Low Grade Intracranial Chondrosarcoma of Para-sellar Region: A Case Report and Review of Literature

Patel Jaikumar S[1], Parikh Sonia K[2], Panchal Harsha P[2], Patel Apurva A[2]
Resident[1], Professor[2]
Department of Medical and Pediatric Oncology,
The Gujarat Cancer & Research Institute, Asarwa, Ahmedabad, Gujarat, India.
Corresponding Author: sonia.parikh@gcriindia.org

Summary

Pituitary adenomas include over 90% of para-sellar and sellar mass. Intracranial chondrosarcoma is a rare neoplasm. It is seen in approximately in 0.15% of all intracranial tumours and 6% of all tumours of base of skull. We report a rare case of intracranial chondrosarcoma originating from para-sellar region. This case denotes the importance of keeping chondrosarcoma as one of the differential diagnoses of para-sellar and sellar mass and also studies the role of cytotoxic chemotherapy in such tumour.

Keywords: Chondrosarcoma, Para-sellar region, Chemotherapy.

Introduction

About 90% of the para-sellar and sellar mass are pituitary adenomas.[1] The remaining 10% include other tumours originating from pituitary gland like craniopharyngiomas, pituitary carcinomas, and astrocytoma and tumours of non-pituitary origin like meningiomas, germ cell tumours, chondrosarcomas, chordomas, and metastatic lesions.[2] Non-adenomatous sellar lesions can be easily confused with pituitary adenomas because of similar location and appearance on neuroimaging.[3] Intracranial chondrosarcoma is a rare neoplasm. It is seen in approximately 0.15% of all intracranial tumours and 6% of all tumours of skull base.[4]

Intracranial chondrosarcoma can occur at any age but is commonly found in the age group of 30 to 50 years. It is seen equally in males and females.[5] We report a rare case of intracranial chondrosarcoma originating from para-sellar region. This case stresses the importance of keeping chondrosarcoma as one of the differential diagnoses for para-sellar and sellar mass and elucidate role of chemotherapy in such tumours.

Case Report

Twenty seven year old female was referred to the department of medical oncology to seek second opinion for role of chemotherapy in residual/recurrent chondrosarcoma of para-sellar region. On examination she was conscious oriented and had right eye ptosis and diplopia with no other obvious neurological deficit. Her past case records were studied for presenting features at the time of primary presentation, investigations done and past treatment taken.

In August 2017 she presented to government hospital, Baroda with complaint of pain in right side of face and jaw since last 2 months with 1 month history of difficulty in mastication. Oral and dental examinations were normal. There was no history of galactorrhea, diabetes insipidus, amenorrhea or headache. She had taken oral analgesic as advised by dentist but had no symptomatic relief. Later magnetic resonance imaging (MRI) of brain was done and demonstrated a 4.2x4.4x4.8 cm lobulated extra-axial space occupying lesion in right para-sellar region with several calcifications, patchy areas of enhancement with mild extension in suprasellar and prepontine cisterns. (Figure1). Blood investigations showed no significant abnormality.

She underwent right sided fronto-temporal craniotomy with near total excision of tumour mass in September 2017. Post surgery patient was discharged on 3rd day with no neurological deficit and in conscious state. Histopathology of excised mass

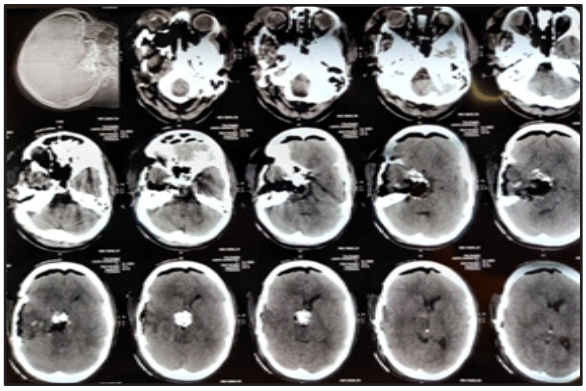

Figure 1: MRI brain showing right para-sellar mass

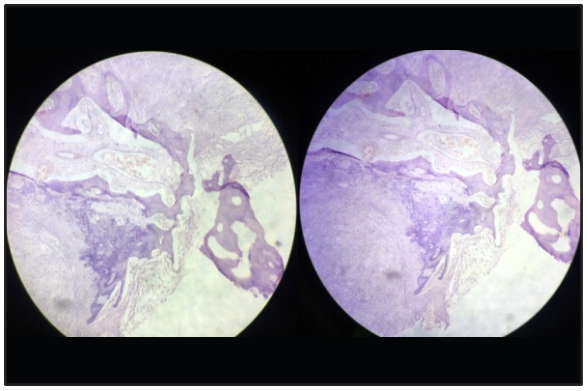

Figure 2: Histopathology of excised tumour [low power (10x) and high power (40x)]

