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Anaesthetic Management of a two year old child for posterior fossa tumor surgery of brain

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Abstract: Brain tumors are an important cause of cancer-related deaths in children; however the survival rates of pediatric brain tumor patients have significantly improved over the years due to developments in diagnostic techniques, neurosurgery, chemotherapy, radiotherapy, and supportive care. Medulloblastoma is the most common embryonal tumor in children. Patients with medulloblastoma are often staged as average-risk or poor –risk on the basis of clinical findings. In this article we have reported a case of medulloblastoma in a 2 year old child presenting with the chief complaint of cerebellar ataxia and its successful anesthetic management during surgery.
Keywords: medulloblastoma, brain tumors, cerebellar ataxia, embryonal tumor.

INTRODUCTION

Medulloblastoma is a form of brain cancer that mainly arises during infancy and childhood [1]. Being the most common malignant embryonal CNS tumor of childhood, medulloblastoma is likely to be composed of biologically different subsets of tumors arising from progenitor and/ stem cells of the cerebellum. At least five different histological sub-types of medulloblastoma have been recognized by the World Health Organization. The response to the therapy possibly depends on the tumor's cell of origin and the cellular pathways active in tumor development and growth [2]. By definition, Medulloblastomas which arise in the posterior fossa, are conventionally stratified on the basis of clinical parameters, such as extent of tumor at the time of diagnosis and completeness of surgical resection, into average-risk and high-risk (poor prognosis) disease [3]. For children older than 3 years with non-disseminated disease and for partially resected "high-risk" disease, standard therapy includes both treatments with radiotherapy and adjuvant chemotherapy. Five-year disease free survival rates of 80% or more have been reported [4]. However, for infants and children younger than 3 years with medulloblastoma the treatment remains highly problematic. In the present article we have discussed a case of medulloblastoma in a 2 year old male patient along with its anesthetic management pre-operatively, intra-operatively and post-operatively.

CASE REPORT

A 2-year-old- boy presented with the chief complaints of imbalance while sitting, inability to stand and walk along with other delayed mile stones as described by his parents. They also complain of nausea and vomiting for last one week. Physicial examination of the child revealed a round to ovoid shaped swelling present at the occiput of the head, lower limb power grade was II along with inability to sit, stand and walk without support. Thus a provisional diagnosis of posterior fossa tumor was given. Patient was subjected to MRI brain with spectroscopy which revealed a 6.4 x 5.2 x 5 cm sized enhancing lesion suggestive of Pilocytic Astrocytoma/ Medulloblastoma.(Figure 1) Thus the treatment plan formulated was posterior fossa craniotomy with excision of the lesion under general anesthesia. Pre-operatively, weight of the patient was11 Kg, his vital signs were: HR- 94/min, B.P. 90/40 mmHg, airway assessment was normal and other hematological and biochemical investigations were within normal limits. So, the patient was posted for surgery the next day.

On the day of surgery intravenous (i.v.) access was secured by 22G canula. Patient was premedicated with i.v. atropine 0.02mg/kg, i.v. ondensetron .1mg/kg and i.v. Midazolam .03mg/kg. General Anaesthesia was induced by giving i.v. fentanyl 1microgram/kg, thiopentone 5mg/kg and i.v. vecuroniom 0.1mg and incubated with ET-Tube size no. 4.5 and secured by

adhesive tape. A right subclavian central line was secured. The Patient was given prone position and proper padding of pressure points and protection of eyes were done.(Figure 2) Intra operative anaesthesia was maintained with 2 microgram/kg/hr fentanyl, Oxygen 30%, N2O 70% and inhalational agent Isoflurane at 0.4%. Intra-operative monitoring was done with Etco2, ECG, NIBP, and Pulse oximeter, HR, CVP and Temp. Fluid Management was done with 6ml/kg/hr infusion of normal saline (NS). After two hour of surgery, the patient was reversed by i.v. neostigmine 50mcg/kg and i.v. glycopyrolate 10mcg/kg. Recovery was uneventful; Patient was extubated once he responded to commands and opened his eyes with good respiratory efforts. Then the patient was shifted to ICU for close observation. The whole of the resected mass was sent for histopathological examination which confirmed the diagnosis of medulloblastoma.

