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Case Report

Pathology Section

Giant Cell Tumour of Clivus: A Rare Case Report

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ABSTRACT

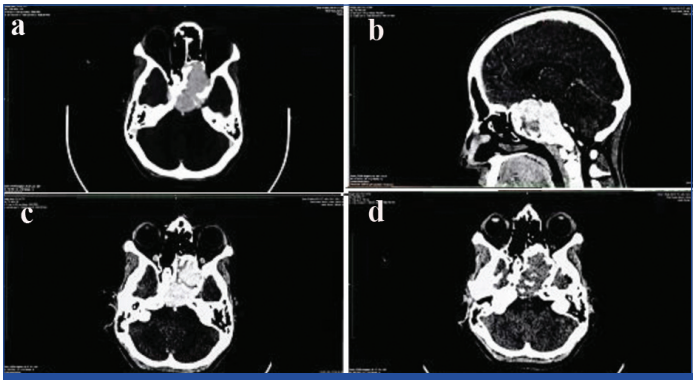
Giant Cell Tumours (GCT) of the skull is rare, being less than 0.05% of all skeletal tumours. They are usually located in the middle cranial fossa affecting the temporal, sphenoid, petrosal and occipital bone. Clival GCT is rarer and 15 cases are described in the literature. Authors report a case of a female patient aged 20 years, who complained of headache with decrease in vision of left eye. Neurological examination revealed left optic nerve palsy. Laboratory test of Vitamin B12, blood urea, Serum Creatinine, Serum Electrolytes were within normal range. Complete blood count showed mild anaemia. The serum calcium and parathyroid hormones were within normal range. Computed Tomography (CT) scan and Magnetic Resonance Imaging (MRI) were done, which demonstrated expansile destructive lytic lesion involving sphenoid bone and clivus, reaching upto sellar, parasellar regions, sphenoid sinus and left posterior ethmoid sinus, effacing left optic foramina and posteriorly effacing prepontine cistern. The left internal carotid artery was partially encased by the mass. The tumour was partially removed by endoscopic trans-nasal trans-sphenoidal approach. Histopathology confirmed it as a benign GCT. Surgical treatment of clival GCTs are fraught with complication because of its close proximity to vital structures. High vascularity, potential malignant behaviour, inaccessibility and very few published cases preclude a definite outcome of this lesion. Histopathology is necessary to differentiate various lytic lesion like chordoma, aneurysmal bone cyst, invasive pituitary adenoma, chondrosarcoma and brown tumour (parathyroidism).

Keywords: Left optic nerve palsy, Osteoclastoma, Skull base tumour

CASE REPORT

A 20-year-old female with one month history of headache and decreased vision in left eye. She had no history of trauma or surgery. No past medical history. Physical examination revealed overall good health. Neurological examinations revealed left optic nerve palsy. Laboratory tests were conducted, the blood biochemical tests included Urea-27 mg%, Serum Creatinine 0.8 mg%, Electrolytes Na^+141 mμ/L, K^+4.1 mμ/L, Cl^+103 mμ/L. The complete blood count showed the following results Haemoglobin (Hb)-10.0 gm%, Total White Blood Cell (WBC) count-4200 cells/cumm, Differential count-61/30/04/05, Packed Cell Volume-31%, Mean Corpuscular Volume (MCV)-81.6 fL, Mean Corpuscular Haemoglobin (MCH)-26.3, Mean Corpuscular Haemoglobin Concentration (MCHC)-32.3%, Total Red Blood Cell (RBC) Count-3.8 Mil/μL, Red Cell Distribution Width (RDW)-13.3%, Platelet count-1.72 lac/cumm. Parathyroid hormone was 36.03 pg/mL (Normal range-15-65), Serum calcium was 9.2 mg/dL (Normal range 8.4-10.2). CT scan brain and Paranasal Sinuses (PNS) demonstrated expansile destructive lytic lesion which was seen involving sphenoid bone and clivus reaching up to sellar, parasellar regions, sphenoid sinus and left posterior ethmoidal sinus and effacing left optic foramina and posteriorly effacing prepontine cistern. Lesion was seen to partially encase the internal carotid artery. The mass lesion showed heterogenous enhancing soft tissue density component. Pituitary gland was not seen separately from the lesion. Small bulge was seen in the suprasellar region [Table/Fig-1].

