CHAPTER **47**

NON-OSSIFYING FIBROMA LEADING TO TIBIAL FRACTURE

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Non-ossifying fibromas are composed histologically of whorled bundles of fibrous connective tissue and giant cells. These small lytic lesions are histologically identical to fibrocortical lesions, but are termed non-osteogenic or non-ossifying fibromas. They appear most commonly in children in the first and second decades of life. It has been suggested that 30 to 40 percent of children over two years of age have one or more of these lesions.

Fibrocortical defects appear in the distal metaphyseal cortex of the long tubular bones of the tibia, fibula, and femur. They are usually less than two centimeters in size and rarely appear in the small bones of the feet. Tumors greater than three centimeters can invade the medullary space. As the child grows, the lesion migrates away from the metaphysis, but rarely extends to the diaphysis, often becoming metadiaphyseal in location. Non-ossifying fibromas are seldom seen in adults because they usually spontaneously convert to cortical bone, leaving only an area of increased cortical width. Therefore, non-ossifying fibromas appear to be a developmental defect in cortex rather than a true bone tumor.

The smaller non-ossifying fibromas are asymptomatic and are usually found incidentally in children. Larger lesions are uncommon, but can be associated with pathological fractures leading to pain and swelling. They can be diagnosed by radiographic characteristics of eccentric location in the metaphysis, with an elongated radiolucent lesion containing a lobulated pattern of trabeculation with a thin sclerotic rim. There may be cortical thinning or expansion noted on the x-ray. These lesions should not be treated unless pathological fractures occur, as in the following case study.

CASE STUDY

A 13-year-old male presented to the authors' clinic following an injury sustained to his right leg four days previously. The injury occurred while sliding into second base during a baseball game. Paramedics at the scene recommended ice packs and emergency room care if the pain persisted. The next day, he was seen at a minor emergency center where x-rays were taken and a posterior splint was applied. The patient remained non-weight bearing until he was seen at the clinic, two days later.

A history and physical revealed a healthy but somewhat obese adolescent male with an unremarkable past medical history and no allergies. Neurovascular status was intact to the right lower extremity, and there was mild edema about the leg and ankle.

An MRI and radiological consult were ordered to rule out malignancy. This was done after plain film radiographs revealed a centralized tumor lying within the distal tibia. Lying just proximal to this was a mildly posteriorly-displaced spiral-oblique fracture of the tibia. There was also an oblique fracture of the proximal shaft of the fibula. Incidentally, a small tumor was noted in the proximal diaphyseal-metaphyseal region of the tibia. The MRI and plain radiographs were read by a consulting radiologist and it was agreed that the lesions most likely represented a non-ossifying fibroma rather than a malignant type of lesion. Closed reduction with casting was the chosen treatment at this time.

The patient was placed in an above-knee fiberglass cast. The knee was placed in flexion with slight plantarflexion of the foot. The patient was instructed to remain non-weight bearing with crutches.

Radiographs at three weeks post-injury revealed slight gaping of the tibial fracture, and the patient admitted to being non-compliant regarding his ambulation. Total non-weight bearing was re-emphasized, and at the five week follow-up, healing was proceeding satisfactorily. The cast was changed and the patient was seen one month later. The cast at this visit was severely broken-down, revealing that the patient had again been non-compliant. Some degree of healing had taken place, although with a residual angulation deformity. The patient was placed in a walking immobilizer and was advised to limit his activities and continue to use crutches. He is still being followed at this time.

RADIOGRAPHIC FINDINGS

The plain film radiographs demonstrated a well-delineated radiolucent lesion situated posteriorly in the distal right tibial diaphyseal-metaphyseal region (Figs. 1A, 1B). The lesion is contiguous with the posterior cortex, which is thinned and expanded. Two areas of radiolucency are noted as well as in the proximal tibia (Fig. 2). Fractures are as noted before in the case report.

Figure 1A. Antero-posterior radiograph demonstrating the bone tumor, as well as the pathologic fracture of the tibia.

Figure 1B. Lateral radiograph reveals the posterior location of the mass, as well as the angulation and displacement of the fracture.

Figure 2. Radiographs of the proximal tibia also revealed two lytic lesions.

Figure 3A. Frontal-plane MRI with low signal intensity of the bone tumor.

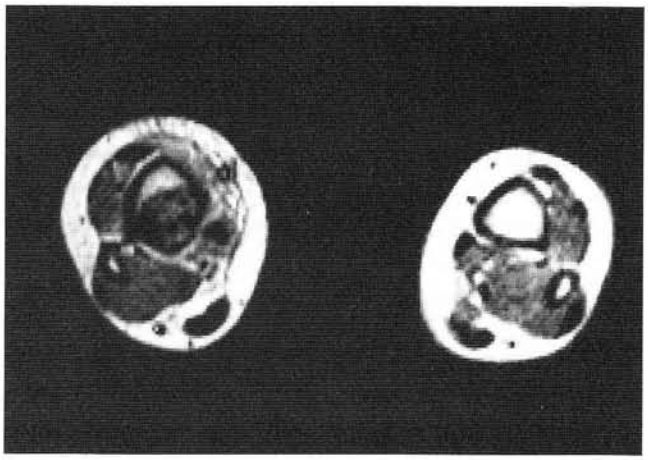

Figure 3B. Transverse-plane MRI confirms the posterior location of the lesion.

The MRI examination demonstrates the lesion in the distal tibia to be somewhat inhomogeneous in signal intensity (Figs. 3A, 3B). The lesion measures four centimeters in its greatest dimension. There is no adjacent marrow edema, and no evidence of a contiguous soft tissue mass. This well-delineated lesion has a slightly lobulated contour.

It was concluded that the lesion was most likely benign in nature. Given the location, appearance, and age of the patient, the most likely diagnosis is non-ossifying fibroma. Based on signal intensities, this may represent the fibrous type of non-ossifying fibroma. The proximal tibial lesions were felt to be either smaller non-ossifying fibromas, or possibly fibrous cortical defects.

DISCUSSION

Non-ossifying fibromas, although benign lesions, may lead to weakening of the bone as they attain large dimensions. Cortical thinning and abnormal stress concentrations within the bone may lead to fracture. In this case, athletic activity was the precipitating event which stressed the weakened bone beyond its limits.

Despite mild displacement and non-compliance by the patient, the fractures appeared to be healed. The patient's young age is a positive factor in this regard. The residual angulation deformity is expected to remodel satisfactorily, a process which occurs to an amazing degree in youthful patients.

The patient in this case report continues to be monitored. Additional considerations would include curettage and bone grafting to repair the defect. The desire to prevent pathological fracture must be weighed against the possibility that spontaneous conversion to more normal cortical bone may occur as the patient matures.

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