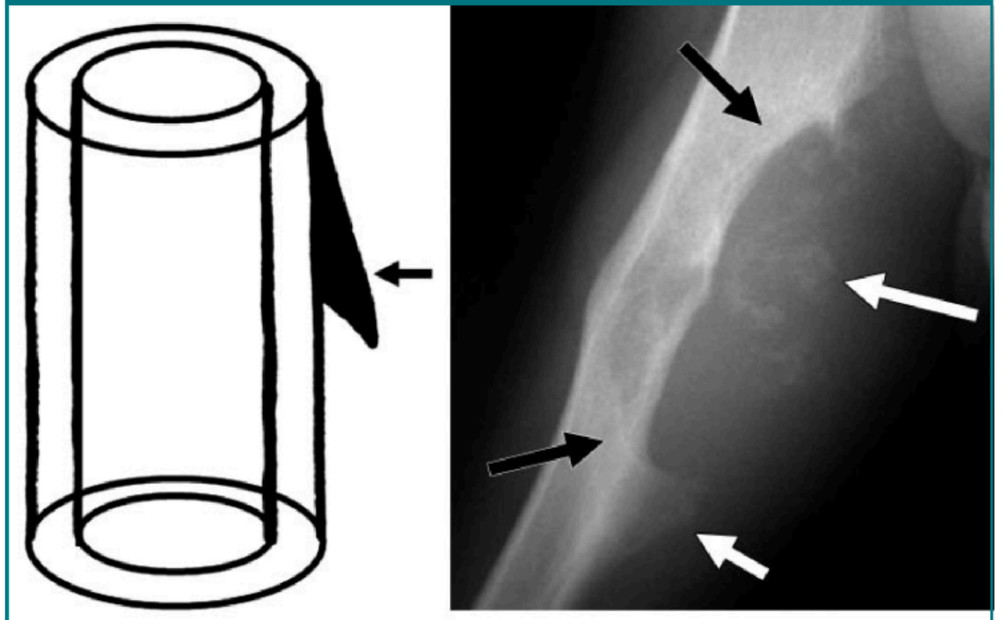
Figure 12



a. b. c.

Figure 12: Aneurysmal bone cysts. **(a)** Anteroposterior radiograph of the pelvis shows expansile lytic lesion of right acetabulum with thinning of the cortex (arrow) and honeycomb trabeculation. Flat bones are a common location for aneurysmal bone cysts. (Image courtesy of Marcia Blacksin, MD, University of Medicine and Dentistry of New Jersey, Newark, NJ.) **(b)** Anteroposterior radiograph of proximal portion of tibia and fibula shows expansile lytic lesion in proximal fibular metaphysis, with mild honeycombing (black arrows). Eccentric origin of the lesion is hard to appreciate in thin bones such as the fibula; both cortices are ballooned, with focal loss laterally (white arrow). (Image courtesy of David Disler, MD, Commonwealth Radiology, Richmond, Va.) **(c)** Anteroposterior radiograph of distal forearm and wrist shows more typical eccentric location of aneurysmal bone cyst in distal metaphysis of the radius, although this particular lesion lacks a honeycomb appearance. Cortex on radial side is very thin (arrows). (Image courtesy of Bernard Ghelman, MD, Hospital for Special Surgery, New York, NY.)

Figure 15



a. b.

Figure 15: Buttress periosteal reaction. **(a)** Diagram shows beaklike solid periosteal buttress formation (arrow). (Adapted and reprinted, with permission, from reference 2.) **(b)** Anteroposterior radiograph of humerus in a patient with periosteal chondrosarcoma shows periosteal buttress (short white arrow). Note well-defined saucerization of humeral shaft (black arrows) and faint mineralization of the matrix (long white arrow).

Envolvimento Cortical

Expansão

Tumores que crescem suficientemente lentamente para permitir que o córtex mantenha-se totalmente ou parcialmente intacto

O grau de expansão, quando presente, reflete a taxa de crescimento da lesão

Lesões que produzem expansão cortical leve tipicamente tem margens bem definidas 1A (defeito cortical fibroso, displasia fibrosa)

Lesões que produzem um maior grau de expansão cortical estão mais propensas a fraturas patológicas (fibroma não ossificante/fibroxantomas, cisto ósseo unicameral)

Lesões com marcado grau de expansão cortical podem produzir severa deformidade óssea ou destruição, mesmo se benignas

Envolvimento Cortical

Expansão

O córtex inchado dá origem à categoria de lesões expansivas líticas em “bolhas de sabão”

Table 7

Lytic Expansile Soap Bubble Appearance

Lesion Character	Lesion
Benign	Aneurysmal bone cyst
	Nonossifying fibroma
	Chondromyxoid fibroma
	Brown tumor of hyperparathyroidism (should have other radiographic features of hyperparathyroidism)
	Hemophiliac pseudotumor (should also have hemophiliac arthropathy)
Malignant	Metastasis (especially renal and thyroid carcinoma)
	Plasmacytoma
	Telangiectatic osteosarcoma

