



## ADAMANTINOMA OF THE TIBIA: A CASE REPORT WITH RADIOGRAPHIC, CT AND MRI FINDINGS

### Radio-Diagnosis

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### ABSTRACT

Adamantinoma is a rare, low-grade malignant bone tumor with a strong predilection for the tibial diaphysis. (1,2) We present a 16-year-old female with a six-month history of left leg pain and swelling. Radiographs demonstrated an expansile, multiloculated osteolytic lesion of the tibial diaphysis with cortical thinning and destruction. CT better delineated internal osseous septations, cortical breach and adjacent soft-tissue extension, while MRI demonstrated the longitudinal extent, cortical involvement and soft-tissue extension. (2,3,5) The characteristic multimodality imaging findings raised suspicion for adamantinoma; however, histopathological examination remains essential for definitive diagnosis. (1,2)

### KEYWORDS

Adamantinoma, tibia, osteolytic lesion, CT, MRI, cortical destruction, multiloculated lesion, bone tumor.

### INTRODUCTION

Adamantinoma is an uncommon primary bone tumor with low-grade malignant potential. It demonstrates a strong predilection for the tibia and most frequently involves the anterior cortex and diaphyseal region. The lesion generally has an indolent clinical course, and patients may present with gradually progressive pain, swelling or a palpable mass. (1,2)

Radiographs are usually the initial imaging investigation and may demonstrate an eccentric, expansile, multiloculated osteolytic lesion with cortical thinning and internal osseous septations. More aggressive lesions may demonstrate cortical destruction and extraosseous soft-tissue extension. (2,3,5)

CT provides excellent assessment of the cortical and trabecular components of the lesion and can demonstrate the degree of cortical expansion, thinning and breach. MRI is particularly useful for determining the longitudinal extent of the lesion, marrow involvement, cortical destruction and soft-tissue extension. (3,4,5)

Although imaging findings can strongly suggest adamantinoma, they are not pathognomonic. Osteofibrous dysplasia, fibrous dysplasia, chronic osteomyelitis and other primary bone tumors may demonstrate overlapping features. Histopathological examination is therefore required for definitive diagnosis. (2,5)

The present case describes the radiographic, CT and MRI findings of an expansile osteolytic lesion of the tibial shaft with imaging features suggestive of adamantinoma.

### Case Report

A 16-year-old female presented with pain and swelling of the left leg for six months. The symptoms were gradually progressive. On clinical examination, a firm, non-mobile swelling was noted over the left tibial shaft. The overlying skin was normal. Mild local tenderness was present. Distal neurovascular status was normal.

Routine laboratory investigations were within normal limits.

### Radiographic Findings

- Anteroposterior and lateral radiographs of the left leg demonstrated an extensive expansile lesion involving the mid-diaphysis of the tibia.
- The lesion was predominantly osteolytic, expansile and multiloculated, with multiple radiolucent compartments separated by residual bony septations. Marked thinning and irregularity of the tibial cortex were present, with focal areas of cortical breach/destruction.
- There was expansion of the involved tibial shaft with associated adjacent soft-tissue prominence. The internal septations and residual cortical bone produced a characteristic multiloculated or

soap-bubble appearance.

- The combination of tibial diaphyseal location, expansile osteolytic morphology, multiloculation, cortical thinning/destruction and soft-tissue prominence raised the possibility of adamantinoma. (2,3,5)

### Ct Findings

CT examination of the left leg demonstrated an expansile, multiloculated osteolytic lesion involving the mid-diaphysis of the tibia. The lesion contained multiple lytic compartments separated by residual internal osseous septations, producing a characteristic multilocular appearance.

There was marked expansion and thinning of the involved tibial cortex with areas of cortical irregularity and focal cortical breach. The lesion predominantly involved the medullary cavity with associated cortical involvement.

CT demonstrated the cortical changes more clearly, confirming focal cortical destruction and extension toward the adjacent soft tissues. The extraosseous component was seen along the involved tibial segment. Lesion predominantly involves anterior cortex.

### No pathological fracture was identified.

The CT findings of an expansile multiloculated lytic lesion centered in the tibial diaphysis with cortical thinning, focal cortical breach and adjacent soft-tissue extension were highly suggestive of adamantinoma. (2,3,5)

### Mri Findings

MRI of the left leg demonstrated a lobulated, expansile and multiloculated lesion involving the tibial shaft.

The lesion showed involvement of the medullary cavity with extension to the cortex. Multiple internal compartments and septations were identified. There was associated cortical destruction/breach with extension into the adjacent soft tissues.

The lesion demonstrated intermediate signal intensity on T1-weighted images and relatively high signal intensity on T2-weighted/fluid-sensitive sequences. The solid components and internal septations demonstrated enhancement following contrast administration.

MRI clearly demonstrated the longitudinal extent of the lesion and its relationship to the tibial cortex and surrounding soft tissues. (3,4,5)

### Radiological Impression

Multimodality imaging demonstrates an expansile, multiloculated osteolytic lesion involving the diaphysis of the left tibia, with marked cortical thinning, focal cortical destruction and adjacent soft-tissue extension.

