Journal of Korean Medical Science
Vol. 11, No. 5, 444-448 Oct. 1996

Adamantinoma of Tibia with Predominant Features of Fibrous Dysplasia

- A Case Report -

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We report a case of adamantinoma of the tibia resembling fibrous dysplasia. The patient was a 55-year-old male, and complained of pain in the right lower leg. Roentgenographs showed a well demarcated osteolytic lesion with small foci of calcification and septation within the diaphysis of the distal tibia. The cortex was partially disrupted. Histologically, initial biopsy specimen showed fibrous connective tissue and trabeculae of immature woven bone, strongly suggestive of fibrous dysplasia. The lesion recurred and the second biopsy revealed nests of spindle cells and tubular epithelial structures embedded in granulation type-fibrous tissue. Immunohistochemically, both the nests of spindle cells and the tubular structures gave a positive reaction for cytokeratin. The present case emphasizes once again that histological diagnosis of fibrous dysplasia of the tibia should be made carefully with exclusion of the possibility of adamantinoma.

Key Words : *Adamantinoma, Fibrous dysplasia, Tibia*

INTRODUCTION

When we meet an osteolytic lesion in the tibia, possibilities of fibrous dysplasia, osteofibrous dysplasia, and adamantinoma can be considered. Among these, adamantinoma of long bones is a rare and peculiar neoplasm. It was named because of its close histological resemblance to ameloblastoma of the jaw. This lesion is a low-grade malignant tumor and a few cases of metastasis have been reported(Weiss and Dorfman, 1977). In contrast, fibrous dysplasia involves usually the medulla of the tibia of a young person, while osteofibrous dysplasia occurs exclusively in the cortex of the tibia of children. A consecutive therapeutic approach is advocated for it.

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Adamantinoma of long bones is so rare and commonly bears features of fibrous dysplasia that without careful scrutiny of epithelial cell components, misdiagnosis of fibrous dysplasia would be done. We report a case of adamantinoma of the tibia with features of fibrous dysplasia.

CASE REPORT

A 55-year-old man was admitted to Seoul National University Hospital because of pain in the right lower leg of 2 months' duration. He had a history of fracture of the right lower leg when he was a boy. On physical examination, the right lower leg was deformed and overlying skin showed tenderness, heat and swelling. Radiological studies of the lesion demonstrated an irregularly expanding osteolytic lesion, 10cm in size in the diaphysis of the distal tibia with focal bulging of the cortex and disruption of small portion of the cortical alignment. There were some septation and calcific

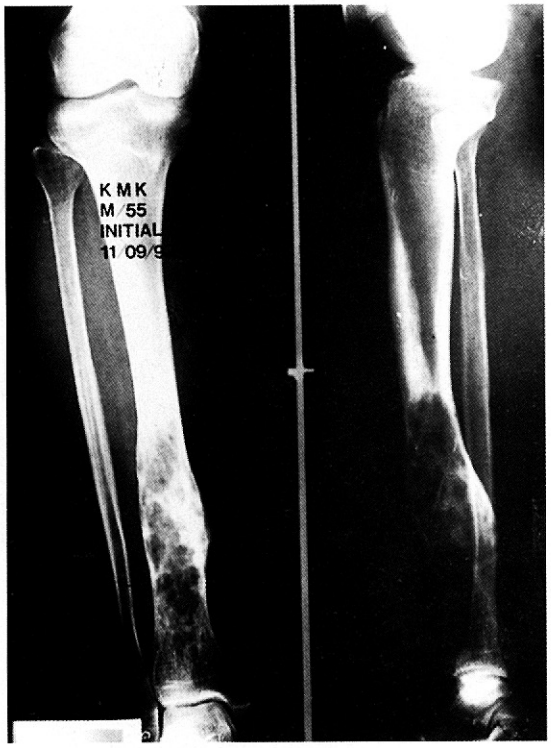

Fig. 1. AP and lateral view taken before the first curettage reveal an irregularly expanded osteolytic lesion in diaphysis of distal tibia. Some areas show focal cortical bulging. There are some septation and calcific densities.

