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CASE REPORT

Giant Cell Tumour in a Patient with Paget's Disease of the Skull Bone - A Rare Case Report

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Abstract:

Paget's disease of the bone (PDB) is a chronic disease which rarely transforms into a malignant condition like giant cell tumour. In this case, a forty seven years old lady suffering from Paget's disease, presented to us with a progressive firm swelling in the front of the left frontal bone including the orbit. She was operated upon and her swelling was diagnosed as Giant cell tumour. Surgical reconstruction was done and she had a good cosmetic appearance. Patients with Paget's disease have a tendency to develop giant cell tumour and this should be kept in the mind during diagnosis.

Keywords: Giant cell tumour, Paget's disease, Titanium mesh.

Introduction

Paget's disease of bone (PDB) is a localized disorder of bone remodeling resulting in abnormal bone architecture. It is a chronic and slowly progressive disorder involving a single bone location (monostotic) or more than one site (polyostotic)[1]. The disease was first described in England, in 1877, by Sir James Paget who defined it with the name of "osteitis deformans"[2].

In Asian countries including Japan, PDB is an extremely rare disease. The Japan National Survey conducted in 2003 identified only 169 cases of PDB. The incidence of PDB in Japan is 0.15 cases per 100,000 general population, and 0.41 cases per 100,000 population over 55 years old[3]. No similar data is available for our country.

The main risk factors for PDB include increasing age, male sex, and ethnic background[4]. The new results indicated that GCT/PDB is caused globally by the P937R mutation in the ZNF687 gene[5]. Giant cell tumor (GCT) of bone is an uncommon, primary neoplasm that occurs chiefly in the ends of the long bones. GCT is rarely encountered in the skull[6].

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There is a general agreement that the primary cell abnormality in Paget's bone disease involves the osteoclasts. Pagetic osteoclasts are markedly increased in number and size, can have as much as 100 nuclei per cell, and contain paramyxoviral like nuclear and cytoplasmatic inclusion[7].

Paget's disease increases the risk of various malignant tumors such as osteosarcoma, fibrosarcoma, chondrosarcoma, malignant fibrous histiocytoma, and very rarely locally aggressive tumor-like giant cell tumor (GCT). The reported cases of GCT complicating Paget's occur mainly in polyostotic disease[8].

GCTs associated with PDB have features distinct from conventional GCTs. GCTs complicating PDB occur in the regions affected by PDB, such as the skull and facial bones, while conventional GCTs arise most commonly in long bones, especially in the area of the knee joint[3]. Rendina et al also in their comparative study of large European studies have concluded that GCT-PDB occurs in the axial skeleton[9].

Alterations in certain laboratory parameters, such as levels of osteocalcin (OC), serum alkaline phosphatase (ALP) and serum parathyroid hormone (PTH), can be used as markers of aberrant bone metabolism in this disease[10].

The Case presentation

Patient Information: A forty seven years old non diabetic, normotensive, right handed woman presented to us with the complaints of progressive swelling on the left side of the forehead for two years. She said that at first the swelling was small. Then slowly it was growing in size and now it has become quite large and covering her left forehead and causing drooping of her eyelid. It was painless and it hindered her ability to look up. She had no history of trauma or fever associated with it.

Clinical findings: On examination there was a three by four centimeters swelling over the left fronto- orbital area. it was non tender and non-pulsatile. The surface temperature was as the surrounding skin. It was partly firm and partly soft in consistency. There was irregular bony margin palpable around the swelling. The overlying skin was free, but the tumour was fixed with underlying structure. there were no engorged veins on the swelling. Transillumination test was negative. There was no palpable cough impulse, it was neither compressible nor reducible. The swelling had grown out in to the left orbit and as such the left eye lid was partially closed. But her vision in the left eye as well as movement of the left eye was intact. Her neurological examination was normal. All other system examination was normal.

Diagnostic assessment: Her routine blood count was normal. Her CT scan was suggestive of PDB or fibrous dysplasia with outer table erosion in the left side of frontal bone (supraorbital) with adjacent soft tissue swelling (figure 2).

MRI scan report was suggestive of diffuse infiltrating lesion in the calvaria with superior aspect of orbit (figure 1).