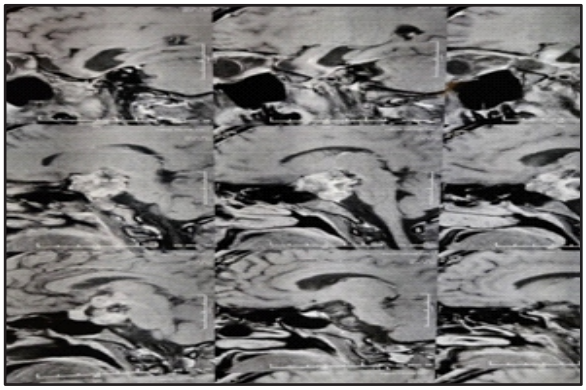

Figure 3: MRI brain showing residual para-sellar mass postsurgery.

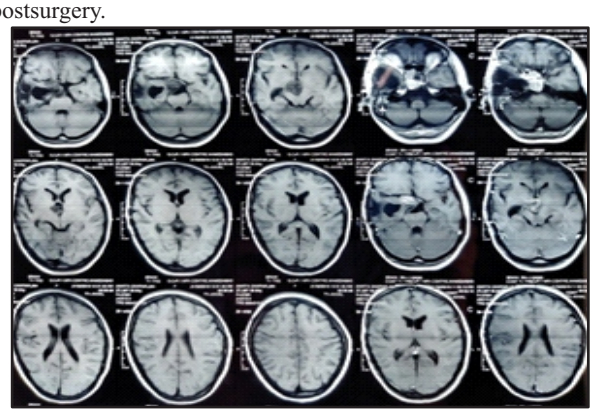

Figure 5: MRI brain at GCRI showing residual para-sellar mass

(Figure 2) showed tumour composed of lobules of hyaline cartilage rimmed by bony trabecula, morphologically foci of myxoid change, calcification and enchondral ossification with no evidence of cytological atypia, mitosis, necrosis suggestive of low grade mesenchymal neoplasm. Immunochemistry showed tumour cells positive for S100 and Vimentin and negative for EMA and AE1 revealing a diagnosis of low grade chondrosarcoma.

One month later she developed right eye ptosis with diplopia. Follow up MRI brain (Figure 3) was done which revealed 3.9x3.2 cm lesion in para-sellar region with pituitary gland not seen separately suggestive of residual/recurrent chondrosarcoma.

She was treated with 65Gy/30 fractions postoperative cranial radiotherapy by volumetric arc therapy (VMAT) technique in November 2017 at Baroda. She had persistent ptosis and diplopia even after radiotherapy. MRI brain two months after radiotherapy showed 3.1x2.6 cm residual mass in para-sellar region. She was started on chemotherapy with VAC/IE (Vincristine, Adriamycin, Cyclophosphamide and Ifosfamide, Etoposide) for 3 alternating cycles with growth factor support till May 2018 which were well tolerated. Post chemotherapy MRI brain (Figure 4) revealed same sized mass in para-sellar region as before starting chemotherapy and with persistent ptosis and diplopia. Patient was

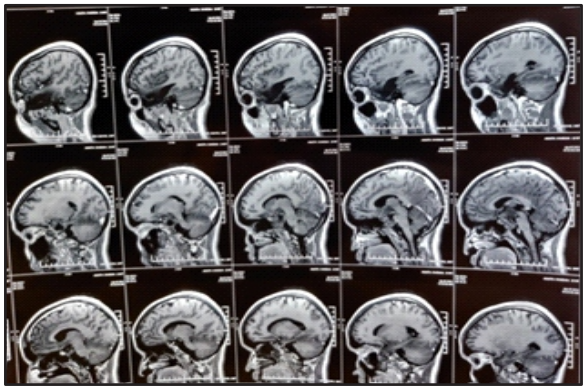

Figure 4: MRI brain showing residual para-sellar mass post chemotherapy

then referred to our center for second opinion.