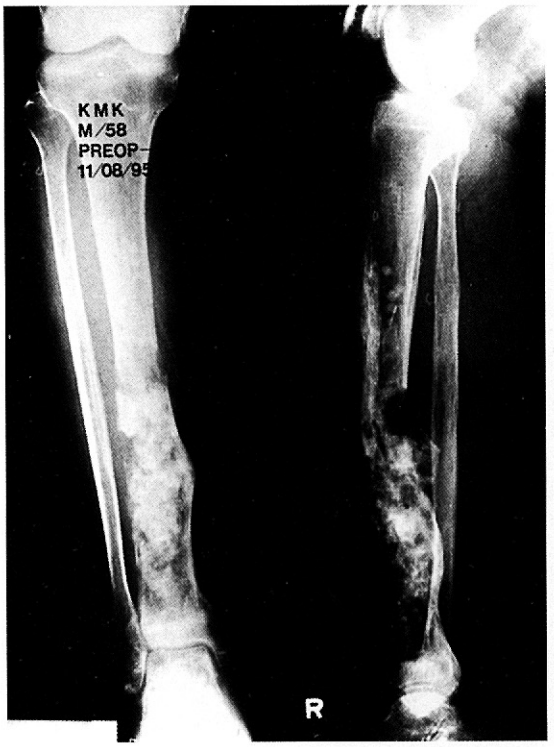

Fig. 2. AP and lateral view taken before the second curettage reveal several small osteolytic areas in posterior aspect of the tibia.

densities in the lesion(Fig. 1). No periosteal reaction was noted. Curettage and bone graft were done in November, 1992.

Three years later, the patient complained of swelling and pain in the same area. X-ray studies revealed several small osteolytic lesions in the posterior aspect of the tibia(Fig. 2). Any other hot uptake was not detected on the bone scan. Clinical and radiological differential diagnoses included fibrous dysplasia, desmoplastic fibroma, and chronic osteomyelitis. Second curettage and bone graft were performed.

The histologic evaluation of the first curettage specimen showed both moderately cellular fibrous tissue and immature woven bone trabeculae. The fibrous part was composed of spindle shaped, fibroblast-like cells and fibrous matrix. The bone trabeculae were comprised of either irregular woven bone spicules associated with cellular fibroblatic stroma or fine lamellar bone spicules set in loose fibrous tissue, very much reminiscent of fibrous dysplasia. Some bony trabeculae had a distinct focal lining of activated osteoblasts, which was interpretated as reactive new bone formation at the peripheral portion of the lesion(Fig. 3). Spindle cells lacked pleomorphism or mitosis. The initial pathologic diagnosis was fibrous dysplasia. On reviewing the first biopsy specimen after the second biopsy, a few small islands of epithelial cells were identified within the fibro-osseous tissue, that were overlooked at that time. The epithelial cell nests consisted of round or ovoid cells with poorly defined cytoplasmic border and slightly hyperchromatic nuclei. Nuclear atypia was not distinct. Some of them showed squamoid appearance(Fig. 4). This case showed a mixture of squamoid and osteofibrous dysplasia-like pattern among the five basic patterns in adamantinoma(basaloid, spindle, squamoid, tubular, osteofibrous dysplasia-like). The epithelial cell nests were positive for cytokeratin and negative for vimentin on immunostaining(Fig. 5). The factor VIII-related antigen was demonstrated in endothelial cells but not in the tumor cells. Histologic features of the second

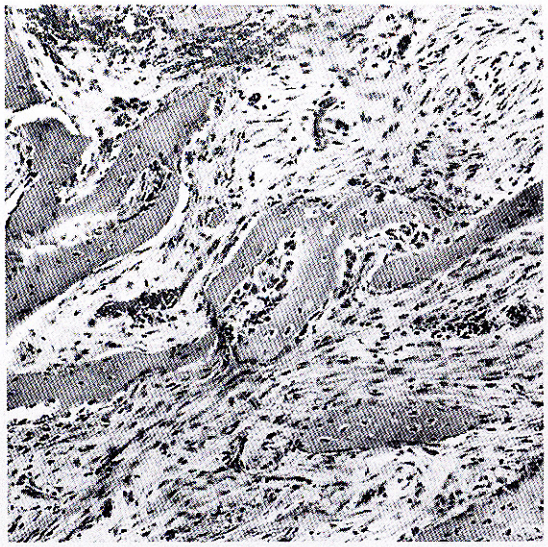

Fig. 3. The woven bone showed focal osteoblastic rimming at the periphery.(H & E, ×100)

