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A Case Report on Cerebellar Astrocytoma

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ABSTRACT:
Background: The majority of other brain tumors have a worse prognosis than cerebellar astrocytomas because they are often histologically benign and amenable to considerable resection. A quarter to a fifth of all pediatric brain tumors is cerebellar astrocytoma. Even though childhood cancer is rare, brain tumors are the most common form of the disease, followed by leukemia and lymphoma.
Case Presentation: Parents brought their 10-year-old child with complaints of occipital headaches for the previous five days, watery eyes for the previous five days, and wobbling while walking for the previous three days. He had already vomited for a day. The vomiting was not projectile and included only food particles, and the headache was occipital rather than radiating. At the time of the assessment, the patient's vital signs were stable, and the CNS examination revealed facial nerve palsy, horizontal and vertical nystagmus, planter's extensor rigidity, and 4/5 power in all four limbs. On fundus inspection, there were no indications of papilledema. A previous report on the patient suggested a brain stem tumor or another disease filling space. The patient received oral permission before beginning injections of ceftriaxone, phenytoin, mannitol, and musette. The call for neurosurgery has ended. In the previous six days, they noticed a suboccipital headache, and in the previous eight days, they noticed unbalance when walking. Cerebellar symptoms, nystagmus, and LMN grade 3 facial nerve palsy were noted. advised MRI brain plain They and contrast with neuronavigational sequencing. MRI brain was repeated at AVBRH which was s/o heterogeneously enhancing altered signal intensity lesion involving left cerebellar hemisphere, cerebellar peduncles, pons, extending into a left cerebellopontine angle with mass effect as described above cerebellar astrocytoma. The patient developed progressive difficulty in swallowing so feeding was started through a

nasogastric tube. Inj. hydrocortisone was started. On 12/12/21 patient had severe respiratory distress and one episode of bradycardia associated with desaturation. The patient was intubated and kept on the mode of ventilation. The patient was having cold peripheries and the bp was low. Inj. hydrocortisone Inj. metronidazole was started. A review neurosurgical call was done. They advised no active neurosurgical involvement till the patient stabilized. The patient had weak pulses and low BP. So, a 3%nacl drip was started, and Inj. vasopressin was increased to 0.0004mcg/kg/min. The central line was inserted and intracranial pressure was increased which is 17mmHg. Sodium levels were monitored. Repeat sodium came to 164 so a 3% NaCl drop was omitted.**Conclusion:**Patient received symptomatic treatment and the patient's prognosis was poor.

Keywords: BrainTumor,CerebellarAstrocytoma,CognitivePerformance,Neurosurgery,Hydrocortisone, Facial Nerve Palsy.

INTRODUCTION:

The brain cells known as astrocytes can develop into tumors known as astrocytoma. Cerebellar astrocytoma start in the cerebellum, which is located at the lower posterior of the brain.[1] The cerebellum is the region of the brain responsible for controlling posture, balance, and movement. Tumors called cerebellar astrocytoma develop in the cerebellum, a part of the brain located close to the base of the skull where muscle coordination and balance are controlled.[2]On a scale from one to four, the World Health Organization assigns a grade to tumors. The grade describes how quickly a tumor grows and how likely it is to spread to surrounding tissues. Eighty percent of cerebellar astrocytomas are low-grade tumors, which means they grow slowly and rarely spread. Cerebellar high-grade astrocytomas are uncommon, although they can grow swiftly and spread. Depending on the tumor's location and other factors, different symptoms may be present. Cerebellar astrocytomas can obstruct the flow of cerebrospinal fluid (CSF), which covers and shields the brain, as they enlarge.[3] The obstruction may cause hydrocephalus, which would raise intracranial pressure. Elevated intracranial pressure can cause headaches, especially in the morning, as well as vomiting, nausea, neck pain, and dizziness. The most typical symptom of cerebellar astrocytomas is a headache when you first wake up. [4]

When a suspected brain tumor is removed from the skull and brain tissue is sampled with a needle, a biopsy is carried out. The tissue is examined under a microscope by a pathologist to look for cancerous cells. If cancer cells are found, the surgeon will proceed with the same procedure while removing the maximum amount of tumor that can be physically removed. [5]

Cerebellar astrocytoma does not runin families. Several genetic disorders, including type 1 neurofibromatosis, increase the risk of developing these tumors (NF1).

