EUROPEAN JOURNAL OF BIOMEDICAL AND PHARMACEUTICAL SCIENCES
http://www.ejbps.com

ISSN 2349-8870
Volume: 7
Issue: 6
353-356
Year: 2020

INTRACRANIAL MALIGNANT PERIPHERAL NERVE SHEATH TUMOUR IN THE CEREBELLO-PONTINE ANGLE – A RARE CASE REPORT AND REVIEW OF LITERATURE

[1]*Dr. Moumita Paul, [2]Prof (Dr.) Mouchumee Bhattacharyya, [3]Prof (Dr.) Apurba Kumar Kalita

[1]MBBS, PGT (Radiation Oncology), Department of Radiation Oncology, Dr. B. Borooah Cancer Institute, Guwahati - 781016, Assam, India.
[2]DMRT, MD, Professor, Department of Radiation Oncology, Dr. B. Borooah Cancer Institute, Guwahati-781016, Assam, India.
[3]DMRD, DMRT, MD, Professor and Head, Department of Radiation Oncology, Dr. B. Borooah Cancer Institute, Guwahati-781016, Assam, India.

***Corresponding Author: Dr. Moumita Paul**
MBBS, PGT (Radiation Oncology), Department of Radiation Oncology, Dr. B. Borooah Cancer Institute, Guwahati -781016, Assam, India.

Article Received on 25/03/2020 **Article Revised on 15/04/2020** **Article Accepted on 05/05/2020**

ABSTRACT
Introduction: Malignant peripheral nerve sheath tumours (MPNSTs) are soft tissue sarcomas derived from peripheral nerves. MPNSTs arising in the intracranial cavity is rare and that occurring in the cerebello-pontine (CP) angle is even more sporadic. The diagnosis is primarily based on conventional pathology and immunohistochemistry. The prognosis of these tumours is extremely poor. MPNSTs are typically treated with surgery and adjuvant radiotherapy and chemotherapy should be considered in cases of incomplete resection. Here, we present a case of a 55 years old male with Intracranial Malignant Peripheral Nerve Sheath Tumour in the left Cerebello-pontine angle. **Case report:** A 55 year old male presented with history of decreased hearing which worsened for the last 2 years alongwith tinnitus and dizziness. On examination, VIIth and VIIIth cranial nerve deficits were found. MRI Brain showed a mixed hyper and hypointense space occupying lesion in the left cerebello-pontine angle. Ventriculo- peritonial shunt was done which was followed by left retromastoid craniotomy and debulking of left CP angle lesion. Post-operative HPE showed Spindle cell sarcoma suggestive of malignant peripheral nerve sheath tumour. IHC showed S-100 positive. He was then taken up for adjuvant radiotherapy (60 Gy in 30#) with conformal technique. Post-radiotherapy, his symptoms started improving. He was on follow-up but after 6 months he started developing same symptoms. He was advised radiological investigation subsequently but unfortunately the patient expired before undergoing that. **Conclusion:** Because of poor prognosis and high chances of recurrence, close follow up is crucial in such tumours. Complete resection in these tumours is quite difficult because of close proximity with critical brain structures. The median survival of patients with intracranial MPNSTs is hardly a year. Studies with large number of patients will be required to ascertain the role and regimen of chemotherapy to be used in these tumours.

KEYWORDS: *Malignant peripheral nerve sheath tumour, Intracranial malignant peripheral nerve sheath tumour, Cerebello-pontine angle, Cranial nerve deficits, Radiotherapy.*

INTRODUCTION
Malignant peripheral nerve sheath tumours (MPNST) are highly malignant tumours arising from the nerve sheaths of peripheral nerves. MPNSTs have three recognized etiologies: tumours may occur in association with Neurofibromatosis (both type1 and 2), may be the consequence of previous radiation therapy, or may occur sporadically.[1] Studies have shown that lifetime risk of developing MPNSTs is 8-13% in patients of Neurofibromatosis-1.[2] But most people have no risk factor for the disease.

These tumours (MPNSTs) often occur in the deep tissue of the limbs and trunk, involving the brachial and lumbar plexuses. MPNST is a highly malignant tumour with an extremely rare incidence of 0.001%.[3,4] Intracranial MPNSTs are even more exceptional. Malignant peripheral nerve sheath tumours are common between fourth and sixth decades of life with a male predilection, the male to female ratio being 2.5:1.[4]

Intracranial MPNST is highly aggressive with generally a poor prognosis. The mainstay of the treatment is surgery. However, radiotherapy and chemotherapy

should be added in the adjuvant setting in cases of incompletely resected/unresected tumours.