Magnetic Resonance Imaging (MRI) scan was done using T1-weighted (T1W), T2-weighted (T2W), Diffusion Weighted (DW), Gradient Recalled Echo (GRE) and Fluid Attenuated Inversion Recovery (FLAIR) sequences in various planes. Expansile destructive soft tissue intensity heterogeneously enhancing mass lesion was seen in body of sphenoid bone/clivus appearing hyperintense on both T2W and FLAIR sequences. Mass was extending into the prepontine cistern posteriorly and parasellar region and was pushing the pituitary gland cranially. The left internal carotid artery was partially encased by mass. Fullness was seen in the region of optic foramen on left side with minimal erosion.



[Table/Fig-1]: a) Axial CT scan demonstrate expansile lytic lesion involving sphenoid bone. b) Sagittal CT scan demonstrate expansile lytic lesion involving sellar, suprasellar, sphenoid bone and clivus. c) Axial CT scan demonstrate expansile lytic lesion involving sellar and suprasellar region. d) Axial CT scan demonstrate expansile lytic lesion involving suprasellar regions left optic foramina.

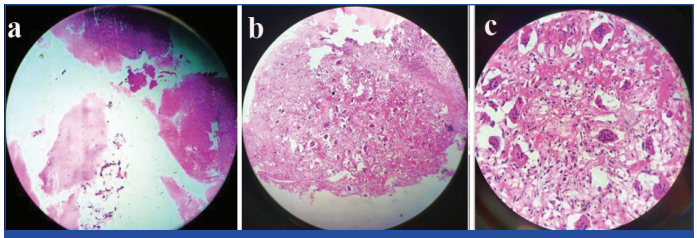
The lesion was extending into sphenoid and left posterior ethmoid sinus. Chordoma and parathyroid tumour were considered in the differential diagnosis after clinical and radiological investigation.

Diagnostic cerebral angiography was done which showed clival tumour supplied by multiple small vessels of both left and right internal maxillary arteries and branches from left internal carotid artery through meningohypophyseal trunk. The tumour was removed using an endoscopic trans-nasal trans-sphenoidal method.

Then specimen was sent to the histopathology. Gross examination showed greyish white soft tissue bits aggregating 2×2×0.1 cm. Sections were stained with H&E.

Histopathological examination, showed bony spicules, fibro collagenous tissue and presence of tumour tissue with diffusely scattered multi-nucleated giant cells within a stroma of spindle cells [Table/Fig-2a-c]. GCT showed two populations of cells,

1. Mononuclear stromal cells
2. Osteoclast-type giant cells
3. The giant cells were large and had over 20 or 30 nuclei



[Table/Fig-2]: a) The figure shows foci of bony spicules, fibro collagenous tissue and tumour tissue with evenly scattered multi-nucleated giant cells in a spindle to polygonal cell stroma (Stain: Haematoxylin and eosin, 40×). b) Giant Cell Tumour (GCT) with a mixture of mononuclear spindle cells and multi-nucleated giant cells. (Stain: Haematoxylin and eosin, 100×). c) High power appearance of Giant Cell Tumour (GCT). (Stain: Haematoxylin and eosin, 400×)

The stromal cells did not showed any nuclear atypia. The differential diagnosis after histopathological examination was aneurysmal bone cyst and GCT. Finally, the diagnosis of GCT of clivus was made. The treatment of the patient included surgical removal of tumour by endoscopic trans-nasal transsphenoidal method followed by radiotherapy in a dose of 54 Gy in 27 fraction over six weeks. The patient was well, till one year after operation in mid December 2020. Further contact was not possible.

