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Acute Presentation of Intrinsic Pontine Glioma in a Child Diagnosed by MRI: A Case Report

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ABSTRACT

Brainstem tumors account for 10-15% of childhood primary tumor. Brain stem gliomas can occur at any age, although they usually present in childhood with mean age of diagnosis 7-9 years. There is no gender predilection. Approximately 80% of infratentorial neoplasms are diffuse intrinsic pontine glioma. The unresectibility of this type of tumor leads these patients to undergo treatment without histological confirmation. Radiotherapy plays a crucial role in the treatment of patients suffering from this type of neoplasms and improving their quality of life over a period of time.

Keywords: Central nervous system, diffuse intrinsic pontine glioma (DIPG), lower motor neuron, upper motor neuron, hemiparesis.

INTRODUCTION

Primary central nervous system tumors are a heterogeneous group of diseases that collectively are the most common malignancy in childhood and adolescence. CNS tumors have the highest morbidity among all childhood malignancies. The overall mortality among this group approaches 30%. The incidence of CNS tumors is highest in infants and children <5 years old (approximately 52cases/1 million children).

Brainstem tumors account for 10-15% of childhood primary tumor. On the basis of MRI evaluation and clinical findings, tumors of brainstem can be classified into 4 types: focal (5-10%); dorsally exophytic (5-10%); cervicomedullary (5-10%); diffuse intrinsic pontine glioma (70-80%). Outcome depends on tumor location, imaging characteristics, and the patient's clinical status[1].Most recent molecular analysis of DIPGs have demonstrated novel mutations in histone H3 and p53 as well as amplification of platelet-derived growth factor receptor alfa in a large number of cases[2].

Here we present a case of diffuse intrinsic pontine glioma in a 6 years old child who presented with sudden onset right sided hemiparesis and left sided LMN facial nerve palsy.

CASE REPORT

A 6 years old male child presented with 14 days history of drooling of saliva from mouth, weakness of the right upper limb and lower limb in form of difficulty in holding strap of bag and difficulty in walking. Weakness is sudden in onset and then gradually progresses as child is not able to eat of his own over next 3-4 days and swaying of body to right side with difficulty in getting up from supine position over next 8-10days.There was no history of pain, any abnormal sensations in lower limbs, loss of consciousness, abnormal body movements, trauma to spine and bladder and bowel involvement. During hospitalization there is no progression of weakness but multiple episodes of vomiting occurred. On examination child was conscious, cooperative and well oriented to time place & person with flexion at elbow

and extension at hip, knee and ankle joint on right side with circumductive gait. Child was hemodynamically stable. There were no neurocutaneous lesions over body. On central nervous system examination LMN type facial nerve palsy in the form of deviation of mouth to right, absent nasolabial fold on left side and not able to frown left eyebrow was noticed. Power in right upper and lower limb was 3/5 with increased tone in right upper and lower limb. Deep tendon reflexes in right upper and lower limb were exaggerated along with up going plantar on right side. Patient admitted with the clinical diagnosis of right hemiparesis with left LMN facial palsy with lesion at the level of brainstem. On routine investigation CBC, LFT, coagulation profile, Hb electrophoresis 2D echo and workup for tuberculosis done which turned out to be normal. MRI of brain demonstrated abnormal signal intensity of pons and mid brain with diffuse engulfment of basilar artery and compression of 4th ventricle with mid diffusion restriction and ring enhancement pattern in bilateral CP angles suggestive of diffuse intrinsic pontine glioma (Fig. 1 and 2). Parents of patient opted for palliative care after knowing about prognosis of disease at higher Centre. As the disease progresses over next two weeks there were features of raised intracranial pressure with hydrocephalous formation. Anti-raised ICP measures started with ventriculo-peritoneal shunting done. Patient died within one month.

