Case Resolution

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DIAGNOSIS: Osteosarcoma.

DISCUSSION

In the magnetic resonance imaging of the right knee (Figure 3), a tumor was detected that compromised the proximal metaphyseal-diaphyseal sector of the tibia, without epiphyseal involvement and a large associated soft-tissue mass. It was predominantly hypointense on T1-weighted images and hypointense on fluid-sensitive sequences, whereas the soft tissue mass was hyperintense. Periosteal detachment with a wide zone of transition was observed.

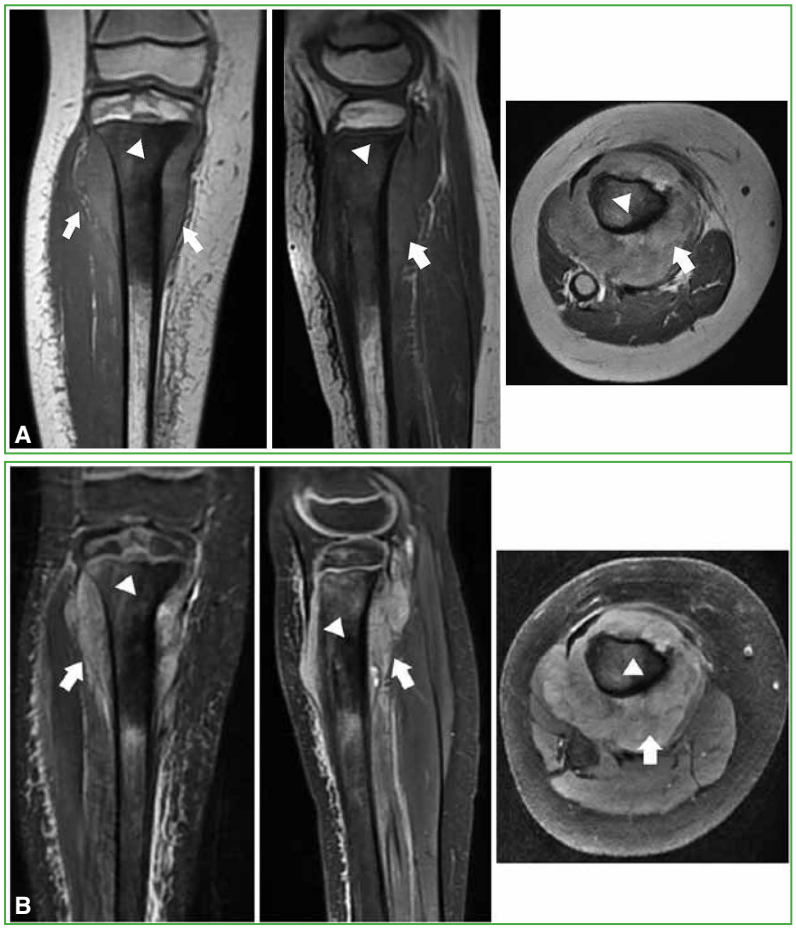

Figure 3. Magnetic resonance imaging of the right knee in T1-weighted sequences (**A**) and fluid-sensitive sequences (**B**), in the coronal, sagittal, and axial planes. A low-signal lesion in the bone (arrowhead) is visualized in both sequences and with a large soft-tissue component, hypointense on T1-weighted images and hyperintense on STIR (arrow). Large periosteal detachment. It is not possible to identify epiphyseal compromise.

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As it was a neoproliferative lesion, the patient was referred to the Pediatric Oncology Service.
He continued with pain and swelling of the leg; ibuprofen 10 ml every 6 hours was administered.
A bone scan (Figure 4) and a tomography of the thorax and abdomen are requested for staging (Figure 5).