Considering the characteristic tibial diaphyseal location and imaging

morphology, the findings are highly suspicious for adamantinoma. (2,3,5)

Histopathological confirmation is recommended.

### Differential Diagnosis

The important differential diagnoses include:

1. Adamantinoma
2. Osteofibrous dysplasia / osteofibrous dysplasia-like lesion
3. Fibrous dysplasia
4. Chronic osteomyelitis
5. Other primary lytic bone tumors

The combination of a tibial diaphyseal location, expansile multiloculated osteolysis, cortical involvement and soft-tissue extension favors adamantinoma in the appropriate clinical setting. (2,5)

### Histopathology

Image-guided biopsy of the lesion was performed.

Microscopic examination demonstrated histopathology typically demonstrates epithelial cell nests, islands or strands embedded within a fibrous or osteofibrous stroma. Immunohistochemistry may demonstrate expression of epithelial markers, including cytokeratins. (1,2)

### Final diagnosis:

Histopathologically confirmed adamantinoma of the left tibia.

### DISCUSSION

Adamantinoma is a rare primary bone neoplasm characterized by a strong predilection for the tibia. The typical age at presentation is during the second to fifth decades, although younger patients may also be affected. The lesion commonly arises in the diaphyseal region of the tibia and may have an indolent course. (1,2)

In the present case, the plain radiograph demonstrated an expansile multiloculated osteolytic lesion involving the tibial shaft. The presence of multiple radiolucent compartments separated by residual bony septations and marked cortical thinning is characteristic of the radiological appearance of adamantinoma. (2,3,5)

CT provided better characterization of the osseous architecture and demonstrated expansion of the tibial shaft, cortical thinning and areas of cortical breach. The presence of residual internal bony septations within the lytic lesion contributed to the multiloculated appearance. CT is particularly useful for evaluating cortical integrity and osseous destruction. (2,3,5)

MRI demonstrated the extent of marrow involvement, cortical destruction and adjacent soft-tissue extension. It is an important modality for local staging and preoperative assessment, particularly when determining the longitudinal extent of the lesion and its relationship with adjacent soft tissues. (3,4,5)

The major imaging differential diagnosis includes osteofibrous dysplasia, which also has a predilection for the tibia. However, osteofibrous dysplasia generally occurs in younger patients and tends to be more cortically based. Chronic osteomyelitis may also mimic adamantinoma, particularly when cortical destruction and sclerosis are present. (2,5)

Despite characteristic imaging findings, radiological appearances alone cannot establish the diagnosis. Histopathological examination is essential, particularly because management differs among the various differential diagnoses.

Treatment of conventional adamantinoma generally involves wide surgical excision with adequate margins. Depending on the extent of resection, reconstruction may be required. Long-term clinical and radiological follow-up is important because local recurrence can occur and distant metastases, although uncommon, have been reported. (1)

### CONCLUSION

Adamantinoma should be considered in the differential diagnosis of an expansile multiloculated osteolytic lesion involving the tibial diaphysis, particularly when associated with cortical thinning, cortical destruction and soft-tissue extension. (2,3,5)

In the present case, radiography demonstrated the characteristic expansile multiloculated osteolytic appearance, CT better delineated the cortical destruction and internal osseous architecture, while MRI demonstrated the local extent and adjacent soft-tissue involvement.

Recognition of these characteristic multimodality imaging features can facilitate early diagnosis, appropriate biopsy planning and surgical management. However, histopathological examination remains essential for definitive diagnosis.

### Figure Legends

- **Figure 1a:** AP radiograph of the left tibia demonstrating an expansile multiloculated osteolytic lesion involving the tibial shaft.
- **Figure 1b:** Lateral radiograph of the left tibia demonstrating cortical thinning/destruction and adjacent soft-tissue prominence.
- **Figure 2a:** TIRM MRI shows a lobulated, multiloculated hyperintense lesion in the tibial shaft. It shows cortical involvement.
- **Figure 2b:** Coronal T1-weighted MRI shows a lobulated, multiloculated lesion in the tibial diaphysis with intermediate signal intensity. It shows eccentric cortical involvement.
- **Figure 2c:** Post-contrast T1-weighted MRI shows heterogeneous enhancement of the multiloculated tibial lesion, with enhancing internal septations.

**Figure 2d:** T2 axial MRI: Shows a multiloculated, T2-hyperintense intramedullary lesion with multiple small cystic-appearing components, producing the characteristic “soap-bubble/honeycomb” appearance.

**Figure 3a:** axial CT images of the left tibia demonstrating an expansile multiloculated osteolytic lesion with internal osseous septations, cortical thinning and focal cortical breach.

**Figure 3b:** Contrast-enhanced sagittal CT demonstrates an expansile, multiloculated lytic lesion in the tibial diaphysis with cortical thinning and destruction. The lesion shows heterogeneous internal enhancement, giving a characteristic “soap-bubble” appearance. Lesion predominantly involves anterior cortex

**Figure 3c:** Contrast-enhanced sagittal CT shows a multiloculated, expansile lytic lesion involving the tibial shaft with cortical thinning and destruction.



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