Here, we present a case report of a 55 years old male with Intracranial Malignant Peripheral Nerve Sheath Tumour in the left Cerebellopontine Angle.

CASE PRESENTATION

Chief Complaints: A 55 years old male, presented with decreased hearing in left ear for 8 years which had been progressively worsening since 2 years, ringing sound in left ear for 2 years, persistent throughout the day and imbalance while walking for last 5 months.

Co-morbidities: He was a known hypertensive for 10 years and a known diabetic for 9 years; on regular medications.

Past history: There was no history of any significant genetic disease or radiation exposure.

Family history: There was no significant family history.

On examination

- Higher mental function was normal.
- Motor system was intact
- Sensory system was intact
- Cranial nerve examination: Mild left sided facial weakness (VIIth nerve involvement) and Rinne's test was positive for both the ears (AC>BC); Weber's test showed lateralisation to right ear (VIIIth nerve involvement) indicating sensorineural hearing loss in left ear. Rest of the cranial nerve functions were intact.

Radiological investigation

MRI Brain: A mixed hyper and hypointense space occupying lesion of size (4.2X3.2X3.4)cm in the left cerebello-pontine angle, causing compression over left cerebellum and brainstem with resulting hydrocephalus. The third and lateral ventricles were dilated.

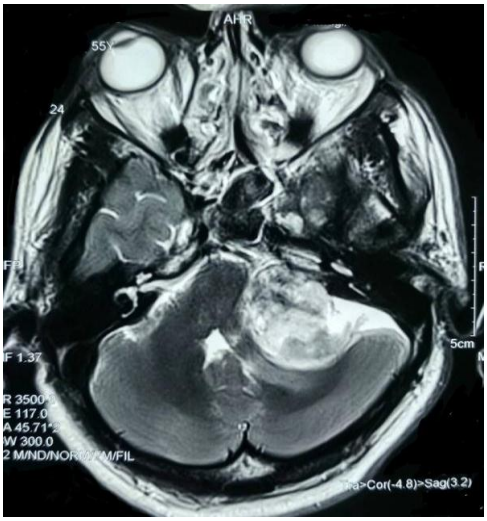

Fig. 1

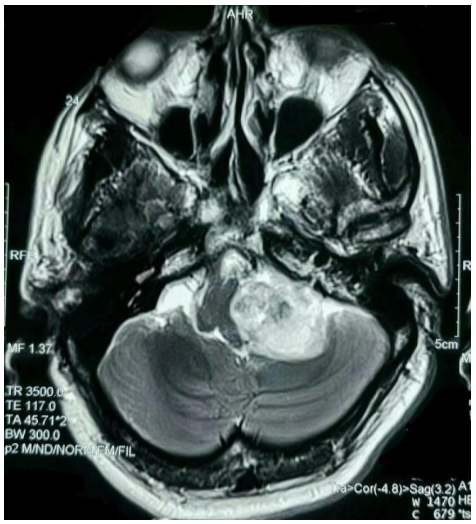

Fig.2

Fig. 1 and 2: Axial T2W images showing the tumour in the left CP angle compressing over the brainstem.