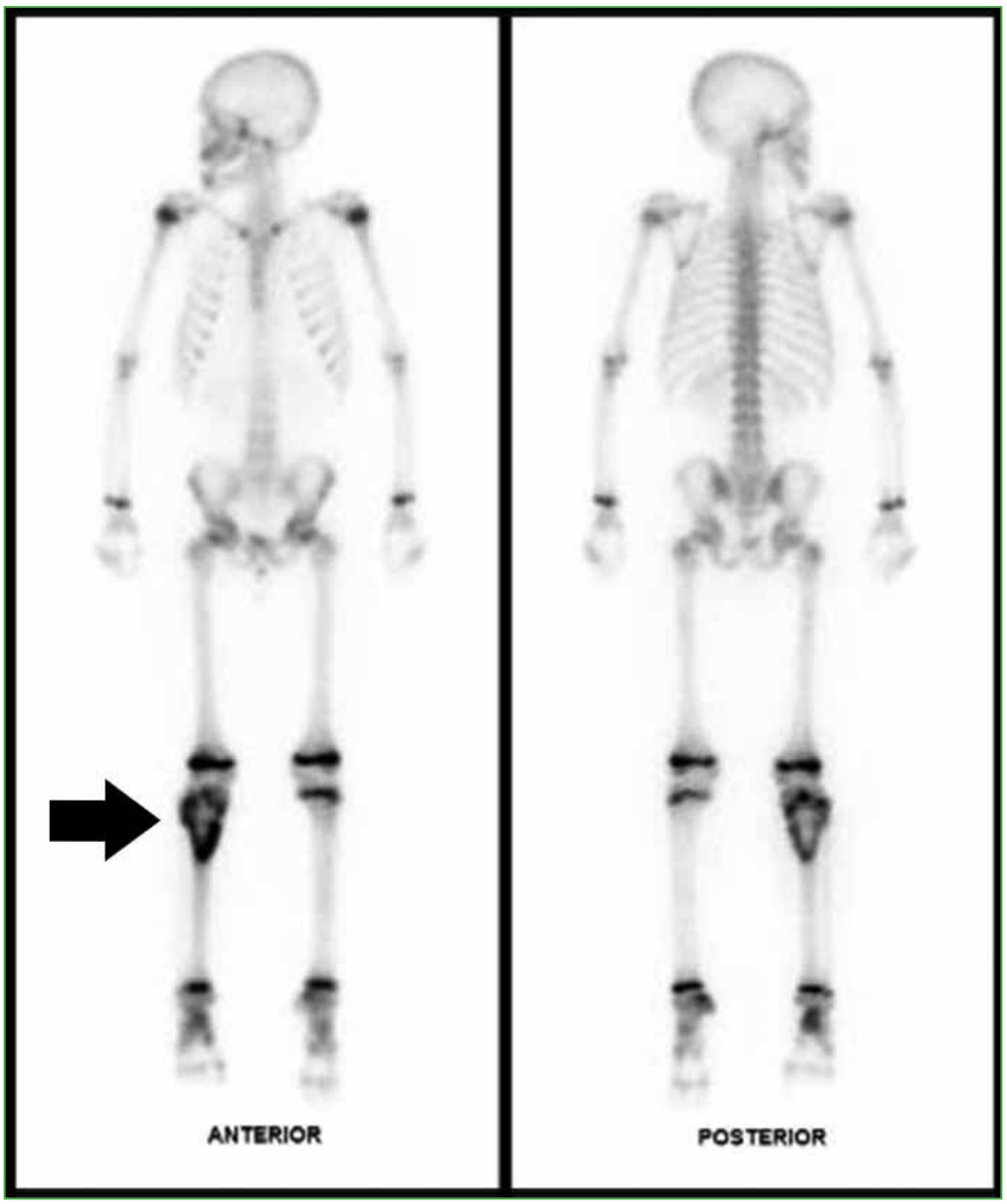

Figure 4. Bone scan. A voluminous expansive lesion in the proximal region of the right tibia (black arrow), with compromise of the growth plate and probable necrotic areas inside. Absence of suspicious secondary foci in the rest of the skeleton.