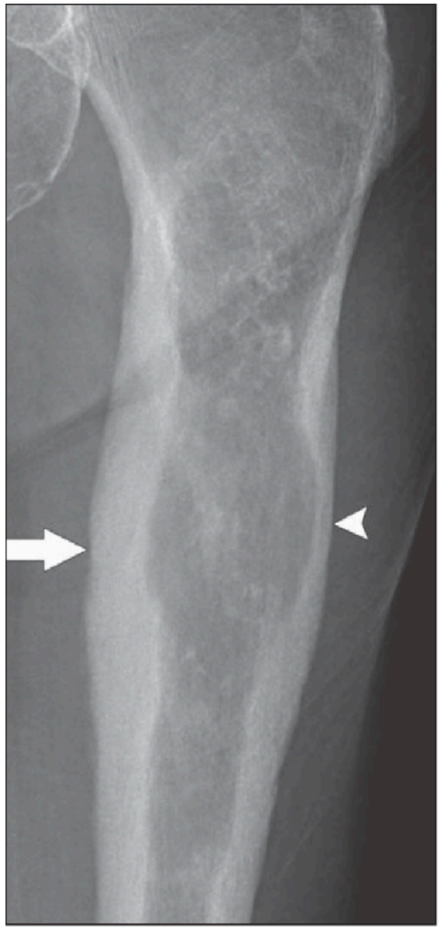


Fig. 6—Low-grade chondrosarcoma of proximal femur in 84-year-old woman. Low-grade sarcomas can mimic benign lesions and low-grade chondrosarcomas are among most potentially confusing bone tumors. Thickened cortex does not always equate with sclerotic rim. Unlike benign fibroxanthoma in Fig. 1, radiograph shows that entire circumference of this bone is enlarged by low-grade chondrosarcoma. Although large fibrous dysplasias can also enlarge entire circumference of bone, fibrous dysplasia will typically exhibit sclerotic rim with possible fibrous matrix mineralization. This chondrosarcoma has no sclerotic rim and exhibits cartilaginous matrix mineralization (see Figs. 11 and 12 regarding mineralized matrix). In addition to thickening of cortex (*arrow*), endosteal scalloping of cortex by tumor also thins areas of cortex (*arrowhead*). Thinning of large sections of cortex by large cartilaginous bone tumors can be indicative of malignancy.

Fig. 7—Unicameral bone cyst of proximal humeral metaphysis in 16-year-old boy. Large lesions that expand bone without adequate cortical reinforcement can result in pathologic fracture. Radiograph shows this unicameral bone cyst is slightly expansile, thins cortex, and has resulted in fracture with subsequent callous formation (*arrow*).

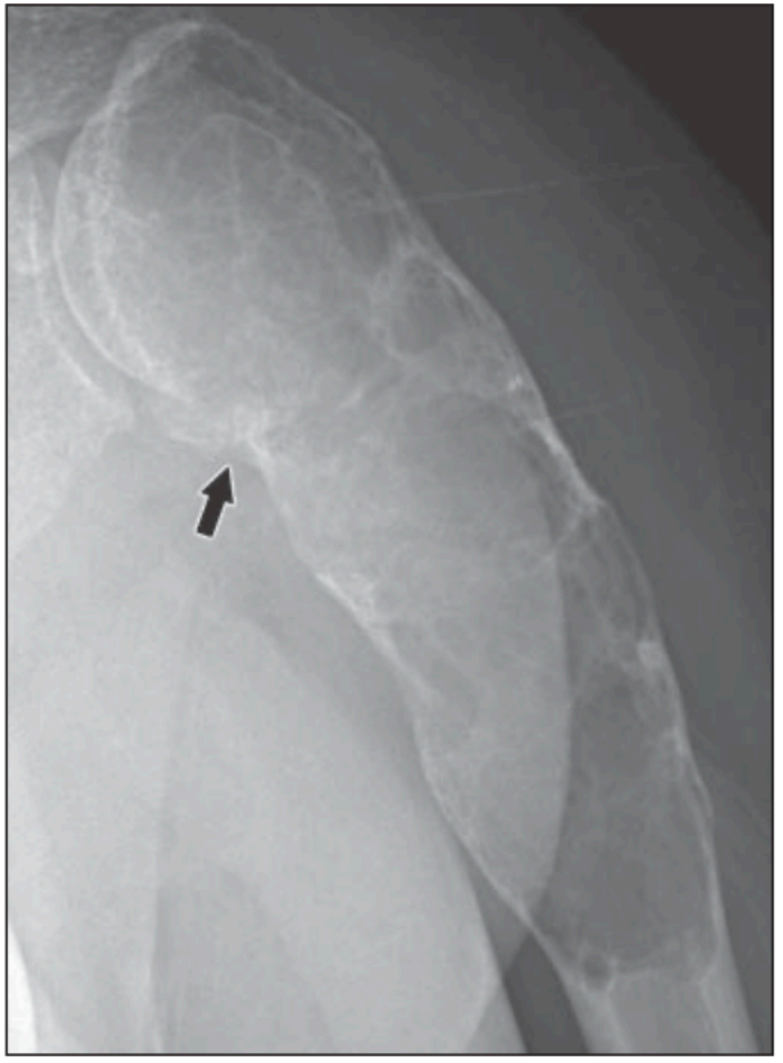


Fig. 8—Aneurysmal bone cyst of proximal humerus in 17-year-old girl. Radiograph shows this large expansile lesion crosses physis into humeral head and also thin cortex, resulting in pathologic fracture (*arrow*). These features produced bowing deformity of bone. Physeal involvement can predispose to limb length discrepancy.

Componente de Partes Moles

Pode ser um desafio diagnóstico

Componente de partes moles em uma lesão óssea sugere malignidade

Tumores que frequentemente tem componentes de partes moles - tumores de pequenas células redondas:

- Osteossarcoma
- Sarcoma de Ewing
- Linfoma

O componente de partes moles pode deslocar o plano adiposo adjacente

Figure 16: Lateral radiograph of distal portion of femur shows osteosarcoma with amorphous tumor-induced new bone formation (black arrows). Note the large soft-tissue mass (white arrows) that displaces adjacent fat.

Tem um Sarcoma de Ewing aqui!!!

Fim

Obrigado pela atenção!!!