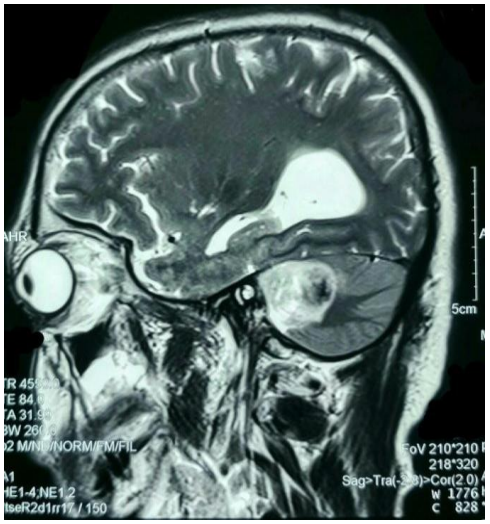

Fig.3

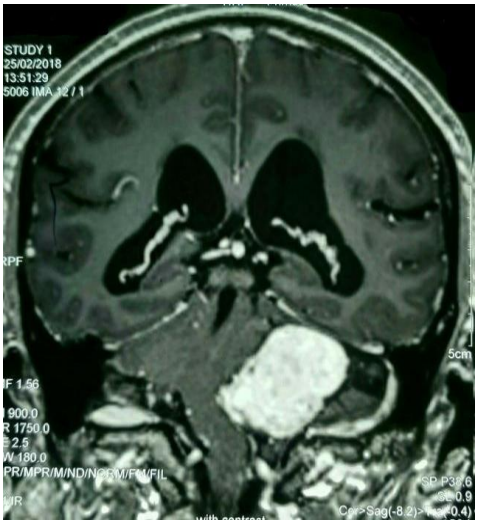

Fig.4

Fig.3: is a T2W image showing the tumour in saggital section and Fig.4 is a post-contrast T1W image showing the tumour in coronal section.

MR Spectroscopy: High choline peak and absence of N-acetyl aspartate and creatine peak.

Surgery: Patient underwent surgery in two steps - first, right (posterior parietal) ventriculo- peritoneal shunt was done which was followed by left retromastoid craniotomy and debulking of left cerebello-pontine angle space occupying lesion.

Post-operative HPE: Spindle cell sarcoma suggestive of malignant peripheral nerve sheath tumour, high grade, probably arising from pre-existing schwannoma.

IHC: CK negative, Vimentin negative, S-100 positive (strong in bland areas and weak in malignant areas), GFAP negative, Desmin negative, CD34 positive (weak, few cells), SMA negative, SOX-10 positive, Ki-67 30-40% in hotspot areas.

Post-operative period: Immediate post-operative period was uneventful.

***Surgery and all investigations (both pre and post-operative) were done elsewhere.**
Patient was sent to our institute for radiotherapy. The case was discussed in Multidisciplinary Tumour Board and the patient was planned for adjuvant radiotherapy with conformal technique IMRT (Intensity Modulated Radiotherapy).

Radiotherapy: He received radiotherapy (IMRT) to the residual tumour alongwith the tumour bed with 6 MV photon to a dose of 60 Gy in 30 fractions over a period of 6 weeks with 2 Gy per fraction.

Post-radiation: The patient improved clinically after radiotherapy though decreased hearing in left ear was persistent. He was on follow-up. But after 6 months, he developed dizziness and tinnitus and his clinical condition deteriorated. Neurological examination findings were insignificant except for the VIIIth cranial nerve deficit.

He was advised MRI Brain for assessment of tumour recurrence but unfortunately the patient expired before undergoing the investigation.

DISCUSSION

Arthur Purdy Stout (1885-1967) played a pivotal role in the development of current understanding of the pathogenesis of peripheral nerve sheath tumours by identifying the Schwann cell as the major contributor to the formation of benign as well as malignant neoplasms of the nerve sheath.[5]

Intracranial malignant nerve sheath tumours can be classified into[6]

Extra-axial lesions: Intimately associated with the cranial nerves and more commonly originating in the posterior fossa. The site of origin is from the eighth cranial nerve in 60%, fifth nerve in 27%, seventh nerve in 10%, and from others in remaining cases[7] and

Intraparenchymal lesions: Also called malignant intracerebral nerve sheath tumours (MINST), not associated with any cranial nerve and more common in the supratentorial region.[8,9]

In this case, the tumour location was extra-axial in origin.

MPNSTs rarely occurs in the intracranial cavity and it is even rarer in the cerebello- pontine angle. One case was reported by Komminoth in 1977. Since then only one other case was published by Sarkar in 1987. Scheithauer *et al*[10] in 2009 studied 17 cases of MPNSTs of cranial nerves and intracranial contents where VIIIth cranial nerve involvement was most common. Ziadi *et al*[4] in 2010 reported 32 cases of intracranial MPNSTs out of which 15 occurred in the CP angle primarily affecting the vestibulocochlear nerve while Lebeau *et al*[7] in 2013 reported 60 cases of intracranial nerve malignant nerve sheath tumour.

Malignant nerve sheath tumours may arise sporadically (47%) or from malignant transformation of benign lesions either Schwannoma (40%) or Neurofibroma (8%).[7]

These tumours have been seen to be mostly associated with Neurofibromatosis 1 and 2. Literature also shows association of these tumours with prior irradiation to head and neck region for some other diseases. But our patient had no focus of tumour on evaluation anywhere in the body or history of radiation exposure.

Diagnosis is made in regards to radiological and histopathological findings alongwith immunohistochemistry (IHC). IHC shows S-100 positive in 50-70% of cases.[4] In our patient too, S-100 was positive. An MR spectroscopy can differentiate it from glial tumours. The presence of a high choline peak without creatine and N-acetyl aspartate resonance suggests a tumour of nonglial source.