Treatment options for cerebellar astrocytomas vary depending on the tumor's location and the severity of its symptoms. Neurosurgeons will examine the tumor in a patient before developing a personalized treatment strategy. In a typical procedure, a neurosurgeon first performs a craniotomy before removing the majority of the tumor. Most patients, especially those with low-grade tumors, are cured by this surgery alone. astrocytoma in the cerebellum. Most individuals with hydrocephalus have symptom relief after having the tumor removed because it restores normal CSF flow. A neurosurgeon may also advise radiation therapy, chemotherapy, or both for some individuals to treat any residual tumor or stop it from returning.[6]

PRESENTATION OF CASE

A 10-year-old child was brought by parents with complaints of occipital headache for 5 days, watering of eyes for 5 days, and swaying while walking for 3 days. He also had a history of vomiting for 1 day. Headache was occipital non-radiating and vomiting was non-projectile and containing only food particles. On examination, the patient was vitally stable with CNS examination showing clasp knife rigidity, 4/5 power in all four limbs, planter's extensor, and horizontal and vertical nystagmus facial nerve palsy. No signs of papilledema were present on fundus examination. The patient had an old report which was suggestive of a space-occupying lesion in the brain? brain stem glioma. The patient was orally allowed and started on Inj. ceftriaxone, Inj. phenytoin, Inj mannitol Inj. pan and InjEmset. A neurosurgery call was done. They observed suboccipital headache for 6 days with imbalance while walking for 8 days. LMN grade 3 facial nerve palsy and cerebellar signs and nystagmus were observed. They advised MRI brain plain and contrast with neuronavigational sequencing. MRI brain was repeated at AVBRH which was s/o heterogeneously enhancing altered signal intensity lesion involving left cerebellar hemisphere, cerebellar peduncles, pons, extending into a left cerebellopontine angle with mass effect as described above cerebellar astrocytoma. The patient developed progressive difficulty in swallowing so feeding was started through the nasogastric tube. Inj. hydrocortisone was started. On 12/12/21 patient had severe respiratory distress and one episode of bradycardia

associated with desaturation. The patient was intubated and kept on the mode of ventilation. The patient was having cold peripheries and the bp was low. Inj. hydrocortisone Inj. metronidazole was started. A review neurosurgical call was done. They advised no active neurosurgical involvement till the patient stabilized. The patient had weak pulses and low BP. So, a 3%nacl drip was started, and Inj. vasopressin was increased to 0.0004mcg/kg/min. The central line was inserted and intracranial pressure was increased which is 17mmHg. Sodium levels were monitored. Repeat sodium came to 164 so a 3% NaCl drop was omitted. The patient's condition is poor.

DISCUSSION

Surgical resection is the first-choice course of treatment, a claim stated by Harvey Cushing and upheld up until this point. The surgeon must pursue a complete resection. The majority of cerebral and cerebellar hemisphere lesions are capable of performing this function. This will frequently be impossible for lesions that are deeply seated, such as those that affect the optic pathway, the hypothalamus, or the brainstem. Therefore, pilocytic astrocytomas have a favorable prognosis when completely removed. The difficulty in treating malignant cancers stems from the patients for whom complete tumor removal is not practical. This issue arises in cerebellar tumors when the tumor has invaded the brainstem; at that point, complete excision is not always feasible. Optic pathways, the hypothalamus, or the basal ganglia pilocytic astrocytomas are rarely completely reputable. Therefore, only 43% of patients with chiasmal gliomas in one study with 28 patients survived for twenty years.[7]