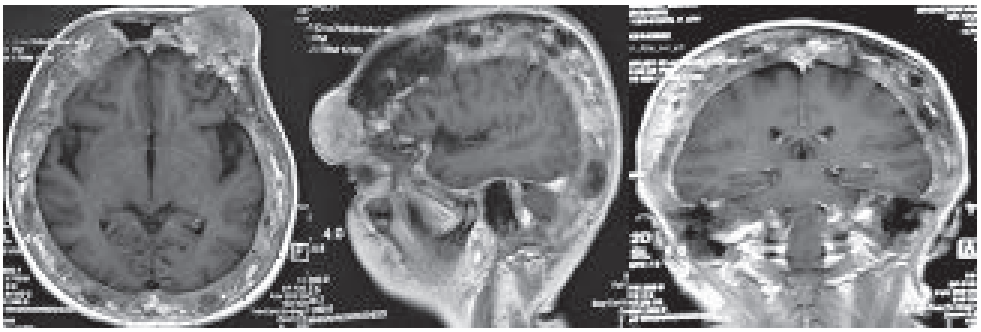

Figure 1: Pre-operative contrast enhanced MRI Showing the thickened skull bone and GCT at the left frontal region.

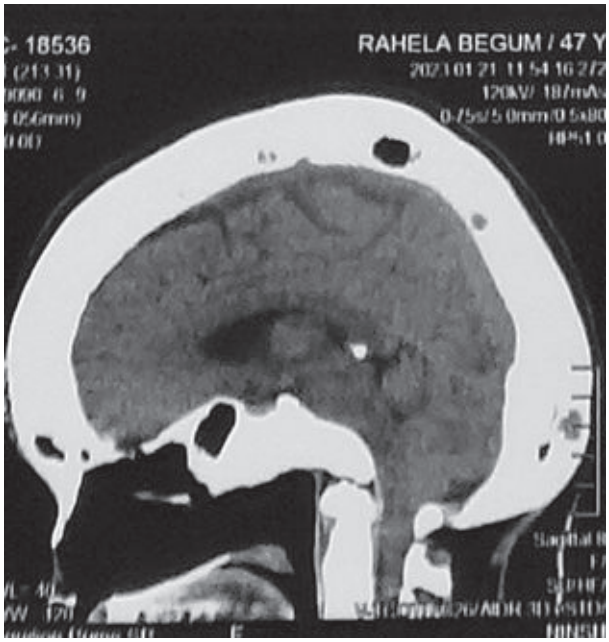

Figure 2: CT scan of head, sagittal section, showing thickening of the skull bone with platybasia.

In bone Scan, there were multiple osteoblastic lesions which was suggestive of multiple skeletal metastasis (figure 3).

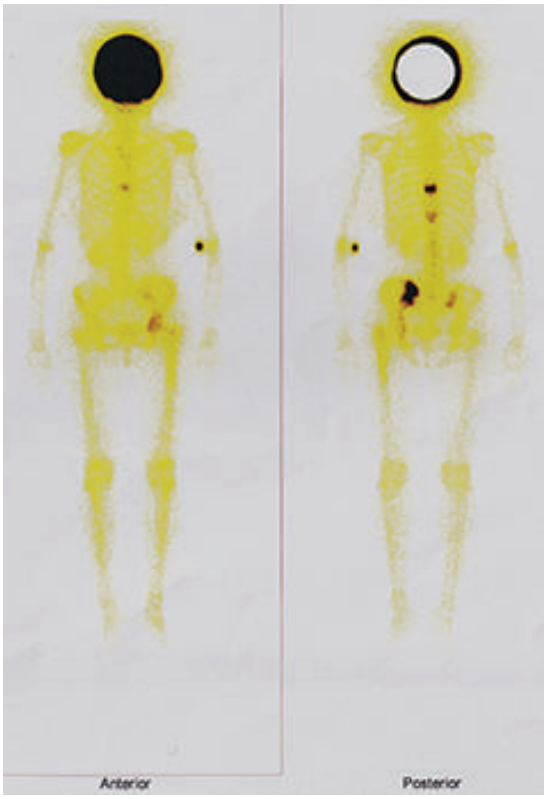

Figure 3: Bone scan (anterior and posterior aspect) showing multiple hotspots, mostly in the skull bone.