DISCUSSION

The GCT is tumours involving the bone and constitutes about 5% of all primary tumours of the skeletal system [1]. It usually occurs in the long bones around the joints in the epimetaphyseal regions of the bone on reaching maturity. Flat bone involvement of the skull, facial bones, pelvis and spine are rare, and GCT involving the skull constitutes <1% of the GCTs involving the skeletal system [2]. Clival GCT remains a very rare tumour forming 0.05% of primary skeletal tumour and less than 15 cases are described [3]. The tumour affects females and males equally. It is commonly seen between 20 years to 40 years of age.

GCTs are usually benign, but may be locally aggressive. Histopathologically, osteoclast like multi-nucleated giant cells are seen evenly dispersed in a background of stromal mononuclear cells and histiocytes. It is this stromal cell which forms the neoplastic component and may display malignant characteristics which may even metastasize rarely to the lungs [4]. GCTs are seen comparatively more in the Asian population affecting Chinese and Indians from 14.2 to 20.3% of the primary bone tumours [1,5]. Clinical features vary according to the site of tumour and involvement of particular cranial nerves I, II, III, IV, and VI. Past cases reported on GCT of clivus have been tabulated and discussed briefly in [Table/Fig-3] [2-4,6-16].

Author, publication year, Reference	Age (years/ sex)	Clinical features	Size (cm)	Duration of symptoms	MRI imaging T1/T2	Vascularity	Surgery	RT	Outcome	Follow-up (months)
Wolfe JT et al., 1983 [8]	16/Female	Headache, diplopia, visual disturbances	NA	4-7 weeks	NA	NA	STR	Yes	Alive with residual tumour	96
Kattner KA et al., 1998 [9]	9/Female	Headache, diplopia	NA	1 month	Space enhancing lesion T2-hypointense and isointense	Moderately vascular	Biopsy (TSS)	Yes	Alive with residual tumour	12
Sharma RR et al., 2002 [10]	18/Female	Headache, progressive hearing loss, facial paresis	NA	6 months	Space enhancing lesion T1-isointense T2-hyperintense	Moderately vascular	NTR	Yes	Alive	12
Sharma RR et al., 2002 [10]	12/Female	Headache, progressive hearing loss, facial paresis, nasal regurgitation, nasal twang	NA	3 months	Space enhancing lesion T1-isointense T2-hyperintense	Moderately vascular	GTR	Yes	Alive	12
Zorlu F et al., 2006 [11]	14/Female	Headache, diplopia	6*4*3.5	2.5 months	Space enhancing lesion Demostrated a lytic expansile lesion	NA	STR	Yes	Alive with residual tumour	24
Gupta R et al., 2008 [12]	17/Female	Headache, diplopia, amenorrhea, visual disturbance	7.6*5.4	6 months	Space enhancing lesion	Moderatey vascular	STR	Yes	Alive with residual tumour	24
SasagawaY et al., 2012 [13]	26/Male	Headache, diplopia	3*3	NA	Space enhancing lesion T1-isointense T2-hyperintense	Highly vascular, massive bleeding	STR	Yes	Death	9
Iacoangeli M et al., 2013 [14]	31/Male	Headache, diplopia	NA	NA	Space enhancing lesion, large GCT originating from the clivus	Highly vascular, massive bleeding, ICA rupture	NTR	No	Alive with residual tumour	24
Roy S et al., 2013 [15]	19/Male	Headache, facial hyperasthesia	5.6*3.6*3.5	6 months	T1-large expansile mass T2-hyperintense	High vascularity	GTR	Yes	Alive with residual tumour	18
Agrawal A et al., 2014 [6]	62/Male	Headache, diplopia	NA	3 months	Space enhancing lesion	NA	Endoscopy f/b STR	NA	No	NA
Shibao S et al., 2015 [2]	25/Male	Diplopia	5.1*3.1*4.9	1 month	Space enhancing lesion T1-isointense T2-hyperintense	Highly vascular, massive bleeding, brain stem invasion	STR	Yes	Death	31
Patibandla MR et al., 2017 [4]	20/Male	Left hemicranial headache, vomiting, dropping of eyelid	NA	6 weeks	T1/T2- isointense	NA	STR	Yes	Alive with residual tumour	3
Satapathy A et al., 2018 [16]	25/Male	Headache, diplopia, diminished vision	5.7*4.5*5.7	4 months	Space enhancing lesion, large mass centered on clivus	Moderately vascular	GTR	Yes	Alive	8
Scotto di Carlo F et al., 2018 [3]	55/Male	Headache, vomiting	NA	NA	Space enhancing lesion lobulated mass originating from clivus till sella and epitropheus	NA	Sub-occipital approach f/b redosurgery	Yes	alive	36
Scotto di Carlo F et al., 2018 [3]	25/M	Headache, diplopia	NA	NA	Space enhancing lesion lobulated mass	NA	Endoscopic endonasal approach	No	Alive	72