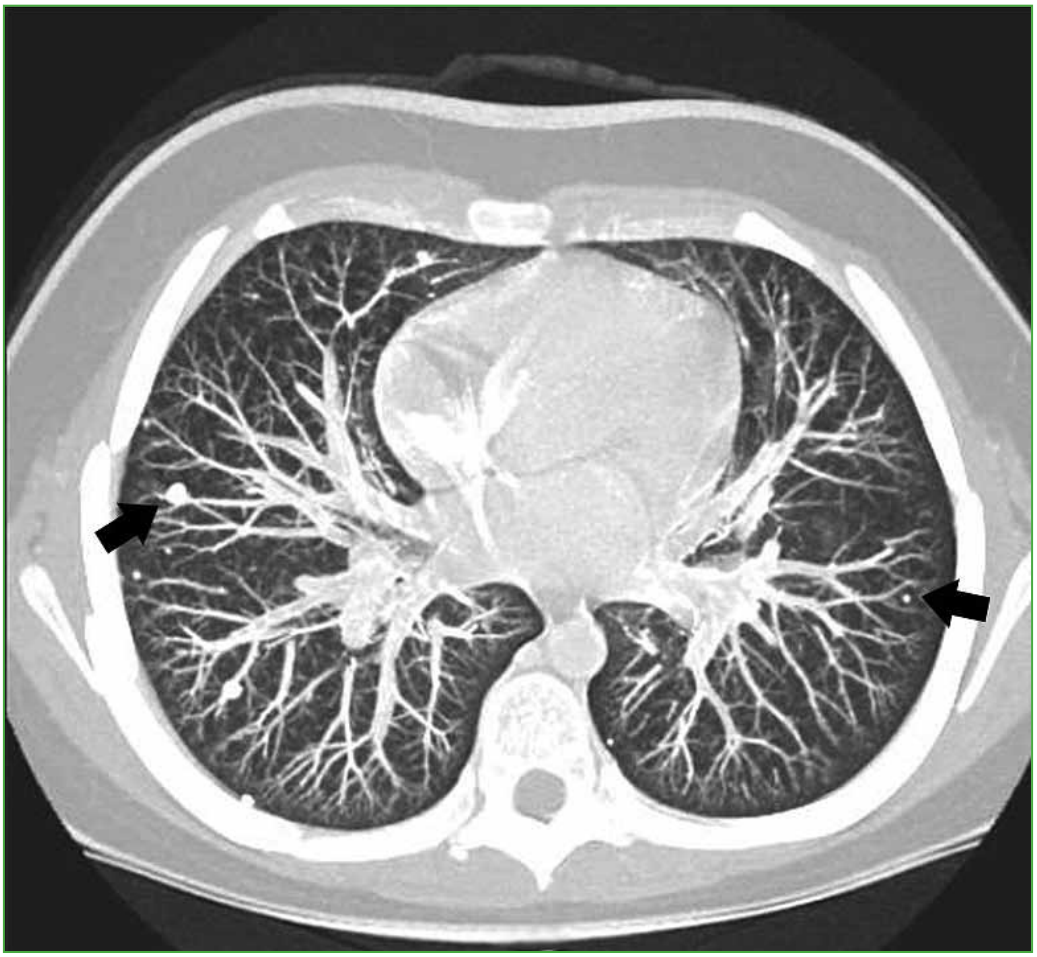

Figure 5. Lung-window chest tomography showing nodular lesions compatible with secondary disease (black arrows).

A CT-guided biopsy under general anesthesia was proposed (Figure 6).

The result of the pathological study revealed a malignant mesenchymoma, represented by small cells, neoplastic cartilaginous tissue and scarce osteoid tissue, compatible with small-cell osteosarcoma.

With a diagnosis of proximal osteosarcoma of the right tibia and soft tissue involvement, with bilateral pulmonary metastases, treatment with chemotherapy with 4 cycles of methotrexate, adriamycin, and cisplatin was proposed.

With all these findings, osteosarcoma of the proximal tibia was diagnosed.

Osteosarcoma is the most common bone tumor in the pediatric population. The male:female ratio is 3:2. It has a predilection for long bones and half of the cases are located around the knee. More than 90% compromises the metaphyseal sector. It is important to evaluate the epiphysis very well to detect if the physis is affected. It presents as a destructive, permeative lesion, located eccentrically, with a wide zone of transition and no sclerotic margin. With regard to density, it is possible to visualize lytic or intensely sclerotic lesions, most with a visible matrix. It can be accompanied by cortical destruction, soft tissue injury, and metastases that may be calcified (lymph node and lung).