Her S. ALP was 2025U/L and S. IPTH was 115.8 pg/mL and 108.3 pg/ml after two weeks. Her serum calcium was normal. Ultrasonogram of the thyroid and parathyroid gland was normal, serum electrophoresis was normal.

Differentials diagnosis: Initially it was thought as a benign scalp swelling, probably a lipoma, osteoid osteoma or extracranial extension of intracranial tumours. These were excluded by CT scan and MRI examination.

Therapeutic intervention: She had undergone tumour excision under general anaesthesia. She was placed on the operation table in supine position with head in the midline. The tumour was approached by left eye brow incision. The tumour was firm, well circumscribed, greyish in colour, moderately vascular and had eroded the left frontal bone in the orbit and attached to the dura. It was totally removed, surrounding bones were drilled out and the hydrogen peroxide toileting was done in the tumour bed. After achieving hemostasis the bony defect was covered with titanium mesh to maintain cosmesis (figure 4).

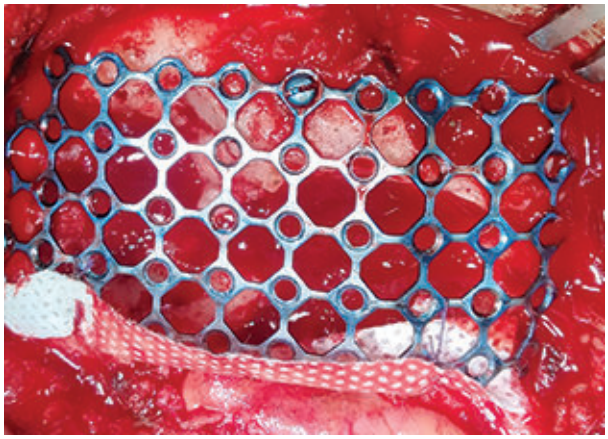

Figure 4: Intraoperative photograph showing the bony defect covered with titanium mesh.

Skin was closed in layers. The tumour was incised, it was very firm and fleshy (figure 5).

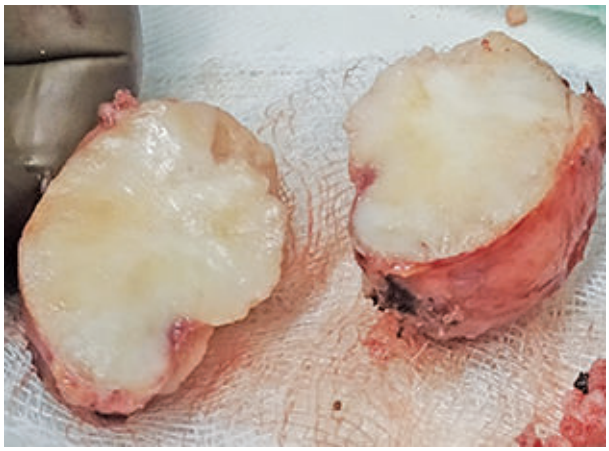

Figure 5: The tumour incised after removal

Her histopathological study showed background spindle shaped cells and irregularly disposed nuclei containing multinucleated giant cells. There were also sparse osteoid materials (figure 6).

Her post-operative period was uneventful. She was discharged from the hospital on the 10th post–operative day with advice to consult an oncologist.

Follow-up and outcome: the patient was followed up in the out-patient department after surgery at one month and six months. During these follow-ups, she was tumour free and her wound had healed well.

