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Case Report

A Newborn with Giant Cell Tumor of the Occipital Bone: Case Report

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ABSTRACT

Giant cell tumors of bone (GCTB) are commonly benign neoplasms and characterized by regional progressive and destructive lesions. They have a malignant potential and the capacity to metastasis. Incidents of GCTB are reported in 20% of all benign and 5% of all malignant bone tumors and pediatric cases account for less than 5% of all them. The first line treatment strategy for GCTBs is surgical resection. A male baby presented at our hospital on his 10th day of life suffering from respiratory distress and persistent vomiting. His blood and urine panels were within normal parameters. CMRI was performed to evaluate his condition. The CMRI report noted a "suspected 4x3 cm contrasted bone-derived malignant-looking mass at the left posterior fossa of the cranium". The biopsy confirmed: "A grade 1-2 giant cell tumor of bone". Surgical resection was not possible because of the location of the mass and its proximity to blood vessels but chemotherapy was the one strategy available in this particular case. The chemotherapy regimen consisted of cisplatin 1 mg/kg/day (1-3 days) and doxorubicin 1 mg/kg/day (1,2 days) and was applied four times every month. Using CMRI, we noted a reduction in mass of more than 50% after two sessions and complete regression after four sessions. The patient was given regular follow-ups with no evidence of recurrence and co-morbidity were observed over the next 60 months. We recommend chemotherapy as a successful alternative strategy when surgical resection, radiotherapy, and other therapies are not applicable for GCTBs.

Keywords: Giant cell tumor of bone, newborn, chemotherapy

Introduction

Giant cell tumor of bone (GCTB) are generally localized at the epiphysis of long bones and are characterized by regional progressive and destructive lesions. GCTs of bone are commonly benign neoplasms but they have malignant potential and the capacity to metastasis (1,2). The first line treatment strategy for GCTBs is surgical resection and other alternatives are localized radiotherapy or chemotherapy. The mainstay molecular pathology of GCTB has been discovered recently in that GCTB overexpress receptors activator of nuclear factor-kappa B (RANK) and its ligand (RANKL) in stromal cells. This interaction causes bone resorption due to the activation of osteoclasts. Denosumab, a monoclonal humanized antibody to RANKL, block RANK-RANKL interaction, has been reported as curative in some patients over 12 years old (3). A newborn presented with GCT of the occipital bone and was treated with chemotherapy and we concluded that chemotherapy is a successful alternative strategy when surgical resection, radiotherapy, and other therapies are not applicable for GCTBs.

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A male baby weighing 3.6 kg at birth and delivered via C-section at the 39th week of pregnancy presented at our hospital on his 10th day of life suffering from persistent vomiting. Cranial magnetic resonance imaging (CMRI) was performed to evaluate his condition and a "suspected 4x3 cm bone-derived malignant-looking mass at the left posterior fossa" was noted (Figure 1). Surgical resection was not possible because of the location of the mass, especially its proximity to major blood vessels. The biopsy showed spindle cells with pleomorphic cells and a variable proliferation index with some areas as high as 20% as demonstrated by Ki-67 staining. Given this information, the presence of giant cell areas and spindle cell areas containing necrosis indicated a grade 1-2 GCT according to the classification by Jaffe et al. (4). Metastasis was not observed in computed tomography of the thorax. Loss of hearing in the left ear was determined via brainstem auditory evoked potential (BAEP) and was probably due to the mass. The patient was not suitable for surgery or radiotherapy, but chemotherapy was the one strategy available in this particular case. The chemotherapy regimen consisted of cisplatin 1 mg/kg/day (1-3 days) and doxorubicin 1 mg/kg/day (1,2 days) and was applied four times monthly. Using MRI, we noted complete regression after four sessions. The patient was given regular follow-ups with no evidence of recurrence or co-morbidity over the next 60 months. The CMRI showed no residual mass at posterior fossa at the 60th month after chemotherapy (Figure 2 a,b,c,d). Bilateral BAEP has proven normal as has his general neurological and mental development during this time with his motor functions and speech as well as his emotional and cognitive abilities testing appropriate to his age. Informed consent was received from family.

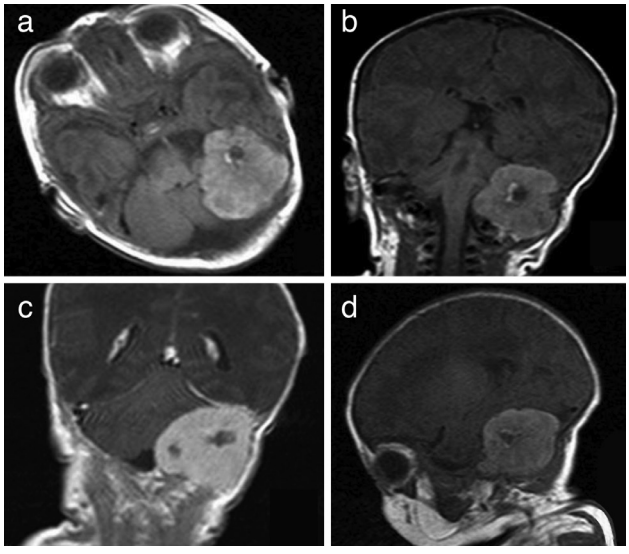

Figure 1. (a,b,c,d) Pretreatment magnetic resonance imaging revealing a mass lesion at the left posterior fossa of cranium