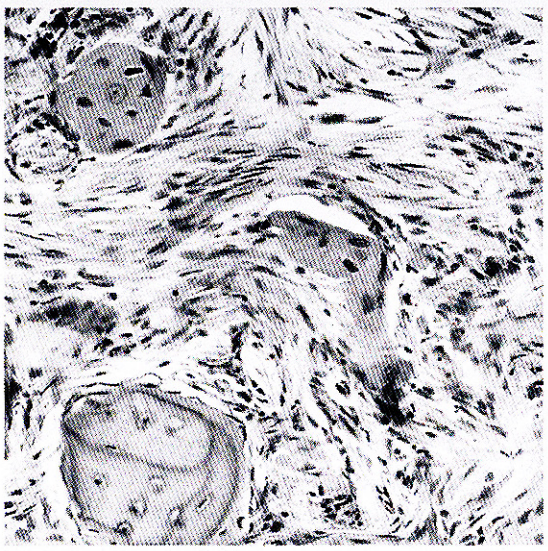

Fig. 4. Photomicrograph demonstrating squamoid cell nests with relatively distinct cell borders.(H & E, ×200)

curettage specimens were altered by a reaction against xenogenic bone grafts. They showed exuberantly inflamed granulation tissue with fibro-osseous tissue which masked the tumor cells of adamantinoma. Squamous cell elements were absent and instead spindle cells and tubular components were noted, which were positive for cytokeratin on immunostaining. The lesion was finally diagnosed as adamantinoma of the tibia.

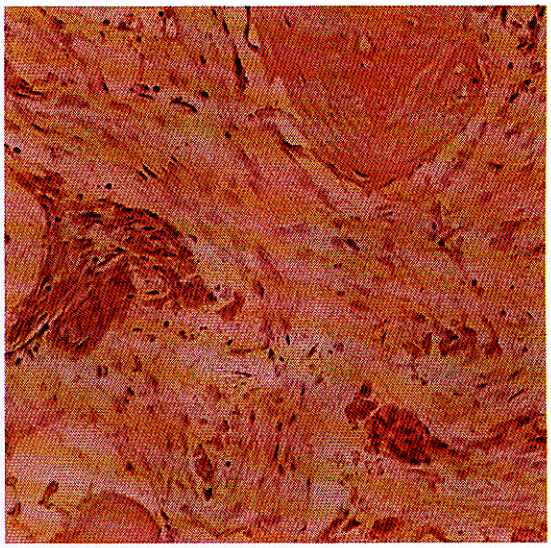

Fig. 5. The epithelial cell nests scattered in fibrous stroma show positive stain for cytokeratin.(×250)

DISCUSSION

Adamantinoma of long bones is a distinctive and rare low-grade malignant tumor of the tibia, most often in the middle or distal ends of the diaphysis. However, it may occur in the metaphysis of long bone and even in the olecranon(Soucacos et al., 1995). Young and middle-aged adults are most often affected. Although adamantinoma is generally a slowly growing neoplasm, it often recurs after local excision. In a late stage, it may even metastasize.

The histogenesis of adamantinoma of long bones remains uncertain. The epithelial cells, synovial cells or endothelial cells have been suggested as the cells of origin(Keeney et al., 1989), although recent immunohistochemical and ultrastructural study support the epithelial origin of the tumor(Rosai and Pinkus, 1982; Levack et al., 1986).