The primary treatment for intracranial MPNSTs is surgery followed by adjuvant radiotherapy. Complete resection of such tumours is quite difficult because of their close proximity to critical structures of brain. Literature suggests that post-operative radiotherapy and chemotherapy help in delaying the onset of recurrence thereby improving survival. The combination of conventionally fractionated radiotherapy with the use of gamma knife stereotactic surgery has shown to stabilise this aggressive form of tumour. Chemotherapy with doxorubicin and ifosfamide showed a partial response rate of 20- 25%.[11]

The prognosis of intracranial MPNSTs is very poor with a median overall survival of 9 months[12] or 1 year survival rate of 33%.[7] In our case, the patient died after 6 months of completion of treatment.

CONCLUSION

Intracranial MPNSTs are rare with no proper pre-operative distinguishing clinical and radiological features. These are highly malignant subtypes of MPNSTs with a poor prognosis. The mainstay of treatment is surgery followed by adjuvant radiotherapy and/or chemotherapy. A close clinical and radiological follow-up is essential to detect recurrence. MPNSTs are treated as other soft tissue sarcomas because such cases are extremely rare so as to perform trials with sufficient number of patients. Recent advances in molecular biology of MPNSTs may help to provide new targeted therapies in near future.

ACKNOWLEDGEMENT

The authors would like to express their gratitude towards the Director of the Institute and towards the faculties and students of the Department of Radiation Oncology, BBCI.

REFERENCES

1. Lafemina J, Qin LX, Moraco NH, et al. Oncologic outcomes of sporadic, neurofibromatosis-associated, and radiation-induced malignant peripheral nerve sheath tumors. Ann Surg Oncol, 2013; 20(1): 66–72.
2. Walker L, Thompson D, Easton D, Ponder B, Ponder M, et al. A prospective study of neurofibromatosis type-1 cancer incidence in the UK. British Journal of Cancer, 2006; 95: 233-238.
3. Kozic D, Nagulic M, Ostojic J, Samardzic M, Milic‐Rasic V, Skender Gazibara M, *et al.* Malignant peripheral nerve sheath tumor of the oculomotor nerve. Acta Radiol, 2006; 47: 595-8.
4. Ziadi A, Saliba I. Malignant peripheral nerve sheath tumour of intracranial nerve: A case series review. Auris Nasus Larynx, 2010; 37: 539-45.
5. D'Agostino AN, Soule EH, Miller RH. Sarcomas of the peripheral nerves and somatic soft tissues associated with multiple neurofibromatosis (Von Recklinghausen's disease). Cancer, 1963; 16: 1015-27.
6. Patankar AP, Sheth JH. Intracranial malignant nerve sheath tumor in the middle cranial fossa: A rare case report with review of literature. Asian J Neurosurg, 2019; 14: 922-6.
7. L'heureux Lebeau B, Saliba I. Updates on the diagnosis and treatment of intracranial nerve malignant peripheral nerve sheath tumors. Onco Targets Ther., 2013; 6: 459-70.
8. Le Fèvre C, Castelli J, Perrin C, Hénaux PL, Noël G. Malignant intracerebral nerve sheath tumours: Two case reports and complete review of the literature cases. Cancer Radiother, 2016; 20: 119-32.
9. Shweikeh F, Drazin D, Bannykh SI. Malignant intracerebral nerve sheath tumors: A case report with review of the literature. Case Rep Surg, 2013; 2013: 384076.
10. Scheithauer, B. W., Erdogan, S., Rodriguez, F. J., Burger, P. C., Woodruff, J. M., Kros, J. M., Gokden, M., & Spinner, R. J. Malignant peripheral nerve sheath tumors of cranial nerves and intracranial contents: A clinicopathologic study of 17 cases. *American Journal of Surgical Pathology*, 2009; *33*(3): 325-338.
11. Carli M, Ferrari A, Mattke A, Zanetti I, Casanova M, Bisogno G, *et al.* Pediatric malignant peripheral nerve sheath tumor: The Italian and German co‐operative group on Soft Tissue Sarcoma. J Clin Oncol, 2005; 23: 8422-30.
12. Gousias, K., Boström, J., Kovacs, A. *et al.* Factors of influence upon overall survival in the treatment of intracranial MPNSTs. Review of the literature and report of a case. *Radiat Oncol*, 2010; 5: 114.