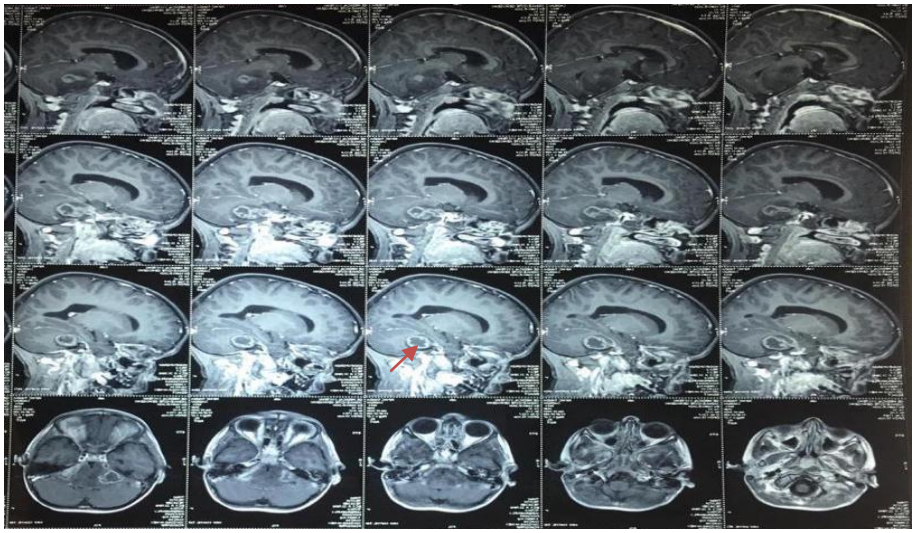

Fig. 1

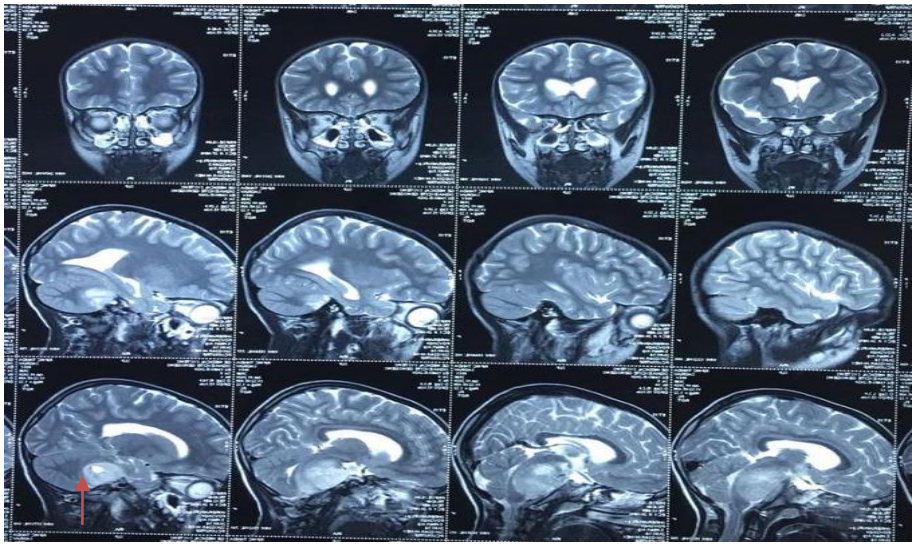

Fig. 2

DISCUSSION

DIPGs characterized by diffuse, infiltrating grade II-IV glioma and associated with a poor outcome independent of histologic diagnosis[1]. DIPG is a low-prevalence, aggressive, and high-grade neoplasm that affects the pediatric population. It is considered one of the leading causes of death in children with brain tumors, and corresponds to 70%–80% of all infratentorial tumors in children and 15% of all brain tumors[3]. Gliomas are classified based on the location and appearance of the lesion. They can be located in the mesencephalic tectum, pontine tegmentum, or bulbous or cervicomedullary junction, and can be of intrinsic or exophytic appearance[4]. The classic presentation includes a triad of neurological signs in which there is involvement of the long tracts; cranial nerves, usually VI or VII abnormalities; and cerebellar ataxia and cerebellar signs for no more than 1 month[16]. Children suffer from pain, fatigue, depression, nausea, vomiting and seizures[17]. It is possible for children to exhibit changes in mood and irritability, increased intracranial pressure secondary to obstructive hydrocephalus resulting from enlarged protrusion, or gelastic seizures[18]. Biopsy in children in whom MRI shows DIPGs is controversial and is not recommended unless there are atypical radiographic findings suspicious for another diagnosis[1]. So despite the re-emergence of diagnostic biopsy over the past decades, DIGPs remains largely a clinical diagnosis based on characteristic features on conventional MRI[10,11]. In magnetic resonance imaging, DIPG is characterized as a large, hypertrophic, expandable intra-axial mass in the brainstem, hyperintense on T2-weighted images (T2WIs) and in fluid-attenuated inversion recovery, and hypo/iso-intense on T1-weighted images[4,12]. Clinical characteristics in the form of stereotypic acute neurologic symptoms are sometimes used with imaging to define typical DIPG, yet these characteristics too are variable and are rarely used as eligibility criteria in modern clinical trials[5,6,7]. From genetic analysis carried out with samples taken from autopsies and rarely from biopsies, three subgroups of pediatric DIPG have been identified, which are very similar to the mesenchymal, proliferative, and proneural groups. Other additional subgroups have been applied to this tumor, such as N-myc proto-oncogene, Hedgehog, and platelet-derived growth factor receptor A[14]. Molecular profiling of DIPG has resulted in a newly defined pathologic entity, H3 K27M–mutant diffuse midline glioma (DMG), which represents approximately 80% of radiographically recognized DIPG[8,9]. The dysregulation of H3K27 methylation was added to the classification of tumors of the nervous system of the World Health Organization for the histological diagnosis of DIPG[15]. These tumors are amenable to surgical resection. This diffuse enlargement of the pons can compromise the surrounding structures such as the basilar artery by enveloping it, submerging it, or displacing it completely or partially because it is common to characterize it exophytically toward the prepontine cistern or sometimes dorsally to the fourth ventricle, causing hydrocephalus that may require shunting[12,13]. In DIPG therapy, fractional focal radiotherapy has been the only effective therapeutic tool. Sessions are administered for 6 weeks with a total dose of 54–60 Gy that has shown good, but brief, clinical response and neurological improvements in about 70% of children undergoing this procedure[19]. So the standard treatment approach has been radiotherapy and the best median survival with this treatment is 12 months. High dose chemotherapy has not been of survival benefit in these patients[1].

CONCLUSION

DIPGs account for about 80% of brainstem tumors. They are generally characterized by diffuse infiltration that symmetrically expands the anatomical structure of the affected site. Among the central nervous system gliomas, DIPGs

have the worst prognosis. Patients evaluated with typical findings of this type of tumor are not routinely biopsied; their classification is based on the clinical picture and MRI. Its treatment is based largely on radiotherapy, which achieves a survival of 8-10 months. A deeper understanding of diffuse pontine gliomas is shedding light on therapeutic targets in the micro environment of the children brain survival. It is the hope that these advances will lead to targeted therapies and improved.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms regarding images and other clinical information to be reported in the journal.

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