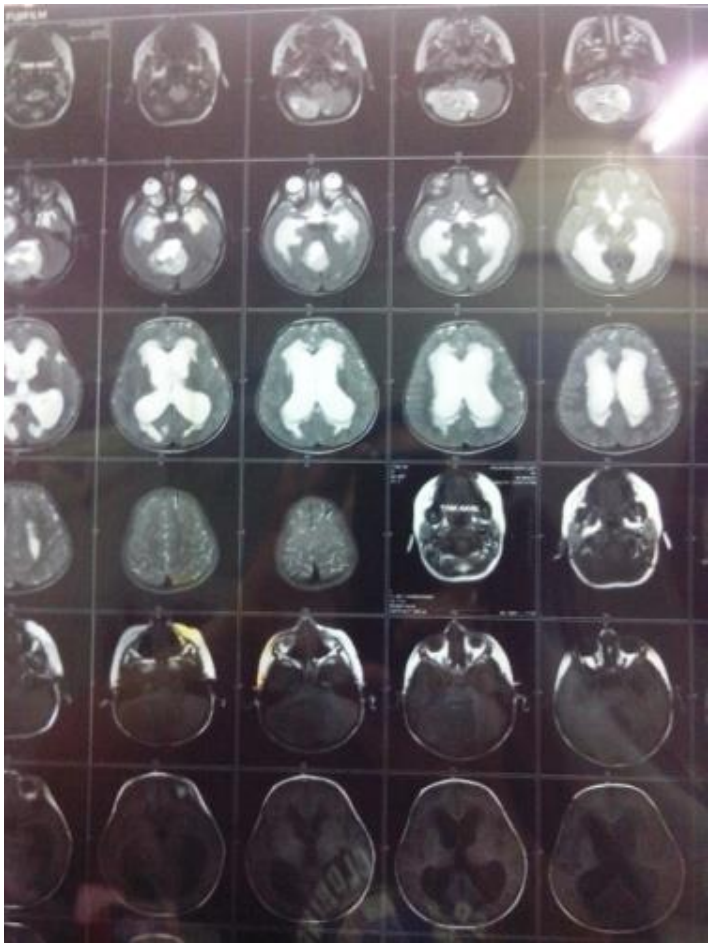

Fig 1: MRI brain with spectroscopy showing a 6.4 x 5.2 x 5 cm sized enhancing lesion

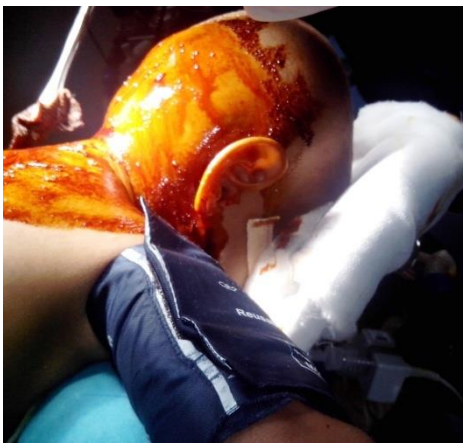

Fig 2: Prone position of the patient and proper padding of pressure points and protection of eyes done

DISCUSSION

Medulloblastoma, first described by Bailey and Cushing, is a primitive neuroectodermal tumor. It is the most frequently occurring primary brain neoplasm in childhood. Approximately 50% of these tumors occur in children younger than five years of age, as was seen in the present case; but are rare in adolescents and young adults. Medulloblastoma behaves differently in adults than in children, and is identified as a different biological and clinical entity altogether [5]. Cerebellar hemorrhage is an extremely rare initial clinical presentation of medulloblastoma; however, medulloblastomas usually cause cerebellar ataxia and acute hydrocephalus owing to their increase in size [6]. Similarly in the present case also cerebellar ataxia was the chief clinical presentation of the patient, but hydrocephalus was not present.

The significant feature of the present case was the occurrence of a medulloblastoma in the posterior fossa of a boy of 2 years of age. Medulloblastoma is considered to be a rare tumor of infants, which is not common below 3 years of age [7]. A central nervous system malignancy comprises 13% of infant cancer with an average annual incidence rate of approximately thirty per million infants, out of which, medulloblastoma accounts for five per million infants. Also, the average annual incidence of occurrence is twice as frequently in male than female. In the present case also the patient was male. The peak incidence of occurrence in children is usually between 5-10 years of age group [8], in contrast to this, the age of the patient in the present case was 2 years. Patients with medulloblastoma present with a combination of signs and symptoms of increased intracranial pressure and cerebellar dysfunction evolving over a period of weeks to a few months. In the present case, the patient had delayed mile stones which included inability to sit, stand and walk without, along with acute onset of nausea and vomiting over last one week.

Current therapy for this disease includes maximum surgical resection, whole neuraxis radiation and chemotherapy [8]. In the present case, posterior fossa craniotomy with excision of the lesion under general anesthesia was done and radiotherapy was planned as the next step of treatment. The prognosis of medulloblastoma in children under three years of age is poor, because of the high morbidity of radiotherapy in children under three years old. Inspite of the aggressive treatment, only about 60% of children with medulloblastoma are cured and most of them usually suffer from the long term long-term side effects of radiotherapy. One of the studies reported in literature showed that the children who survived medulloblastoma suffered a loss of normal-appearing white matter, an associated decline in intellectual function and long term endocrinal deficiencies [9].

CONCLUSION

The perioperative management of pediatric neurosurgical patients presents many challenges to neurosurgeons as well as anesthesiologists. Many conditions are unique to pediatric patients. Thus, thorough preoperative evaluation and a basic understanding of age-dependent variables and the interaction of anesthetic and surgical procedures are essential in minimizing perioperative morbidity and mortality. This article highlights a unique case of medulloblastoma in a 2 year old male patient along with its successful anesthetic management.

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