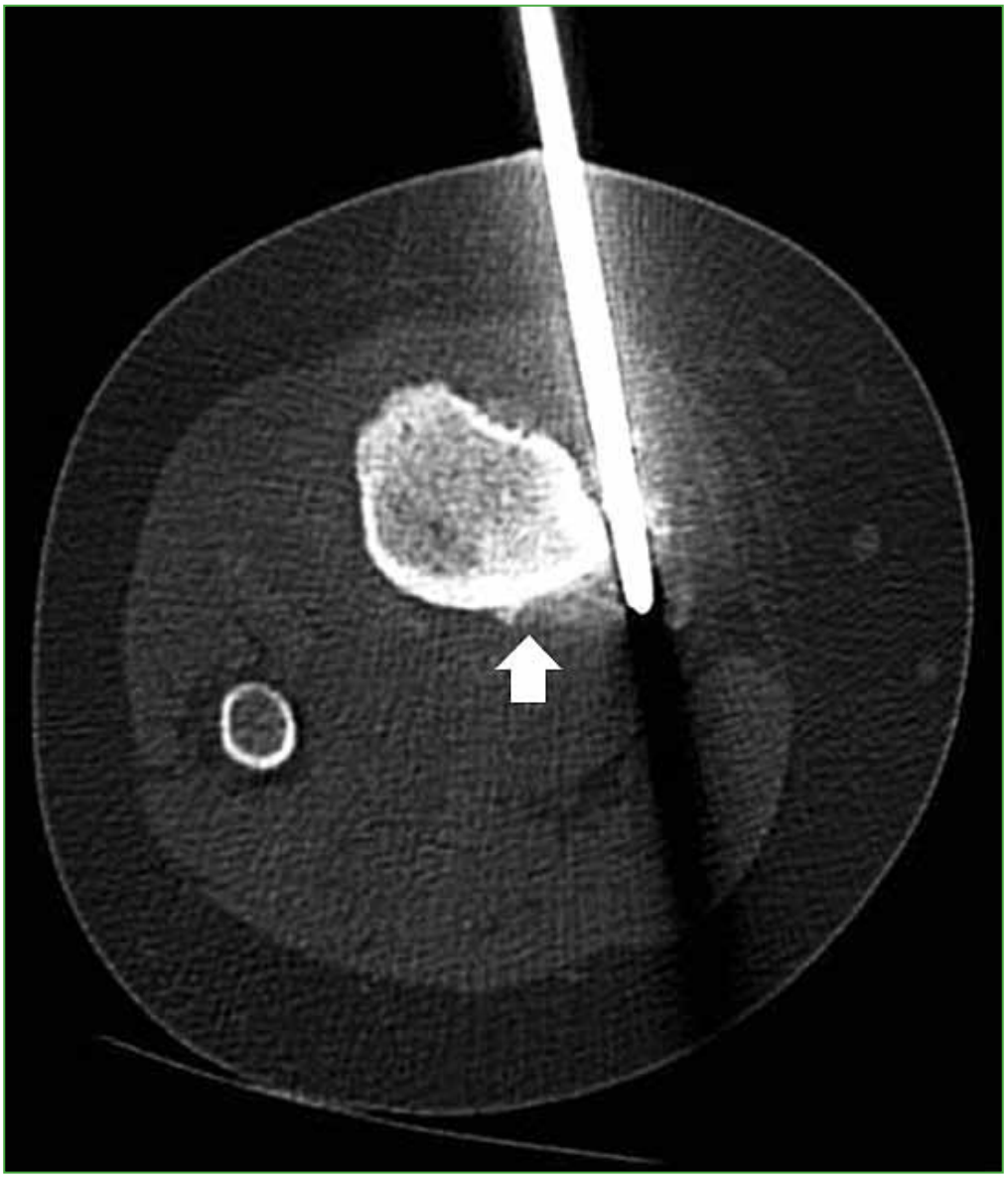

Figure 6. Tomography-guided biopsy, under general anesthesia, of the soft tissue component and the bone component. A sunburst periosteal reaction can be visualized (arrow).

Radiological findings

Destructive, moth-eaten or permeative lesions, with an eccentric metaphyseal or metaphyseal-diaphyseal location. Usually, an outline of the bone is not expanded, reflecting a rapidly destructive process. They present an aggressive periosteal reaction, with an interrupted pattern, sunburst appearance, and Codman triangle.

Tomographic findings

They allow a better definition of the osteoid matrix, but the study is only intended for taking a biopsy. Necrosis can be visualized in the soft tissue masses with a low attenuation area.

MRI findings

Osteoid material with low signal in all sequences. After injection of the contrast medium, intense enhancement of the marrow and areas of necrosis in soft tissue can be observed.

Findings in nuclear medicine studies

On a bone scan, a single lesion or skip metastases in the same or adjacent bone may be visualized. Positron emission tomography is used for prognostic evaluation.

Image-guided biopsy

It should be planned together with imaging specialists and the cancer surgeon. It is necessary to cross only one compartment and remember that the path of the needle must be resected.

