Chondroblastoma With Secondary Aneurysmal Bone Cyst of the Capitate

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abstract

Chondroblastoma is a benign tumor that typically arises in the epiphysis of a long bone. There have been only 2 reported cases of chondroblastoma involving the capitate. This is the first report of chondroblastoma with secondary aneurysmal bone cyst involving the capitate. A 33-year-old man presented with a 3-year history of pain and swelling of the right wrist. Radiography as well as computed tomography showed a radiolucent area and no matrix calcification within the capitate. Magnetic resonance imaging revealed a homogeneous signal that was low on T1-weighted images and high on T2-weighted images and showed only slight enhancement. On the basis of imaging findings, the authors chose excisional biopsy. The bone tumor in the capitate was explored through a dorsal approach by dividing the extensor tendons. After repeated curettages, bone graft substitute using allograft bone was packed into the capitate. Histologically, the authors diagnosed this tumor as a chondroblastoma with a secondary aneurysmal bone cyst. At the final 2-year follow-up, there was evidence of bone union, full range of motion, and recovery and no evidence of recurrence. Although the recurrence of chondroblastoma is occasionally reported, the principal treatment is intralesional curettage and bone graft. High-speed burring, phenol, bone cement, and cryosurgery have been reported to reduce local recurrence. Complete excision of the carpal bone seems to be overtreatment.
Chondroblastoma is a benign tumor that accounts for approximately 1% of all primary bone tumors and typically arises in the epiphysis of a long bone. Only 2 cases of chondroblastoma of the capitate have been published. One report showed the frequency of primary bone tumors, including chondroblastoma, in carpal bones. Another report showed suspected tuberculosis of the capitate, and the resultant histopathologic findings altered the diagnosis to chondroblastoma without secondary aneurysmal bone cyst (ABC) formation. This report describes the first case of chondroblastoma with secondary ABC change of the capitate that was treated successfully with curettage (intraleisional resection) and bone graft substitute.

CASE REPORT

A 33-year-old man had a 3-year history of pain and swelling of the right wrist. The patient had no history of trauma. Physical examination of the wrist showed swelling, local heat and tenderness, and range of motion (ROM) that was 60° of flexion and 30° of extension. Neurologic findings were normal. Radiographs showed a radiolucent area within the capitate (Figure 1A). Chest radiograph showed no evidence of metastasis. Computed tomography showed similar findings as the radiograph and no matrix calcification inside of bone. The cortex showed discontinuity that suggested pathological fracture (Figure 1B). Magnetic resonance imaging showed a homogeneous signal with low intensity on T1-weighted images (Figure 2A) and high intensity on T2-weighted images (Figure 2B) without fluid-fluid levels. Enhanced T1-weighted images (Figure 2C) showed only slight enhancement at the edge of the capitate, with surrounding inflammation. Based on these findings, the differential diagnosis included benign cystic tumors such as aneurysmal bone cyst, chondroblastoma, and giant cell tumor. Based on the differential diagnosis, excisional biopsy was performed. The bone tumor in the capitate was explored through a dorsal approach.

Figure 1: Radiograph showing a lytic lesion in the capitate (A). Coronal computed tomography image showing a lytic lesion in the entire capitate with pathological fracture (B).

Figure 2: Magnetic resonance imaging of the lesion. T1-weighted (A), T2-weighted (B), and enhanced T1-weighted (C) images. Magnetic resonance imaging showed low signal intensity on enhanced T1-weighted images and high signal intensity on T2-weighted images, as well as rim enhancement on enhanced T1-weighted images.

The bone tumor in the capitate was easily cut by scalpel, and the discharge of fluid inside of bone was seen after removal of the cortex. High-speed burr was not used because of the pathological fracture. Instead, many curettages by curettes and washes by water jet were radically repeated. Finally, bone graft substitute using allograft bone was packed into the capitate. Histologically, the curetted specimen from the capitate bone of the right hand showed mononuclear tumor cells (chondroblasts) in a solid growth pattern, with polygonal, somewhat eosinophilic cytoplasm and round to ovoid, indented, or lobulated nuclei and evenly distributed chromatin (Figures 3A-3C). Nucleoli were not prominent, and mitotic figures were uncommon. Production of a cartilaginous matrix that showed ossification and focal calcification was also identified (Figure 3B). The tumor cells were accompanied by randomly distributed osteoclastic-type multinucleated giant cells (Figures 3A-3B). Hemorrhagic findings with hemosiderin pigmentation (Figure 3A) and cystic formation (Figure 3D) were also observed. Immunohistochemically, tumor cells were positive for S-100 protein. Based on these pathologic findings, the tumor was identified as a chondroblastoma with secondary ABC change. Two years after surgery, there was evidence of bone union, full ROM, and recovery, and no evidence of recurrence (Figure 4).

DISCUSSION

Chondroblastoma is a benign tumor commonly located in long bones, including the humerus, tibia, and femur. Chondroblastoma involving the hands is very rare. In a review of 26,800 primary bone tumors, Murray et al reported primary bone tumors of the carpus in only 44 cases (0.16%). Among these 44 cases, there were 11 patients with osteoid osteoma (25%), 6 patients with osteoblastoma (13.6%), and 6 patients with chondroblastoma (13.6%). Of the 6 cases of chondroblastoma, 3 were located in the scaphoid, with 1 each in the capitate, lunate, and triquetrum. No details about histopathology, treatment, or recurrence rate were given. Mangini reported 1 case...
of chondroblastoma of the capitate associated with suspicion of tuberculosis. This case was treated successfully with only curettage without bone graft, and the histopathologic findings showed no evidence of secondary ABC change. To the authors’ knowledge, there has not been a previous report of chondroblastoma with secondary ABC change of the capitate treated by curettage and bone graft substitute.

The recurrence rate for chondroblastoma is reported to be 10% to 32%, and secondary ABC change is believed to be a risk factor for local recurrence. The principal treatment of chondroblastoma is intralesional curettage and bone graft. Suneja et al reported that of 52 patients treated with only intralesional curettage, 7 (13.2%) patients had a local recurrence. High-speed burring, phenol, bone cement, and cryosurgery were recommended to reduce local recurrence. Rybak et al reported the use of percutaneous radiofrequency ablation as an alternative to surgery in selected cases. Although treatments have been improved, repeated recurrence may result in endoprosthetic replacement and amputation.

Curettage and bone graft is the preferred treatment for chondroblastoma in the hands or wrist. However, Daly et al reported that chondroblastoma of the hamate was treated with complete excision. Although 1 treatment option is complete excision of the carpal bone, this approach seems to be overtreatment because chondroblastoma is believed to be less aggressive in the carpal bones. In addition, considering the young age at presentation (10-20 years), resulting osteoarthritis in the carpometacarpal joint must be considered in the treatment decision. Furthermore, surgery of the midcarpal and radiocarpal joints may result in loss of grip power and hand function. The authors suggest that the first treatment option for chondroblastoma in all locations should be only curettage and allograft or artificial bone graft.

References

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Case Report