Confusion between adamantinoma and osteofibrous dysplasia or fibrous dysplasia commonly occurs. Similarity of clinical presentation and histological appearance between osteofibrous dysplasia and adamantinoma has prompted some investigators to propose a relationship between the two lesions; different histological expressions of the same process, in which osteofibrous dysplasia represents the benign differentiation(Markel, 1978; Campanacci et al., 1981; Alguacil-Garcia et al., 1984). The exact nature of the osteofibrous dysplasia-like lesion associated with an adamantinoma-

tous component remains somewhat enigmatic. The other opinion is that they may arise from each other (Schajowica and Santini-Araujo, 1989 ; Ishida et al., 1992). The coexistence of fibrous dysplasia-like lesions and adamantinoma of the tibia has been reported (Markel, 1978). Ueda et al.(1991) suggested that juvenile intracortical adamantinoma with predominent osteofibrous dysplasia-like feature might be a regressing form of adamantinoma specific in childhood. Interestingly, Czernick et al.(1989) separated this into two ; the relatively benign osteofibrous dysplasia-like or differentiated adamantinoma and the fully malignant classic adamantinoma. Diagnostic features characteristic of the differentiated adamantinoma include young age, intracortical location, uniform predominance of an osteofibrous dysplasia-like pattern, and scattered positivity of epithelial elements for cytokeratin. But we do not like the term "differentiated adamantinoma", because the term suggests that adamantinoma can differentiate or regress into a less aggressive lesion. They called this variant of adamantinoma "osteofibrous dysplasia-like adamantinoma". There was a report of rare cases of osteofibrous dysplasia in childhood progressing to conventional adamantinoma in an adult patient(Unni et al., 1974). Weiss and Dorfman(1977) interpreted the osteofibrous dysplasia-like portions occasionally found in the periphery of conventional adamantinoma as a mesenchymal differentiaion and insisted that adamantinoma and osteofibrous dysplasia were on a continuum, with osteofibrous dysplasia at one end and adamantinoma at the other. The relationship between osteofibrous dysplasia, osteofibrous dysplasia-like adamantinoma and adamantinoma remains obscure, but osteofibrous dysplasia and osteofibrous dysplasia-like adamantinoma may be the precursor of adamantinoma (Springfield et al., 1994). A chromosomal anomaly(trisomy 7,12) was observed in osteofibrous dysplasia(Bridge et al., 1994) and clonally aberrant adamantinoma. This supports relationship between two lesions. But the other opinion was that osteofibrous dysplasia does not show progression to adamantinoma(Park et al., 1993).

The expression and distribution of cytokeratin subtypes depend on the stage of tumor cell differentiation, in that the expresssion of high molecular weight cytokeratin is greater in more differentiateid cells and decreases in undifferentiated areas(Benassi et al., 1994). Immunohistochemistry for cytokeratin revealed that adamantinoma and osteofibrous dysplasia were of a similar histogenesis. But Sweet et al.(1992) reported that immunohistochemical staining is not useful. They reviewed 30 cases of osteofibrous dysplaisa and found 28(93%) cases had scattered cytokeratin positive elements but no foci of adamantinoma.

Sweet et al.(1992) suggested that cortical lesions in adults which carried the diagnosis of osteofibrous dysplasia should be thoroughly examined, and the entire curettage specimen should be processed to exclude the possiblilty of adamantinoma. The question of whether the scattered cytokeratin-positive cells in osteofibrous dysplasia would lead to the larger epithelial islands typical of adamantinomas was incompletely resolved.

In primary tumors, the tubular subtype appears most frequently, followed by the osteofibrous dysplasia-like, basaloid, spindle cell and squamoid subtypes. When a local recurrence or metastasis develops, there is a tendency for a shift to the spindle cell pattern or for a clear increase in the ratio of epithelium to stroma(Hazelbag et al., 1993, 1994). In our case, several epithelial islands were noted in the first curettage specimen, and later the spindle component increased. Osteofibrous dysplasia-like adamantinoma may be a precursor lesion of the classic type of adamantinoma. The patient who had had a presumed osteofibrous dysplasia-like adamantinoma, which contained a few isolated cytokeratin positive epithelial cells within the stroma at the time of presentation, had a full-blown adamantinoma at the time of the local recurrence(Hazelbag et al.,1993,1994).

There was no consistent method of grading adamantinoma of long bones to predict the ultimate aggressiveness of the tumor. The only histologic feature associated with an increased recurrence rate was the absence of squamous differentiation(Campanacci and Laus, 1981). Keeney et al.(1989) insisted the most important prognostic factor was the mode of initial therapy. Prognosis has been best with early radical excision.

In conclusion, the present case indicates that the diagnosis of fibrous dysplasia or osteofibrous dysplasia of the tibia should be made with exclusion of the possibility of adamantinoma in the tibia.

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