The disease of this patient progressed with pulmonary metastasis, and it was decided to continue with an extended chemotherapy regimen. A new MRI staging (Figure 7) showed a new bone lesion in the distal femur, for which supracondylar amputation was suggested.

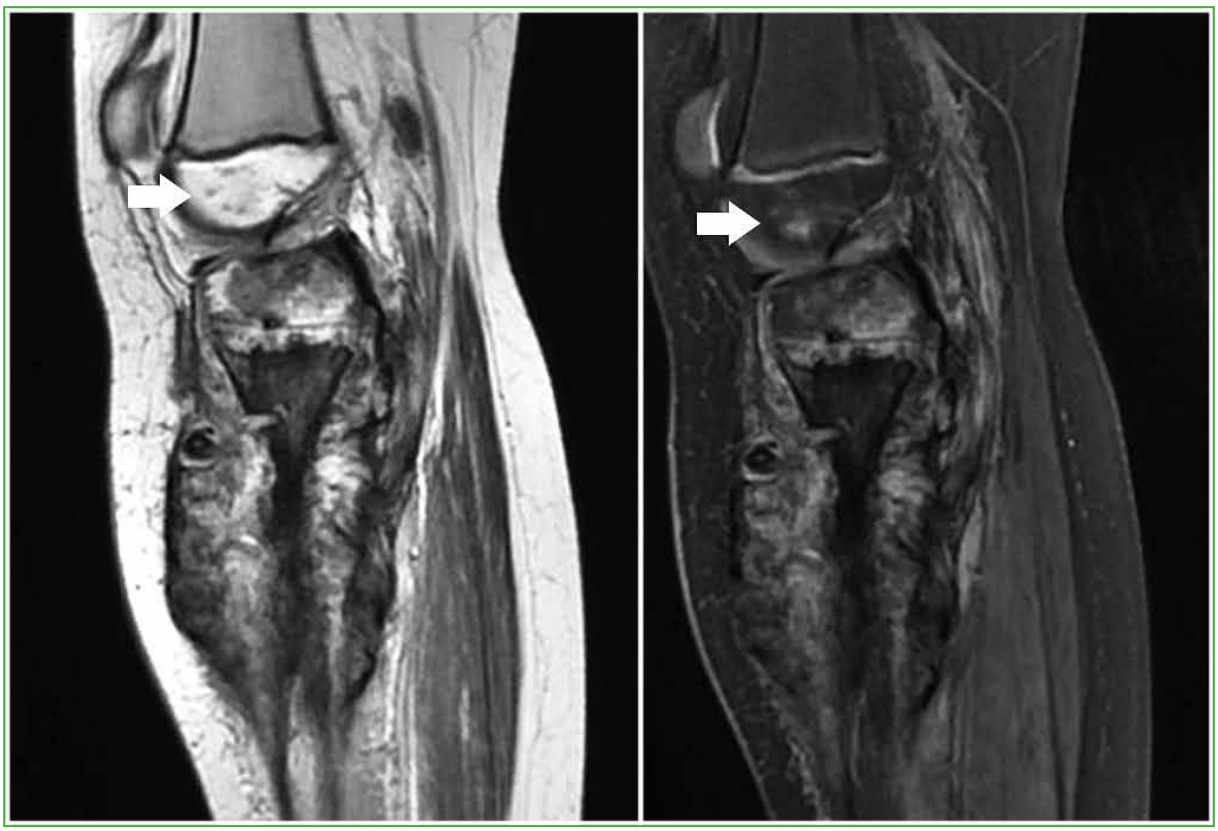

Figure 7. Control MRI of the knee. A new bone lesion is visualized in the distal femur, in the epiphyseal sector (arrows) in T1-weighted and fat suppression sequences.

The most frequent differential diagnoses are other sarcomas, such as Ewing's or an infectious process (osteomyelitis) (Figure 8).