The amount of potential for surgical resection has a key role in the prognosis of a patient with pilocytic astrocytoma. Older investigations have shown that tumors and their remnants may remain dormant for many years (16,18,27,40). (16,18,27,40). Therefore, the neurosurgeon is faced with a difficult choice: undertaking the risk of medically induced neurological impairment when striving for entire tumor removal on the one hand, or forgoing risky surgery and accepting the remaining tumor on the other. The treatment of tumors in deep-lying regions of the brain, such as the brainstem, hypothalamus, and optic chiasm, is where this problem is most common, as was previously indicated. Regarding the appropriate course of action for these individuals, various neurosurgical clinics have divergent views. These can be extremely surgically aggressive or firmly expectantly conservative. The possibility that remaining cancers could advance, perhaps even quickly, serves as justification for aggressive therapy (55,56). The frequent observation of benign and dormant behavior of the residual tumor is a driving force behind opponents of the contrary viewpoint. Similar conflicting views exist on the use of other treatment methods because it is unknown how effective chemotherapy and radiation therapy are. We don't know how the leftover tumor will behave, which is primarily what gives rise to these dualistic viewpoints.[7-15]

The World Health Organization (WHO) has classified astrocytomas into four groups depending on the rate of their growth and propensity to infect nearby brain tissue. The growth of non-infiltrating astrocytomas is often slower than that of infiltrating ones. The prevalence of diffuse or infiltrating astrocytes is higher than that of non-diffuse astrocytes. Adult patients with them often have them more often in one of their brain hemispheres, and men typically have them more frequently. In young people, the brain stem and cerebral hemispheres are both impacted. It can occasionally be difficult to distinguish astrocytomas from oligodendrogliomas, tumors made up of oligodendrocytes. These tumors come under the group of infiltrating gliomas. Mixed oligodendroglioma-astrocytoma describes some infiltrating gliomas (oligoastrocytoma). 8 One of the researchers discovered that more than 70 years ago, pilocytic astrocytomas (PAs) were identified as a distinct clinical entity. They have a collective 10-year survival rate of over 90% and are generally benign (WHO grade I). Rarely do they develop into new malignant gliomas; the majority only need to be surgically removed. While the majority exhibit traditional morphology, some challenging cases resemble other gliomas, some of which are malignant and necessitate prompt medical intervention.[16-21] Nearly nothing was understood about the molecular processes underlying their formation until recently is now known to be a single-pathway disease because high-throughput sequencing techniques used to investigate the entire genome have made it clear that particular aberrations in the mitogen-activating protein kinase (MAPK) pathway are entirely to blame for the condition almost uniformly. The most typical method involves the tandem duplication of a 2 Mb-fragment of 7q, which causes the fusion of two genes and the synthesis of a transforming fusion protein made up of the kinase domain of BRAF and the N-terminus of KIAA1549. Infrequent fusion partners and additional BRAF V600E, KRAS, and NF1 mutations are other anomalies of the MAP-K pathway that have been identified. Other tyrosine kinase growth factor receptors on the cell surface, like FGFR1, as well as anomalies in the MAP-K pathway, are among these abnormalities. Although the KIAA1549-BRAF fusion occurs everywhere, the frequency of the multiple other mutations discovered varies in PAs that develop in various brain areas. Sadly, almost all of the mutations found have been reported in other types of brain tumors, albeit some of them still have useful diagnostic potential. The difficulties of potentially employing these molecular abnormalities

to establish a diagnosis of PA when the histopathological findings are ambiguous or to choose the most appropriate course of treatment for a specific patient will be explored.[9]More research is therefore required to pinpoint risk factors for both neurological problems and learning challenges as well as to create effective therapeutic plans. To convey our findings, we intend to conduct additional research on language, motor skills, cognition, and academic performance.[22-30]

CONCLUSION

Cerebellar astrocytomas account for 15–25% of all pediatric brain tumors. Even though childhood cancer is uncommon, brain tumors are the most frequent form of the disease, followed by leukemia and lymphoma. For kids who were treated for low-grade astrocytomas, the long-term functional prognosis was positive. However, some patients claim that they experience neurological issues and learning challenges that are not addressed in the classroom. Therefore, it's critical to pinpoint those who require more extensive medical and cognitive follow-up plans that include in-school therapies.

CONFLICT OF INTEREST: NO

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