At our institute diagnosis was reconfirmed and histopathological review and immunohistochemistry revealed low grade chondosarcoma. Fresh MRI brain (Figure 5) showed presence of 3.4x3.2x4 cm mass involving suprasellar and right para-sellar region. Review of literature was done for role of chemotherapy in chondrosarcoma of para-sellar region. In view of debatable role of chemotherapy in this condition, patient was asked to follow up in neurosurgery department. The patient has been kept under close follow up in view of non-progressive disease and as per the record, patient last attended hospital in December 2019.

Review of Literature

Chondrosarcoma is a rare form of bone sarcoma marked by chondroid matrix production. The incidence rate is approximately 0.2 per one lakh person and more commonly seen in third and fifth decade of life without any gender predilection. They may arise anywhere in the body.[4,5]

Intracranial chondrosarcomas of the skull base are seen in 1% of the total chondrosarcomas, and in approximately 6% of entire skull base tumours.[4] Endocranial chondrosarcomas originate more commonly from the base of skull than skull vault.This may be due to difference in embryonic development pattern. Bones of skull base develop by endochondral ossification while skull vault bones develop by intramembranous ossification. Chondrosarcoma of the skull base is considered to originate from remnants of endochondral mesenchymal tissues.[6] In a review study on intracranial chondrosarcoma by Korten et al, common locations were petrous bone (37%), occipital bone and clivus (23%), sphenoid bone (20%), frontal, ethmoidal and parietal bones (14%) and dural tissue (6%).[7]

Common clinical presentations of intracranial chondrosarcomas observed in various studies are history of headaches, facial pain,

oculomotor dysfunction and signs and symptoms associated with raised intracranial pressure.[8]

According to World Health Organization, chondrosarcomas are divided into three categories on basis of histological grade: well differentiated (Grade I), moderately differentiated (Grade II), and poorly differentiated (Grade III).[4] Grade I chondrosarcoma need to be differentiated from enchondroma. It has slightly higher cell density and more cellular atypia compared to enchondroma. Grade II chondrosarcoma is more cellular than grade I. The tumour cells are large and have irregular and hyperchromatic nuclei. Grade III chondrosarcoma is hypercellular with enlarged and hyperchromatic cell nuclei resulting in fusiform pattern. This grading system is important because of its prognostic value.[9,10]

Skull base chondrosarcomas mostly have low-grade histology. These tumours are locally aggressive with low risk of metastases resulting in therapeutic challenges.[11] Immunohistochemical markers such as vimentin, cytokeratin, and S100 help to differentiate chondrosarcoma from chordoma. Chordomas do not express vimentin and chondrosarcomas are negative for cytokeratin expression. S-100 protein expression is present in both.[12]

Intracranial chondrosarcoma is mostly treated with surgical resection when feasible. Surgery may be followed by adjuvant radiation and/or chemotherapy to improve recurrence rates and overall survival.[13] Few studies in literature show chemotherapy may be effective in mesenchymal chondrosarcoma and in dedifferentiated chondrosarcoma. Chemotherapy in general had minimal benefit in grade I chondrosarcomas and is not considered as standard of care in adjuvant/neoadjuvant setting. However, it can be considered in the locally advanced or metastatic setting.[14,15] In general, minimal objective responses were seen in different studies with regimens frequently used in other soft tissue and bone sarcomas, i.e. anthracycline, ifosfamide, cisplatin and gemcitabine in combinations.[15,16]

Prognosis in patients with intracranial chondrosarcoma depends on multiple factors like histological subtype, extent of tumour resection, previous treatment received (surgery or radiation therapy), and use of postoperative radiation therapy. Studies have shown local recurrence to be the most important predictor for adverse outcomes.[4,13]

With chemotherapy, no significant objective responses were observed in studies of intracranial chondrosarcoma.[14] Objective response rate was found to be dependent on the histological type in the study by Italiano et al, with low grade chondrosarcoma having 11.5% objective response and median progression free survival of 4.7 months for all grades. In the same study, cytotoxic chemotherapy had responses in 31% of the patients with mesenchymal type and in 20% of the patients with dedifferentiated type.[16]

In contrast to conventional chondrosarcoma, dedifferentiated chondrosarcomas are high grade. They are locally aggressive with greater risk of metastasis.[16] They are generally treated with regimens used for osteosarcomas.[17] Mesenchymal type of chondrosarcoma also have an aggressive behavior and is treated with chemotherapy regimens similar to Ewing sarcoma.[17,18]