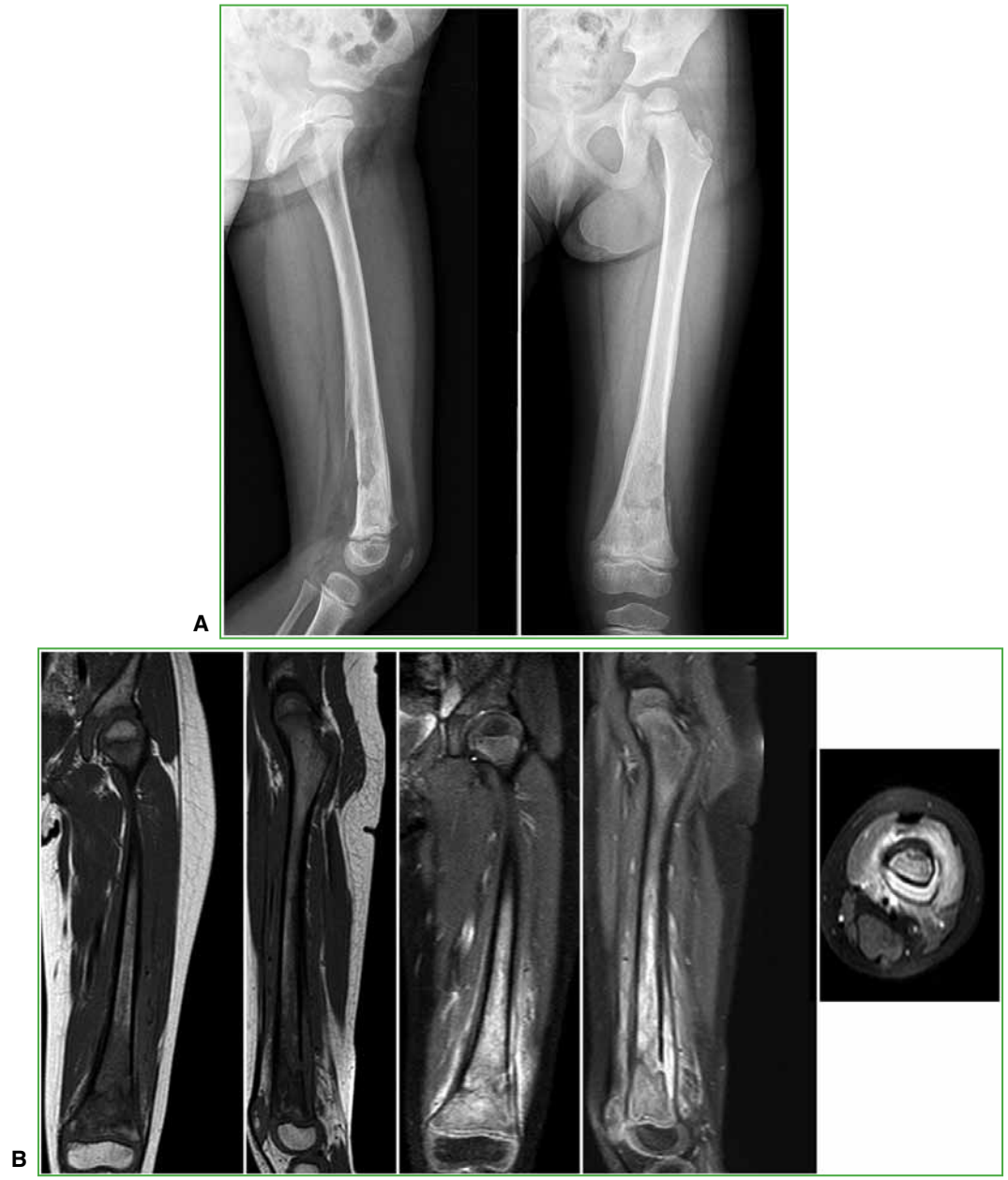

Figure 8. A 4-year-old patient with no history of trauma, who consulted for pain and irritability of two months' duration, and sporadic feverish symptoms. **A.** Postoperative anteroposterior radiograph of the left femur. A mixed appearance lesion is observed, alternating moth-eaten and permeative areas, with a marked detachment of the periosteum, associated with a pathological fracture. **B.** Magnetic resonance imaging of the left femur in T1 (coronal and sagittal) and STIR (coronal, sagittal and axial) sequences. An extensive lesion, hypointense on T1 and hyperintense on STIR, is visualized, with a wide zone of transition, detachment of the periosteum, and pathological fracture, without epiphyseal involvement.

Since the disease is assumed to be systemic when diagnosed, an initial treatment with chemotherapy ± radiotherapy should be started. This is followed by extended resection, saving the limb, if possible. Then, postoperative chemotherapy and postoperative radiation therapy if the margins of the resected tumor are not clear.