Discussion

Pain is the leading symptom when GCTB is localized in the long bones but neurologic symptoms or failures are revealed when GCTB is present in the skull. Unfortunately, various benign or malignant tumors may be confused with GCTB (3). Histological examination of GCTB shows a heterogeneous tumor occurring in stromal cells and multinucleated giant cells with over-expressed RANK and RANKL (2,4). The preferred treatment of GCTB is resection with surgery or extended intralesional curettage, but this is not always suitable given the location and size of the tumor. Radiotherapy has been used as a treatment option in combination with surgery or chemotherapy for GCTBs, but this carries the risk of malignant transformation, local recurrence and some side effects (1,2).

Table I lists the pediatric cases of GCTB in the skull reported in the literature since 2000. They are mostly adolescents with base of the skull treated with surgical intervention, radiation or embolization (5-10). Our case was one of the youngest patients described in the literature. Treatment is determined by location and age. The location of the mass and patient's age prohibited us from performing wide resection, radiotherapy or using denosumab in this case. Conventional chemotherapy was used following an

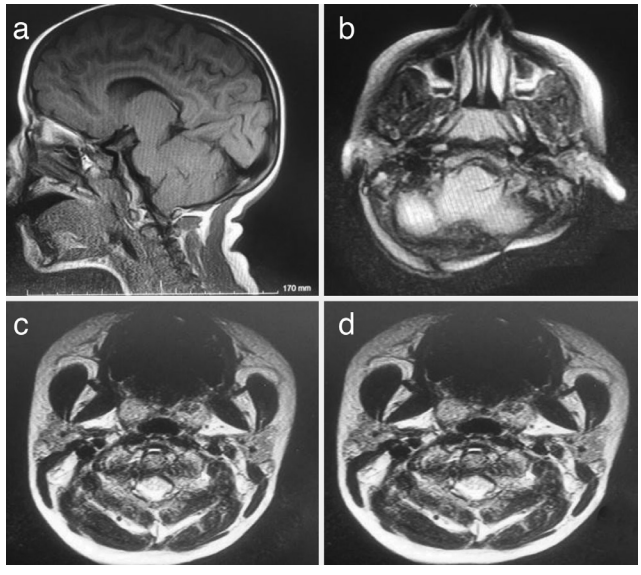

Figure 2. (a,b,c,d) Magnetic resonance imaging shows any residual mass lesion at the left posterior fossa of cranium after 5 years of chemotherapy.

Table I. Pediatric cases of giant cell tumor of bone at skull in literature

Case No	Reference	Age/Gender	Location	Treatment	Outcome
1	Sharma et al. (6)	17 years/male	Sphenoethmoidal	Partial resection and radiotherapy	Two years follow-up with no recurrence
2	Sharma et al. (6)	12 years/female	Petroclival	Close to all resection	After 1 year locale recurrence
3	Bibas-Bonet et al. (7)	8 years/female	Temporopetroidal	Radiotherapy	Eight years follow-up with neurologic sechel and no recurrence
4	Elder et al. (5)	2 years/female	External auditory canal	Embolization and resection	Thirteen months follow-up with no recurrence
5	Elder et al. (5)	7 weeks/female	External auditory canal	Close to all resection	Eleven months follow-up with no recurrence
6	Gupta et al. (8)	17 years/female	Sphenoid bone	Resection and radiotherapy	Two years follow-up with no recurrence
7	Karamanakos et al. (9)	5 weeks/female	Temporal bone	Partial resection	Died after 4 weeks
8	Inoue et al. (10)	16 years/male	Sphenoid bone	Close to all resection and denosumab	Ten months with monthly denosumab treatment and no recurrence

informed consensus between the physician and the infant's family. The patient has had no recurrence or co-morbidity, nor was any toxicity as a result of chemotherapy detected over five years of follow-up.

Although the pathology prognosis in our case was not completely compatible with malignant (grade 3) GCTB according to the classification by Jaffe et al. (4) the chemotherapy response has led us to believe that that the mass would have become malignant. We recommend chemotherapy as a successful option for treating GCTB if other strategies are not possible or suitable.

Ethics

Informed Consent: Informed consent was received from family.

Peer-review: Externally and internally peer-reviewed.

Authotship Contributions

Surgical and Medical Practices: E.T., B.D., Ş.Ç., T.T., B.D., Design: E.T., B.D., Data collection or Processing: E.T., B.D., Analyses or Interpretration: E.T., B.D., Literature Search: E.T., B.D., Writing: E.T., B.D.

Conflict of Interest: No conflict of interest was declared by the authors.

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