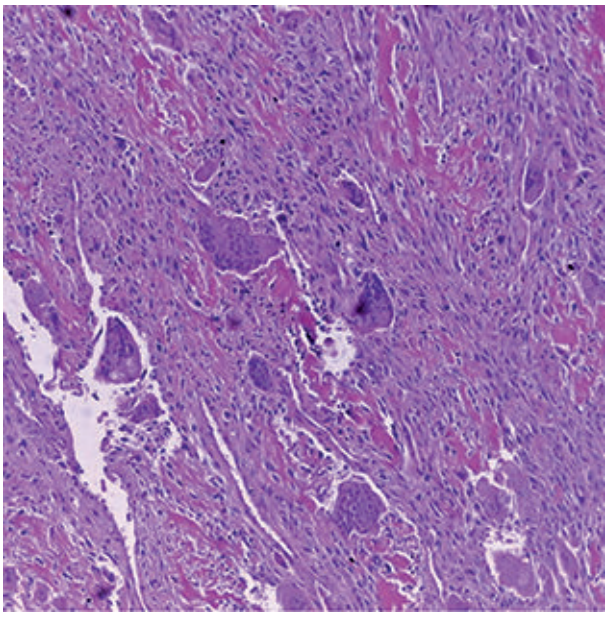

Figure 6: Histopathological picture H&E staining, showing irregularly disposed nuclei, background spindle shaped cells containing multinucleated giant cells. sparse osteoid materials are also seen.

Discussion:

GCT usually does not occur in frontal bone[11]. This patient had this because of PBD. Haibach et al in 1985 had reviewed 82 cases of neoplasms arising in Paget's disease of bone. In their study, there were 77 osteosarcomas, 3 fibrosarcomas, 1 chondrosarcoma, and 1 giant cell tumour[12]. Bertoni et al had reviewed 546 cases of giant cell tumour. Of them, only 15 were in the skull. Only one patient with PDB had GCT in the frontal bone[6]. In another study by Dahlin et al, out of 195 patients only one of the GCT occurred in a patient with Paget's disease of bone[13]. This patient had GCT of the frontal bone also.

Scintigrams are more sensitive than conventional radiography, revealing up to 30% more bone lesions, especially in sites with multiple overlapping radiographic shadows such as the ribs, sternum, and scapula[14]. In this patient there was more uptake in the skull, left hemipelvis, D9 and D11 vertebra, both SI joints and the head and upper end of left femur.

Radiologically, all remnants of osteoporosis circumscripta disappear, being replaced by condensing foci of sclerosis and obscuration of the inner and outer tables combined with considerable bony sclerosis and widening. Sclerotic bone occurs primarily along the inner table. There will be marked thickening of the skull vault and peripheral migration of the outer table correlate with the clinical finding of an enlarged head diameter. Bone softening of the skull in Paget's disease may lead to basilar invagination, "dropping" of the occiput, and platybasia[15]. This patient had such feature in x-ray skull and CT scan. When in the skull, GCT shares anatomical characteristics and imaging features with several other tumors, including chordoma, chondrosarcoma, meningioma, and osteosarcoma, among others[16].

In a cross sectional study by Seton et al, out of 285 patients, lesions in the skull were endorsed in 29% of self-reported data, and were detected in 30% and 19% of bone scan and X-ray data, respectively[17]. This patient was detected by CT scan and MRI of the skull.

Of the biochemical parameters, ALP is raised in PDB and Calcitonin is normal range[10]. In this patient S ALP was 2025 U/L. this was much higher than the normal range. Her S. parathyroid hormone level was 115.8 pg/ml and 108.3 pg/ml after two weeks. Which may be due to pagetic hyperparathyroid syndrome[18].

Intraoperatively, the tumour was extradural and closely attached with dura. It had eroded the frontal bone and the orbital rim and had entered the orbit. In a study, all the GCT of the skull had an extradural location and were closely adherent to the dura mater, with destruction of the regional bones[11]. We had to reconstruct the eroded orbital rim with titanium mesh to maintain cosmetic result.

Pathologically, GCTs consist of three types of cells: round monocytes-resembling cells, spindle-shaped fibroblast-like stromal cells and multinucleated giant cells[11].

Although GCTs are generally benign lesions, they have the potential for locally aggressive behavior and less commonly, malignant differentiation. Surgical excision is the first line of treatment with the subsequent prognosis closely related to the degree of excision[11]. We had excised the total tumour and then reconstructed the defect of the orbital rim with titanium mesh.

Recommendations:

Paget's disease of the bone is a rare entity, in the skull it is even rarer. Giant cell tumour is infrequently seen in patients with PDB. But in the frontal bone is also rare. We must keep this uncommon diagnosis in mind while diagnosing and preparing the patient for surgery.

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