Mortality rate is lowest among patients with Grade I chondrosarcoma. The overall 5 year mortality rate of patients with intracranial chondrosarcoma reported in study was 11.4%, and the mean survival time was 53.7 months.[4]

Conclusion

Chondrosarcoma should be considered as a differential diagnosis for intracranial tumours, especially when located at the skull base (para-sellar region). Therapy should include extensive surgical excision, followed by radiotherapy. Chemotherapy has limited role in treatment, as chemo-sensitivity of these tumours is low.

References:

1. Sautner D, Saeger W, Ludecke DK: Tumours of the sellar region mimicking pituitary adenomas. Experimental and Clinical Endocrinology 1993;101:283-289
2. Huang BY, Castillo M: Nonadenomatous tumors of the pituitary and sella turcica. Topics in Magnetic Resonance Imaging 2005;16:289-299
3. Abele TA, Yetkin ZF, Raisanen JM, Mickey BE, Mendelsohn DB: Non-pituitary origin sellar tumours mimicking pituitary macroadenomas. Clinical Radiology 2012; 67:821–827
4. Bloch OG, Jian BJ, Yang I et al: A systematic review of intracranial chondrosarcoma and survival. Journal of Clinical Neuroscience 2009;16:1547–1551
5. Casali PG, Blay J, Bertuzzi A et al: ESMO/European Sarcoma Network Working Group. Bone sarcomas: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up. Annals of Oncology 2014; 25:iii113–iii123
6. Bloch O, Parsa T: Skull base chondrosarcoma, evidence-based treatment paradigms. Neurosurgery Clinics of North America 2013;24:89–96
7. Korten AG, Ter Berg HJ, Spincemaille GH, Van Der Lan RT, Van De Wel AM: Intracranial chondrosarcoma: review of the literature and report of 15 cases. Journal of Neurology, Neurosurgery & Psychiatry 1998;65:88–92
8. Gay E, Sekhar LN, Rubinstein E et al : Chordomas and chondrosarcomas of the cranial base: Results

and follow-up of 60 patients. Neurosurgery 1995;36: 887–897
9. Bjornsson J, McLeod RA, Unni KK, Ilstrup DM, Pritchard DJ: Primary chondrosarcoma of long bones and limb girdles. Cancer 1998; 83: 2105-2119
10. Pritchard DJ, Lunke RJ, Taylor WF, Dahlin DC, Medley BE: Chondrosarcoma: a clinicopathologic and statistical analysis. Cancer 1980; 45: 149-157
11. Van Maldegem A, Gelderblom H, Palmerini E et al: Outcome of advanced, unresectable conventional central chondrosarcoma. Cancer 2014; 120: 3159–3164
12. Brooks JJ, Livolsi VA,Trojanowski JQ: Does chondroid chordoma exist? Acta Neuropathologica 1987; 72: 229–235
13. Bloch OG, Jian BJ, Yang I et al: Cranial chondrosarcoma and recurrence. Skull Base 2010; 20: 149–156
14. Colia V, Provenzano S, Hindi N, Casali PG, Stacchiotti S: Systemic therapy for selected skull base sarcomas: Chondrosarcoma, chordoma, giant cell tumour and solitary fibrous tumour/hemangiopericytoma. Reports of Practical Oncology & Radiotherapy 2016; 21:361–369
15. Van Maldegem A, Bovee JV, Gelderblom H: Comprehensive analysis of published studies involving systemic treatment for chondrosarcoma of bone between 2000 and 2013. Clinical Sarcoma Research 2014;4:11
16. Italiano A, Mir O, Cioffi A et al: Advanced chondrosarcomas: role of chemotherapy and survival. Annals of Oncology 2013;24: 2916–2922
17. Beirmann JS, Chow W, Adkins DR et al: NCCN Clinical Practice guidelines in oncology. Bone Cancer Version1.2020 [online]. Available at https://www.nccn.org/professionals/physician_gls/pdf/bone.pdf Accessed March 23, 2020.
18. Frezza AM, Cesari M, Baumhoer D et al: Mesenchymal chondrosarcoma: prognostic factors and outcome in 113 patients. A European Musculoskeletal Oncology Society study. European Journal of Cancer 2015;51: 374–381