

## Giant Cell Tumor of Bone

There are numerous primary tumors of bone with giant cell or macrophage activity seen within the tumor tissue when viewed under the microscope. These include the aneurysmal bone cyst, chondroblastoma, solitary bone cyst, osteoid osteoma, osteoblastoma, fibrous dysplasia and osteogenic sarcoma, hemorrhagic type. Some pathologists classify these tumors as variants of the true giant cell tumor, making it almost a diagnosis of exclusion if none of the above diagnoses can be established histologically. The clinical entity known as the benign giant cell tumor of bone is seen typically in young adult females between the ages of 20 and 40 years. It is less common in males. The lesion is usually found in the ends of long bones, often about the knee joint where 50 per cent of the lesions will be seen. The next most common locations are the sacrum and distal radius. The other epiphyseal tumor in children is the chondroblastoma that also has giant cell activity in the tumor. Even the so-called brown tumor of hyperparathyroidism has excessive macrophage activity but it is a pseudotumor induced by parathormone-producing lesions such as parathyroid adenomas and secondary hyperparathyroidism seen in renal failure disease.

Currently, most experts feel that the giant cell tumor is a low-grade, benign mesenchymal tumor with a fibro-osteoblastic stem cell. It has a molecular genetic defect similar to the stem cell of the osteosarcoma but with a greater degree of molecular genetic stability. The giant cell seen in this tumor is an immune response by the host in an attempt to remove the neoplastic fibro-osseous tissue. Giant cell tumors account for between 5-10 per cent of all benign tumors of the skeletal system. They are usually associated with pain in the adjacent joint involved, such as the knee joint, which may develop an effusion. Radiographically, the lesion is very characteristic because of its purely lytic nature. It can be very geographic, located in the epiphyseal-metaphyseal location of a long bone, frequently coming in direct contact with the subchondral bone of the adjacent joint. In more aggressive cases, the lesion will break through the adjacent metaphyseal cortex and gain access to the subperiosteal space and take on the appearance of a more malignant process, such as a hemorrhagic osteosarcoma.

Even though this condition is considered benign with a very low mitotic index seen in the stromal cells, one or two per cent of the tumors can metastasize to the lung as a benign process. There is an excellent prognosis for cure with simple surgical resection in 80 per cent of the cases. Treatment usually consists of an aggressive curettement of the tumor followed by a packing of the defect with

either bone graft, in smaller lesions, or more typically with methyl methacrylate in larger lesions which gives a better chance of a permanent cure – about a 5 to 10 per cent recurrence rate with the cementation technique. In more aggressive lesions located in the sacrum or anterior portion of the spinal column, where surgical resection is very difficult because of the adjacent nerve roots or spinal cord, occasionally local radiation is used. However, in about 5 per cent of cases, this can cause the tumor to convert into a high-grade tumor sarcoma at a much later date. The tumor also has the potential for spontaneous conversion to a high-grade tumor, such as an osteosarcoma or a malignant fibrous histiocytoma, in about one per cent of cases.

Giant cell tumors that recur locally have a greater potential for pulmonary metastasis, running as high as 6 per cent and, for this reason, chest x-rays should be obtained periodically for approximately three years after the primary treatment of the tumor.