Singh S et al., 2020 [7]	35/Female	Headache, diplopia, blurred vision	4*2.5*0.5	6 months	Space enhancing lesion homogenously enhancing lesion	Highly vascular	Endoscopic endonasal trans-sphenoidal subtotal resection	Yes (60Gy/45fr)	Alive with residual tumour	6
Goswami SS et al., 2021 (Present Case)	20/Female	Headache diminished vision	NA	1 month	Space enhancing lesion Expansile lytic lesion T2/FLAIR - hyperintense	NA	Endoscopic trans-nasal transsphenoidal resection	Yes (54Gy/27fr)	Alive with residual tumour	12

[Table/Fig-3]: Review of literature of GCT of clivus [2-4,6-16].
NA: Not available; STR: Subtotal resection; TSS: Trans-sphenoidal sinus surgery; GTR: Gross total resection; ICA: Internal carotid artery; NTR: Near total resection; GCT: Giant cell tumour; f/b: Followed by

The patient presents with headache, visual disturbances, defects in visual fields, diplopia, weakness and paralysis of eye muscles, proptosis, loss of hearing, endocrine dysfunction and dysfunction of third and sixth cranial nerves [4,6].

In the present case, the patient had tumour involving the cranial nerves I and III and so presented with visual disturbances in the left eye. Histologically, the GCT showed scattered osteoclastic giant cells in the background of benign mononuclear stromal cells. Radical surgery with complete removal of the diseased bone is difficult in clival GCTs due to its peculiar anatomical location and approximation to adjacent vital neurovascular structures [1]. In the present case minimal invasive endoscopic surgery was carried out through the trans-nasal, transsphenoidal approach with partial resection of the tumour.

GCTs are resistant to radiotherapy and show a potential for malignant transformation. An adjunctive therapy may be recommended following partial tumour excision of skull base [1]. Chemotherapy with Adriamycin and bisphosphonates has been tried [4]. Radiographical and histological grading of the tumours don't correlate with the clinical behaviour. It is the extent of resection in surgery which affects the prognosis. Usually the recurrences occur within a couple of years following treatment hence follow-up is necessary. Availability of very few recorded; published cases preclude a definite prognosis of clival GCTs. With the present case, totally 16 cases have been identified [7]. The male to female ratio is equal. The patient's age ranged from 9 to 62 years. The duration of the tumour ranged from 1 to 6 months. The commonest complaints of the patients were headache with diplopia. The MRI findings revealed space enhancing lesions. The lesions were moderate to highly vascular. Fourteen patients had been treated with radiotherapy. Of the 16 patients, two have expired. The longest survivor is eight years on follow-up. In the present case the patient has been on follow-up for one year and is alive.

CONCLUSION(S)

GCT of clivus and sphenoid bone is very rarely seen. The tumour bone is located in the cranial cavity at inaccessible location and is in close approximation to vital structures, hampering complete excision. Histopathological examination is necessary due to presence of various osteolytic lesions in this location viz., chordoma, aneurysmal bone cyst, chondrosarcoma, parathyroid tumour and invasive pituitary adenoma. Malignant change in GCT has to be ruled out by histopathology as rare metastasis to lungs may occur.

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